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Dryopteris goldiana × *D. intermedia*, a Natural Fern Hybrid New to Canada

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The rare fern hybrid *Dryopteris goldiana* × *D. intermedia* is reported for the first time from Canada on the basis of a collection from eastern Ontario. The plant occurred in rich deciduous woods in an extensive seepage area at the base of a slope. The immediate vicinity had an unusually high floristic diversity and 25 associated vascular plants are listed. Distinguishing characteristics of the hybrid are outlined.

Key Words: *Dryopteris goldiana* × *D. intermedia*, Goldie's Fern, Evergreen Wood Fern, hybrid, conservation, biodiversity, bioindicator, Canada.

Areas of occurrence of natural hybridization of native species should be preserved as part of a dynamic ecosystem (Whitham and Maschinski 1996). Such areas containing plant hybrids are often "hot spots of ecological and evolutionary activity" (Whitham 1991). Hybrids are important with regard to genetic diversity and the conservation of evolutionary potential, and in some cases they serve as important indicators of areas of high biodiversity (Whitham 1991). They also provide opportunities for research aimed at testing evolutionary and ecological hypotheses. Natural hybridization has played a significant role in the evolution of the fern genus *Dryopteris* (Evans and Wagner 1964). The distribution and frequency of *Dryopteris* hybrids are important in determining relationships between the taxa for classification purposes, and an understanding of hybrids and their characteristics is essential for identification.

During a study of the floristic composition of the Rigaud Headwaters ANSI (Area of Natural and Scientific Interest) in eastern Ontario, a plant was found that had characteristics of both Goldie's Fern, *Dryopteris goldiana* (Hook. ex Goldie) A. Gray, and Evergreen Wood Fern, *Dryopteris intermedia* (Muhlenb. ex Willd.) A. Gray. Because such a hybrid had not previously been found in Canada (Cody and Britton 1989), the Canadian floristic literature provided no means of identification of the plant. Its identity as a hybrid of the two species it resembled was later determined with publications covering areas in the United States and specialized literature on fern hybrids. The identification was confirmed by J. D. Montgomery, a specialist in classification and identification of *Dryopteris* taxa.

Voucher:

Ontario: Glengarry Co.: Kenyon twp.: 10 km NE of Maxville, approx. 31 G/7 18T 519450 5021750, 2 Oct. 2001, P.M. Catling (DAO).

Distribution and ecology

Dryopteris goldiana occurs throughout a large portion of eastern North America, reaching its northern limit in southeastern Canada where it occurs from New Brunswick west to southern Quebec and southern Ontario (Cody and Britton 1989; Carlson and Wagner 1982). *Dryopteris intermedia* is more widespread in eastern North America and in Canada where it occurs from Newfoundland west to northwestern Ontario (Cody and Britton 1989; Carlson and Wagner 1982). Although a number of hybrids involving each of these two species have been reported from Canada (Cody and Britton 1989), a cross between *D. goldiana* and *D. intermedia* is known only from the United States where there are reports from Michigan, New Jersey, New York, North Carolina, Ohio and Vermont. It is generally considered to be rare (Wherry 1961; Montgomery 1982; Thorne and Thorne 1989). After 10 years of studying *Dryopteris*, Evans and Wagner (1964) noted that they had examined thousands of plants in dozens of localities without finding this cross, which they regarded as "one of the most unusual of the rare hybrid woodferns".

Habitat

Dryopteris goldiana × *D. intermedia* is reported to occur near the bottom of moist limy talus (Thorne and Thorne 1989). At the eastern Ontario location the plant occurred in rich deciduous woods in an extensive seepage area at the base of a slope. The area is within the hilly Glengarry Till Plain and the vegetation in this region has developed over a substrate of sand and gravel. The forest was dominated by Black Maple (*Acer saccharum* Marshall ssp. *nigrum* (Michx. f.) Desmarais – 30%), Sugar Maple (*Acer saccharum* Marshall ssp. *saccharum* – 40%), Bitternut Hickory (*Carya cordiformis* (Wandenh.) K. Koch – 10%), White Ash (*Frax-*

