Bill Dore's Notes on the Kaladar Cactus (*Opuntia fragilis*)

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The late botanist William G. Dore habitually left copious notes with his herbarium specimens and kept files on interesting plants while at the Biosystematics Research Institute of the Canada Department of Agriculture in Ottawa, Ontario. Analysis of his specimens, notes and letters regarding an isolated colony of Brittle Prickly-pear Cactus (*Opuntia fragilis*) from Kaladar in eastern Ontario led to the unfolding of a botanical story of discovery and rediscovery. This colony was first discovered in 1934, the location apparently lost and subsequently rediscovered in 1947, more or less neglected, and then brought to the attention of a wider circle of botanists in the mid 1960s. Attempts to determine its taxonomic identification were thwarted by the infrequency of flowering until the early 1960s.

Key Words: William (Bill) G. Dore, Brittle Prickly-pear Cactus, *Opuntia fragilis*, discovery, determination, Kaladar, Ontario.

The eminent Canadian plant biologist and naturalist, William (Bill) G. Dore, left a legacy of botanical contributions when he died in 1996 (*see* Darbyshire 1998). These included excellent herbarium specimens in the Vascular Plant Herbarium of the Biosystematics Research Institute in Ottawa (now called the Eastern Cereal and Oilseed Research Centre, Agriculture and Agrifood Canada), to which supplemental information had been routinely appended (Darbyshire 1998). Bill Dore's specimens with their added notations and his cactus files showed a particular personal interest in a remarkable disjunct colony of *Opuntia fragilis* (Brittle Prickly-pear Cactus) from a single rock outcrop, near Kaladar in eastern Ontario (*see* Beschel 1967b; Staniforth and Frego 2000). This population is approximately 1000 km east of the nearest part of the main range for the species, in Wisconsin (*see* distribution map in Staniforth and Frego 2000). The objective of this note is to explore Bill Dore's specimens, annotations, notes and letters on the Kaladar cactus in order to document the events surrounding its discovery, determination and possible origin.

Materials and Methods

Relevent specimens, letters, annotations and notes were obtained from two sources. Firstly, Dore generously provided a copy of his entire *Opuntia* file to K.A.F. in 1980 (Frego 1980*, Dore 1980*). Secondly in April 2000, W.J.C. retrieved materials from the herbarium file for *Opuntia fragilis* housed in the Vascular Plant Herbarium of the Eastern Cereal and Oilseed Research Centre, Agriculture and Agrifood Canada. Together, these consisted of four herbarium specimens (*MacClement 6372, Dore and Senn 47-671, Moore 2765, Dore 22811*) with their annotation labels, 11 letters sent by or to Bill Dore, two pages of typed and four pages of hand written notes. The specimens and written material spanned the years from 1934 to 1980. Collectively these items captured the history of the discovery of the colony, the determination of identification for the cactus species, and some of the thought that went into the consideration of the colony's origin. We organised photocopies of the items into a chronological sequence (*see* Documents and Specimens Cited section) and their information contents were linked to present a history of discovery for *Opuntia fragilis* in eastern Ontario.

Results and Discussion

Discovery

Local people knew of the cactus colony long before it was "discovered" by a professional botanist in 1934. According to Mary I. Moore of Deep River, Ontario (Moore 1965*, 1967*, 1973*), three generations of the Smedley family had known of its location since about 1905. On the other hand, and to the frustration of the researchers, directions to the site by locals usually turned out to be erroneus. For instance, David Brydson, the owner of a local hotel, was notably inaccurate regarding the colony's whereabouts and its flowering characteristics, even though he had transplants growing in his own garden (Dore 1947*, 1949b*,1967c*).

W. T. MacClement (Professor of Botany, Queen's University, Kingston 1906-1936; *see* Smallman et al. 1991) appears to have made the first botanical collection of the cactus in May 1934 (MacClement 1934*).

