A Tribute to Donald M. Britton (1923–2012), Canada's Premier Pteridologist

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"Do you know what you have here, man?" When Donald Britton, one of the world's foremost pteridologists, got that excited about a specimen, you knew that an adventure was about to begin.

Don (Figure 1) enjoyed a long, exceptionally productive career at the University of Guelph specializing in the cytogenetics and systematics of ferns and fern allies. In addition to building the pteridophyte collection in the University of Guelph herbarium (OAC) (Thiers 2012) to world-class status and conducting a large body of scientific research that generated an impressive bibliography (appended), he inspired a whole community of academic and applied researchers. Subsequent investigations of fern distribution, taxonomy, genetics, and ecology were taken to heights never before seen in Canada.

Don benefited from an early exposure to the natural world at a beloved family cottage on an island in Portage Lake (Gordon Bay) in the District of Parry Sound about 125 km north of his Toronto, Ontario, home. He spent entire summers there as a child. Whether hiking with his cousin under the supervision of his uncle Jock (Charles) Stewart, who informed the lads about the identification of the flora, or exploring the "wilderness" of the family island on his own, Don learned instinctively to be comfortable in the natural world (John Beverly Clark, personal communication, 28 July 2012). Until the end of his life, Don retained a close relationship with the natural world and spoke affectionately of Portage Lake, almost as if it were a lifelong friend.

Donald MacPhail Britton was born in Toronto on 6 March 1923, the youngest son of Arthur Britton and Marjorie Spence. He endured a bout of tuberculosis as a child and wiled away many hours during his recovery examining seed catalogues. His cousin, John Beverly Clark (personal communication, 28 July 2012), suggests this greatly encouraged his already budding interest in horticulture and plants. Don maintained a magnificent garden throughout his adult life.

He was schooled locally, completing an undergraduate degree in biology and science in 1946 at the University of Toronto. He did graduate work at the University of Virginia, achieving his Ph.D. in 1950 with a thesis entitled "Cytogenetic studies on the Boraginaceae" (Catling 2003). Thereafter, he was a post-doctoral fellow in the Department of Plant Sciences at the University of Alberta for a year (Britton 1953) and spent five more years as an Assistant Professor of Horticulture at the University of Maryland, working on *Rubus* (Catling 2003). Even in those early days, he had established a reputation for working on "impossible groups" of plants (Mainguy 2007), a research challenge that remained with him throughout his career.

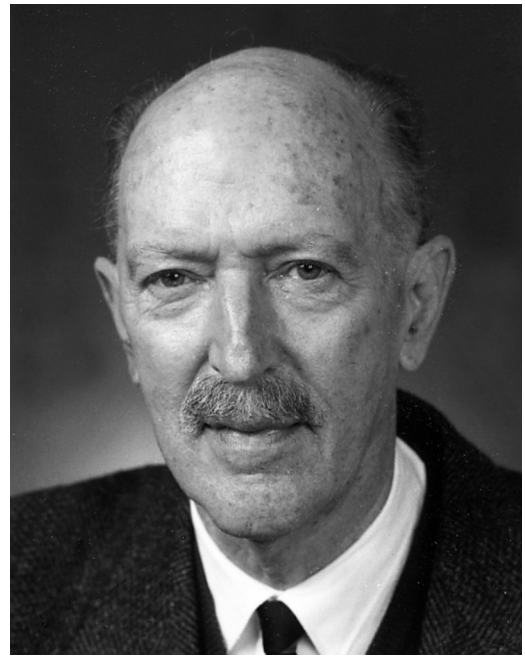

FIGURE 1. Donald M. Britton (1997). Photo courtesy of Robert Britton.

Precisely when his interest in pteridophytes developed is unclear, but it was evident early in his academic career. He published his first paper on ferns in 1953. He was inspired to undertake a cytological study of southern Ontario ferns by British scientist Irene Manton (1904–1988), who pioneered the use of staining and squash techniques and later employed the new electron microscopy technology to produce greatly enhanced

images of fern chromosomes (Preston 1990). In documenting her findings, she included cytological data on European populations of species also present in southern Ontario (Manton 1950). Don refined her techniques for his Canadian studies, producing cytological images with previously unknown efficiency and clarity. Not surprisingly, Portage Lake was the source of some of the plant material (e.g., Fragile Fern (*Cystopteris fragilis*)) for his initial pteridophyte publication.