inus americana L. – 10%), and American Basswood (*Tilia americana* L. – 10%). The trees were mostly about 75 years old, and light selective cutting probably occurred 40 years ago. Average Sugar Maple tree diameter at breast height (dbh) was about 33 cm and the maximum was 45 cm for White Ash and Basswood. The general area (approximately 30 × 100 m) at the base of the slope had an unusually high diversity of herbaceous species along with woody saplings of Ironwood (*Ostrya virginiana* (Miller) K. Koch) and maples. Dominant herbs included *Mitella diphylla* (Two-leaved Bishop's Cap), and the sedges *Carex platyphylla* J. Carey (Broad-leaved Sedge) and *Carex pedunculata* Muhlenb. ex Willd. (Long-stalked Sedge). Other frequent species observed during the autumn visit to the site included *Actaea pachypoda* Elliot (White Baneberry), *A. rubra* (Aiton) Willd. (Red Baneberry), *Adiantum pedatum* L. (Northern Maidenhair Fern), *Allium tricoccum* Aiton (Wild Leek), *Amphicarpa bracteata* (L.) Fern. (Hog Peanut), *Anemone acutiloba* (DC.) G. Lawson (Sharp-lobed Hepatica), *Athyrium filix-femina* (L.) Roth ex Mert. var. *angustum* (Willd.) G. Lawson (Northern Lady Fern), *Carex plantaginea* Lam. (Plantain-leaved Sedge), *Caulophyllum thalictroides* (L.) Michx. (Blue Cohosh), *Deparia acrostichoides* (Swartz) M. Kato (Silvery Glade Fern), *Diplazium pycnocarpon* (Spreng.) M. Brown (Narrow-leaved Spleenwort), *Dryopteris goldiana* (Hook. ex Goldie) A. Gray (Goldie's Fern), *Dryopteris intermedia* (Muhlenb. ex Willd.) A. Gray (Evergreen Wood Fern), *Eupatorium rugosum* Houtt. (White Snakeroot), *Gymnocarpium dryopteris* (L.) Newman (Oak Fern), *Maianthemum racemosum* (L.) Link (False Solomon's Seal), *Phryma leptostachya* L. (Fogfruit), and *Uvularia grandiflora* Sm. (Large-flowered Bellwort).

Identification Characteristics

Although rare, the *D. goldiana* × *D. intermedia* hybrid is not difficult to identify because it combines unique characters of both parents: the glands of *D. intermedia,* especially on the indusium, and the dark petiole scales of *D. goldiana*. The hybrid plant collected in eastern Ontario possessed both of these features. The blade, abruptly tapered at the tip (Figure 1), is distinctly bipinnate-pinnatifid at the base and the basal pinnules are shorter than the adjacent pinnules (Figure 1) so that the specimen keys to *D. intermedia* in many texts (e.g., Montgomery and Wagner 1993). However, the sori are essentially on the midvein of the segments rather than between the midvein and the margin as is characteristic of *D. intermedia*. The basal pinnae are lanceolate or ovate rather than triangular or deltate, thus eliminating *D. clintoniana* (D. C. Eaton) Dowell and *D. cristata* (L.) A. Gray. The relatively abrupt tapering of the frond to the tip eliminates the *D. celsa* (Palmer) Knowlton, Palmer and Pollard × *intermedia* hybrid. Together the above characteristics

FIGURE 1. Silhouette of voucher specimen of *D. goldiana* × *D. intermedia* from eastern Ontario showing distinctive features including the abruptly tapered frond tip, bipinnate-pinnatifid frond base and basal pinnules shorter than the adjacent pinnules. The frond is 81 cm tall.

of the frond, glands, sori position, and scales distinguish the *D. goldiana* × *D. intermedia* hybrid from all other known *Dryopteris* hybrids. In a detailed study of *D. goldiana* × *D. intermedia*, Evans and Wagner (1964) emphasized that it looks like an unusually large individual of *D. intermedia* and often resembles *D. intermedia* more closely than *D. goldiana*.

Another hybrid woodfern involving *D. goldiana* was recently given a name, *Dryopteris* × *mickelii* Peck (*D. clintoniana* × *goldiana*), and was reported for the first time in the Ottawa district of eastern Ontario (Peck 2001; Cody 2002). This hybrid differs from the *D. goldiana* × *D. intermedia* hybrid in the fronds being pinnate-pinnatifid on the basal pinnae instead of bipinnate-pinnatifid. The recently described Correll's Woodfern, *Dryopteris correllii* Wagner (*D. carthusiana* (Villars) H. P. Fuchs × *D. goldiana*) is unlike *D. goldiana* × *D. intermedia* in being eglandular throughout (Evans and Wagner 1964; Wagner and Gilman 2001).

Additional information on the distinctive characteristics of *D. goldiana* × *D. intermedia* is available in Evans and Wagner (1964), Montgomery (1982), and Thorne and Thorne (1989).

Acknowledgments

The identification was confirmed by J. D. Montgomery. Useful comments were provided by W. J. Cody.

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New Records of the Eastern Red Bat, *Lasiurus borealis*, from Cypress Hills Provincial Park, Saskatchewan: A Response to Climate Change?

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During the summer of 2001 we captured two Eastern Red Bats (*Lasiurus borealis*) in Cypress Hills Provincial Park, Saskatchewan. A possible explanation for this range extension is a warming trend since 1965 documented for the area.

Key Words: Eastern Red Bat, *Lasiurus borealis*, new records, global warming, Cypress Hills, Saskatchewan.

Eastern Red Bats (*Lasiurus borealis*) are a wide-ranging vespertilionid found throughout most of the United States, much of South America and in southern Canada from the east coast to approximately the mid-longitude of Saskatchewan in the west (Shump and Shump 1982; Saskatchewan Environment and Resource Management 2001; Figure 1). This species roosts almost exclusively in the open foliage of trees (Shump and Shump 1982; van Zyll de Jong 1985). It is usually found near forests, often roosting along for-