We have no information as to how MacClement became aware of the site. Claude Garton (Lakehead University) later recalled (Dore 1978*) that the event had been a Sunday field trip to the site for botany students from Queen's University. A pressed specimen was sent to Merritt Fernald at the Gray Herbarium, Harvard University, for identification. However, there is no record of any determination having been made by Fernald and it appears that the specimen was overlooked for the next 31 years. The MacClement field trip also resulted in living plants being cultured in the greenhouse at Queen's by MacClement and his successors R. O. Earl (Dore 1967c*) and A. Crowder (Crowder 1973*).

Apparently, unaware of the MacClement "discovery" and the existence of the Harvard specimen (Dore 1967a*), Dore and others continued trying to verify rumours that a wild cactus existed somewhere in southeastern Ontario (Dore 1947*). Herbert Groh (Department of Agriculture, Ottawa) and Dore, acting on erroneus directions by local people, searched the Kaladar area without success but may even have been as close as the opposite side of the road in 1942 (Dore 1947*). Jack Gillett eventually relocated the colony on 30 July 1947 (Dore 1947*) and informed Dore, who travelled to the site with Harold Senn during the following week and procured a specimen for the Biosystematics Research Institute (Dore and Senn 1947*). The site was next visited by Dore, Senn and Clarence Frankton (Department of Agriculture, Ottawa) on 17th August 1949 (Dore 1949b*).

The next recorded visit did not occur until 3rd May 1965 (Moore 1965*), when Mary Moore (Deep River, Ontario) collected a specimen. Coincidentally, in June 1965, Bernard Boivin of Agriculture Canada unexpectedly encountered the forgotten MacClement specimen while visiting the Gray Herbarium. He reported its existence to his colleague Bill Dore (Dore 1967a*). It appears that no one in Ottawa was aware of the existence of this early specimen, and its discovery must have been quite an exciting event. A photograph of the original Gray Herbarium specimen was soon accessioned into the Herbarium of the Biosystematics Research Institute (MacClement 1934*). This was likely to have been the stimulus behind renewed investigations into the cactus by Dore and others in the mid- and late 1960s (Dore 1966*).

On 30th May 1967, Dore, Roland Beschel (Queen's University, Kingston), Paul Maycock (Erindale College), Gunnar Wassen (National Herbarium, Ottawa) and probably others visited the site. Wassen took black-and-white photographs of the plants (Dore 1967b*) and the site (Figure 1).

FIGURE 1. A photograph of the Brittle Prickly-pear Cactus (*Opuntia fragilis*) site, near Kaladar, southeast Ontario taken by Gunnar Wassen during a field trip with W. Dore, R. Beschel, P. Maycock (and possibly others) in May 1967.

FIGURE 2. A photograph of cactus cladodes "attached to Paul Maycock's big boot" (Dore 1967b) taken by G. Wassen in May 1967 at the Kaladar site.

Later that same year, Beschel led the Canadian Botanical Association on one of its first field trips which included a visit to the cactus colony (Beschel 1967a*). In June 1967, Beschel published a description of the site and the cacti in the Quarterly Bulletin of the Kingston Naturalists (Beschel 1967). At the same time and perhaps unwittingly, Dore drafted a longer article and sent it to Beschel for review and possible co-authorship (Dore 1967c*). In his covering letter to Beschel, Dore recommended that an appropriate place for publication would be the *Ontario Naturalist*. This article was never published even though Beschel revisited the site in July 1967 to take more photographs and gather more descriptive information about the cacti and other plants at the site (Beschel 1967b*).