Don joined the Department of Botany (later, Department of Botany and Genetics) at the University of Guelph in 1958, becoming a full Professor in 1971 and Professor Emeritus upon his retirement in 1988. In her eloquent address at Don's memorial service, former student Kathleen Pryer of Duke University described him as a teacher and supervisor, noting that he:

> was extremely generous with his time and very patient with students, and he showed us through his example how you need to put in the long hours to get those perfect chromosome squashes, and to locate those hard-to-find ferns when doing field work. It was a natural talent for him —it was as though he had special radar in the field for finding the ferns that we were after. One does not learn how to do that from books, but by watching and observing, if you are fortunate to be with someone who has the "know how"… I [am] reminded not only of his very special sense of humour, but also how he was always gently encouraging me to move beyond my comfort zone—to get my work published and to move on, to not "stew about things" or be so "fearful".

Don was proud of his students and followed their progress closely, likely none more than Kathleen Pryer, who appropriately enough at the time of his death was President of the American Fern Society.

In his professional undertakings, he took a biosystematic approach, combining his various laboratory tools with direct and typically first-hand field experience. His use of this combination of investigative methods led frequently to valuable insights into the systematics of some of the most complex and seemingly inscrutable of fern groups. He became a world authority on the taxonomy of genera such as *Dryopteris, Polypodium, Woodsia, Pellaea, Polystichum,* and *Isoetes*. Unravelling the complexities of such groups typically followed the same path: first ferret out the taxonomic basics (find the diploids), then work towards the complexities (the polyploids), and let the exceptions (hybrids) help to establish the boundaries between species.

His work with hybrids in several fern genera was ground-breaking and led to two particularly notable "Do you know what you have here, man?" moments. The first was in the early 1970s, when he immediately identified the strange woodfern (*Dryopteris*) that Paul Keddy and I found in Algonquin Provincial Park, Ontario, as a hybrid involving Fragrant Wood Fern (*Dryopteris fragrans*) as one of the parents. By then, Don was a well-established authority on the complex genus *Dryopteris*, which was also being studied extensively by the prominent U.S. botanist Warren (Herb) Wagner Jr. and others. Hybrids that involved all other widespread species of *Dryopteris* in North America had been found and described. Don and Herb were in a (mostly!) friendly competition to find the missing link and now Don had it. As we developed and refined our investigation, Don admonished us to keep news of this under our hats in case "others" got wind of it and might be tempted to rush similar findings into publication. The idea that botanical taxonomists could think like Yukon prospectors staking gold claims in the dead of night was a revelation to us, but we kept quiet.

Soon enough, a letter arrived from Herb Wagner speaking of rumours of a *Dryopteris fragrans* hybrid found in our neck of the woods. There followed an exchange of uninformative "weather's fine; wish you were here" responses to Herb's bundles of reprints, specimens, and information that arrived as incentives to loosen our tongues. We managed to keep the confidence, however, until the description of the Algonquin Woodfern (*Dryopteris* × *algonquinensis* D. M. Britton) was in press (Britton et al. 1975) (Figure 2). Such intrigue!

The second "Do you know what you have here, man?" moment occurred years later and with considerably fewer cloak and dagger elements. It began in 1988, with an Ottawa River *Isoetes* specimen I sent Don to be deposited in the OAC herbarium and for his verification. He immediately recognized it as a hybrid —the existence of such entities in *Isoetes* only having just been discovered. We eventually described it as Dodge's Quillwort (*Isoetes* × *dodgei* Eat.) (Britton and Brunton 1989)… and the floodgates opened. When you started a project with Don, you had to be ready to be inundated with letters, papers, photos, specimens, and thoughts of all kinds, and to be prepared for the project to veer off into other directions, most undertaken simultaneously. In the preceding years, Don had begun to unravel the cytological and morphological mysteries of the exasperatingly difficult aquatic lycophyte genus *Isoetes* with graduate student Laima Kott (e.g., Kott and Britton 1983). Work on the *I.* × *dodgei* hybrid opened many leads, and from the late 1980s, as our journey led us in new and unexpected directions, Don and I became increasingly fascinated (obsessed?) with the genus.

He was deliberate and thorough in his leadership of these investigations. Following our comprehensive reviews of thousands of herbarium specimens to identify populations of possibly undescribed taxa from various parts of North America, I would then conduct field searches for living plants. These field explorations were almost always conducted in concert with skilled field botanist Karen L. McIntosh and were focussed in

FIGURE 2. At the site of the Algonquin Woodfern, 15 June 1975 (left to right: Daniel Strickland, Paul Keddy, Daniel Brunton, Don Britton, Tony Reznicek). Photo: D. F. Brunton.

areas particularly rich in species of *Isoetes* in western Canada, the Maritimes, and the southeastern United States. When searches were successful and target plants had been secured, we would pass the living material to Don, who then applied his cytological expertise, real-world experience, and scholarly insight to unravelling or confirming what we had brought back.

Over a period of two decades of such investigation, "the book" on quillworts was practically rewritten. Within a few years, he had us studying and writing about *Isoetes* taxa from across North America and from Europe, Asia, and even New Zealand. At one point, I flippantly noted that we were studying 34 of the 30 known species of *Isoetes* in North America. Over 30 scientific papers and 17 new taxonomic descriptions resulted. Remarkably, all of these papers were published after Don had officially retired. A detailed listing of his many taxonomic innovations and redefinitions is provided in Pryer (*in press*).

Don never questioned that these investigations would be anything but joint efforts, even when his partner lacked an institutional affiliation or formal training. As with all his cooperative initiatives, he was completely unimpressed by one's title or position. If you shared his passion and had a measure of skill and determination, you were part of the team (Brunton and Catling 2012). This democratic attitude to research and to research associates encouraged the development of a large network of contacts within Canada and beyond. While he never became comfortable with the Internet, Don maintained an internet network scale of correspondents with whom he exchanged a steady flow of information, specimens, and insights. This not only contributed significantly to the growth of the OAC herbarium but also positioned him uniquely to address the ecological and distributional aspects of the Canadian pteridophyte flora in the definitive *Ferns and Fern Allies of Canada,* which he co-authored with Bill Cody in 1989 (Cody and Britton 1989).

It has to be said, however, that despite successfully managing such a large international communications network, Don was not always the clearest of communicators. His writing style was cryptic at times (most times!), often taking the form of a stream of botanical consciousness (Figure 3). I only half-jokingly observed that I developed a fuller understanding of the scope of particular projects we were working on when Don copied me on a letter he had sent to someone else explaining what we were doing! I think he assumed that his thoughts must also be occurring to you when you were working on the same project. He did not seem to realize that his insight and grasp of the subject might be several times deeper and quicker than yours. Flattering and intimidating all at the same time!

Don was known by everyone in the fern world. This was vividly demonstrated when I attended fern conferences with him in Toronto in 1989 and Montreal in 1997. He was a quiet-spoken and unassuming gentleman and moved very much in the quieter areas of those halls, leaving the more brightly illuminated, crowded areas to the more flamboyant participants, such as the aforementioned, always delightful Herb Wagner. We would be sitting quietly off to the side with Don occasionally punctuating the conversation with "Oh joy" in ironic reference to some new challenge that a speaker had just shared with the rest of us. But our conversations were constantly interrupted by a stream of botanists who just had to come over and express their

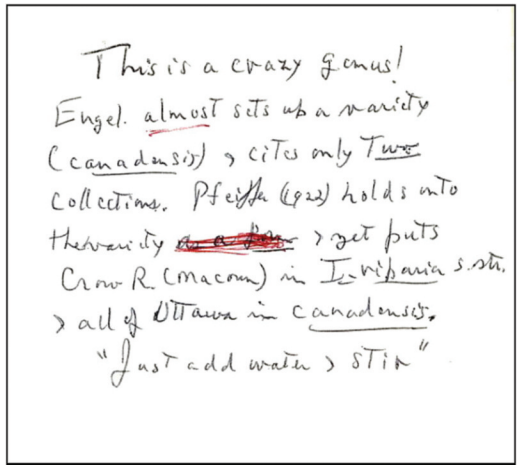

FIGURE 3. Britton marginal note: "This is a crazy genus! [George] Engel[mann] *almost* sets up a variety ([*Isoetes riparia*] *canadensis*) and cites only *two* collections. [Norma] Pfeiffer (1922) holds on to the variety… and yet puts [one of the two collections, the] Crow River [Ontario collection by] ([John] Macoun) in *I. riparia* s. str. and all of [the] Ottawa [River] collections in *canadensis*. "Just add water and stir".

delight in seeing him and thanking him for the various things he had done for them. He took this all in stride, just matter-of-factly mentioning some of the ways that he had assisted particular researchers with certain of their undertakings.