Determination

The identity of the Kaladar cactus appears to have been nearly as elusive as its discovery. This was likely attributable to its similarity to certain other species in the genus (such as *O. polyacantha*) and to the rarity of flowers in Kaladar plants. The MacClement specimen was originally determined as "*Opuntia*" in 1934 (MacClement 1934*). R. O. Earl of Queen's University sent the MacClement specimens to M. O. Malte (Chief Botanist, National Museum) for identification but the lack of flowers led to inconclusive results (Dore 1947*). During 1949, Dore wrote to cactus experts Elzada Clover (University of Michigan) and H. A. Shetrone (Ohio State Museum) to seek help with the identification process (Dore 1949a*, 1949c*; Meyer 1949*) but there is no documentation of any reply. In the 1950s and early 1960s, most specimens (Dore and Senn 1947*; Moore 1965*; Dore 1966*) were being labelled as "Opuntia (?fragilis) Haw." but the origin of this tentative determination is unknown as is the basis on which it was made. There seems to have been no uncertainty in the determination by the time that Beschel undertook his studies on the cactus in 1967 (Beschel 1967a*, 1967b*). All specimens that we examined had been confirmed with annotations as *Opuntia fragilis* (Nutt.) Haw. by Lyman Benson (Pomona College, Claremont, California) in April 1972 and by Bruce Parfitt (Arizona State University) in 1991.

Colony origins

Alternate hypotheses to explain the origin of this anomalous disjunct distribution have been developed by Beschel (1967b*), Dore (1967c*) and Staniforth and Frego (2000). The two hypotheses are: (1) human introduction at an unknown date, or (2) as a relict of a wider distribution during hypsithermal period, 8000-4000 years before present. Dore's documents in the late 1940s indicate that these hypotheses were already being formulated at that time; i.e., "Mr. Gillett is of the opinion that the cactus is introduced or escaped" (Dore 1947). At the Annual General Meeting of the Canadian Botanical Association (Vancouver, June 1980), Dore hypothesised that both *Lithospermum canescens* and *Opuntia fragilis* may have been purposely spread by aboriginal people because the former possesses a red dye whereas mucillage from stems of the cactus can act as a mordant for the dye. We were recently enlightened by Daniel Brunton of Ottawa (Brunton 2000*) of another of Dore's explanations: "The colonization road upon which the nearby highway was later constructed was put in when a 19th century gold rush occurred in the area just to the north (of Kaladar); this was, I believe, about the time that the California gold rush was winding down. It's not hard to imagine some western gold seeker unknowingly brought a pad along on his gear, only to have it fall or be broken off at the Kaladar site". In support of the relict hypothesis, Dore wrote that he, Clarence Frankton and Harold Senn had observed other associated species at Kaladar "which may indicate affinity with a more southern or western climatic area" (Dore 1949b*) suggesting that the cactus was part of a relict hypsithermal community. This second hypothesis is now thought to be less likely (Staniforth and Frego 2000), largely because closely associated species do not have western or southern affiliations as was originally proposed. However, some southern species reach their northern limits in the general region (Brownell et al. 1996).

Conclusions

The isolation of disjunct plant populations intrigued and challenged Bill Dore's imagination for explanations. The Brittle Prickly-pear Cactus

growing near Kaladar, in eastern Ontario: a population located more than 1000 km from the main range of the species is an excellent example of this. We can imagine that rumours of its existence amongst local people reached Bill Dore and other Ottawa (and Kingston) botanists, in the 1940s. The task of finding the colony (and perhaps the challenge of who would be the first to detect it!) resulted in several botanising expeditions, but it was Jack Gillett who eventually discovered the site. The hunt was then replaced by the challenge of formulating an acceptable, logical, ecological or historical explanation of its origins. Dore excelled at this. Darbyshire (1998) noted that "Bill is well known for his hypotheses of aboriginal and early European influences" when attempting to explain the unusual distributions of plants, but cautions, "Although many people have been quick to reject these explanations of present-day plant distributions, few have offered contesting hypotheses to explain 'how' and 'why'". Dore's letters, specimens and copious annotations allowed us to follow the events which led to the discovery, species determination and hypotheses of origin for this unusual population and in so doing, they have contributed an interesting aspect to the history of discovery of the Canadian flora (*see* Pringle 1995).

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Documents and Specimens Cited

(marked * in text), in chronological sequence

MacClement, W. T. 1934. Photograph of Herbarium specimen of *Opuntia fragilis*. Accessioned from Gray Herbarium. *Collection number: MacClement 6372* (DAO 269655).

Dore, W. G., and **H. A. Senn.** 1947. Herbarium specimen of *Opuntia fragilis. Collection number: Dore & Senn 47–671* (DAO 82191).

Dore, W. G. 1947. Two typed pages, signed and dated ("Fall 1947") and identified as "Re. 47.671". Attached to *Collection number: Dore & Senn 47–671* (DAO 82191).

Dore, W. G. 1949a. Letter to Dr. Bernard S. Meyer, Ohio State Unversity. Dated 4 April 1949.

Meyer, B. S. 1949. Letter to W. G. Dore. Dated 14 April 1949.

Dore, W. G. 1949b. Two hand-written pages, signed and dated ("Dec. 5, 1949"). Attached to *Collection number: Dore & Senn 47-671* (DAO 82191).

Dore, W. G. 1949c. Letter to Dr. Elzada Clover, University of Michigan. Dated 6 December 1949.

Moore, M. I. 1965. Herbarium specimen of *Opuntia fragilis. Collection number: Moore 2765.* (DAO 82194)

Dore, W. G. 1966. Herbarium specimen of *Opuntia fragilis. Collection number: Dore 22811.* (DAO 82193)

Dore, W. G. 1967a. Handwritten note dated (18 May 1967) and signed. Attached to *MacClement, W. T. 6372* (DAO 269655).

Beschel, R. E. 1967a. Field trip 1 to the Kingston region led by R. E. Beschel, Queen's University. Annual meeting of the Canadian Botanical Association. Ottawa. 30 May 1967. Mimeographed sheets.

Dore, W. G. 1967b. Letter to Dr. Gunnar Wassen. Dated 15 June 1967.

Dore, W. G. 1967c. Letter to Roland E. Beschel. Dated 18 June 1967. Attached to a rough draft of a 12 page manuscript "Rare Cactus in Ontario Wilderness by William G. Dore and Roland E. Beschel".

Beschel, R. E. 1967b. Letter to W. G. Dore. Dated 27 July 1967.

Moore, M. I. 1967. Letter to W. G. Dore. Dated 17 August 1967.

Moore, M. I. 1973. Letter to W. G. Dore. Dated 9 April 1973.

Crowder, A. 1973. Letter to W. G. Dore. Dated 17 April 1973.

Dore, W. G. undated (but post-1978). Hand-written note regarding visit to cactus area by Claud Garton and Prof. MacClement in 1933 or 1934.

Dore, W. G. 1980. Letter to Katherine Frego. Dated 2 July 1980.

Frego, K. A. 1980. A copy of Dore's "cactus file" given to K. A. Frego in 1980.

Brunton, D. 2000. Letter to R. J. Staniforth. Dated 20 July 2000.

Literature Cited

Beschel, R. E. 1967. The cactus at Kaladar. The Bluebill: Quarterly Bulletin of the Kingston Field Naturalists 14: 11–12

Darbyshire, S. J. 1998. A tribute to William George Dore, 1912-1996. Canadian Field-Naturalist 112: 357–365.

Pringle, J. S. 1995. The history of the exploration of the vascular flora of Canada. Canadian Field-Naturalist 109: 291–356.

Smallman, B. N., H. M. Good, and **A. S. West.** 1991. Queen's Biology: an academic history of innocence lost and fame gained, 1858-1965. Queen's University Press. Kingston, Ontario, Canada. 215 pages.

Staniforth, R. J., and **K. A. Frego.** 2000. Ecological history and population dynamics of a disjunct population of Brittle Prickly-pear Cactus, *Opuntia fragilis* (Cactaceae), in eastern Ontario. Canadian Field-Naturalist 114: 98–105.

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