Appropriately, Don received many scientific accolades and honours in his lifetime. He was awarded the Lawson Medal by the Canadian Botanical Association in 1991. The citation for this prestigious award highlighted his work as a pioneering pteridophyte cytogeneticist and his effective direction of productive graduate students (Catling 2003). He was made an honorary member of the American Fern Society in 2001 for his extensive contributions to North American and global pteridophyte research in general and to *Isoetes* systematics in particular (Anonymous 2002). He also received the inaugural John Goldie Award for Field Botany from the Field Botanists of Ontario in 2007 in acknowledgement of his outstanding work as a field botanist, for contributing over 13 000 vascular plant specimens (the vast majority of these being pteridophytes) to the OAC herbarium, for his mentorship of both professional and non-professional botanical associates, and his service as an important resource person for many conservation initiatives across Ontario (Mainguy 2007). Similar achievements and contributions on a national scale were noted when he was made an honorary member of the Ottawa Field-Naturalists' Club in 2001 (Brodo et al. 2001). Don was a long-term member of the OFNC, joining in 1972.

He was a co-recipient of the Windler Prize in 1997 for the best paper published in the 1996 volume of *Castanea* (Tyndall 1997), on the clarification and redescription of *Isoetes virginica* Pfeiffer (Brunton et al. 1996). On the occasion of his 80th birthday in 2003, two issues of BEN (*Botanical Electronic Newsletter*) were dedicated to his achievements (Brunton 2003; Catling 2003; Ceska and Ceska 2003; Pryer 2003; Reznicek 2003), and an upcoming paper concerning *Cystopteris* and *Gymnocarpium*, genera of which Don was a keen student, is dedicated to his memory (Pryer, *in press*).

Don was humble about awards and tributes. He was, however, delighted to have several fern taxa named in his honour. In each case, his pleasure was heightened by having enjoyed a lengthy personal relationship and extensive research activity with one or more of the authors. Taxa named in his honour (all still recognized as originally described) are as follows:

Britton's Oak Fern *(Gymnocarpium* × *brittonianum* Sarvela) K. M. Pryer & C. Haufler),
Britton's Quillwort *(Isoetes* × *brittonii)* D. F. Brunton & W. C. Taylor, and
Britton's Male Fern *(Dryopteris filix-mas* spp. *Brittonii)* C. Fraser-Jenkins & C.-J. Widen.

I think he was particularly pleased that the endemic North American subspecies of the Male Fern (Figure 4) was named in his honour; he maintained several fine specimens of this handsome fern in his garden.

FIGURE 4. Britton's Male Fern (*Dryopteris filix-mas* ssp. *brittonii*), Cape Breton Highlands National Park, Nova Scotia. Photo: D. F. Brunton.

Even as Don was winding down his research activities, he remained generous with both his time and his botanical resources. He donated the majority of his rich fern library and thousands of scanning electron microscope images of *Isoetes* for my use, for example.

Unfortunately, Don was diagnosed with Alzheimer's disease in 2008. Despite this debilitating challenge, he retained his love of nature virtually to the end of his life. He was well and gently cared for by his family,

particularly by his delightful wife of 60 years, Mary Ann (neé Cronyn), until her death in 2010, and thereafter by his children. His son Robert moved into the family home in 2010 to allow Don to remain with his prized fern garden and comfortable, familiar surroundings. Don died of pneumonia on 18 May 2012 and his remains were subsequently interred in the cemetery of St. John's York Mills Anglican Church (Toronto). In addition to his son, Robert, he is survived by two daughters, Barbara and Anne (Terry Greenlay), and two grandsons, Ben and Scott Greenlay.

A Celebration of Life Memorial Service was held in Guelph on 28 July 2012 at St. George's Anglican Church, where he and Mary had been long-time members. Kathleen Pryer, Hugh Dale, and I were honoured to speak there of his scientific achievements and the esteem in which he was held in the botanical world. It is a measure of Don's humble nature that the significance of his scientific reputation was unknown to most of his long-time church associates in attendance that day.

In final reflection upon a great life and a great career, I am reminded once again of Don's question, "Do you know what you have here, man?" I sure do; in Donald Britton we had an internationally renowned botanist, the greatest fern authority Canada has known, an extraordinarily creative and inspiring researcher, and a loyal and generous friend. Of all those wonderful attributes, the last of these was perhaps the greatest.

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