NOTEWORTHY COLLECTION

REDISCOVERY OF THE ARCTIC-ALPINE DISJUNCT, *SAXIFRAGA CERNUA* L. IN ONTARIO

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Species: *Saxifraga cernua* L.
Synonyms: *Saxifraga cernua* var. *exiloides*, *Saxifraga bulbifera*
Family: Saxifragaceae, sect. Irregulares
Common Names: nodding saxifrage, bulblet saxifrage, drooping bulbous saxifrage, nodding bulbous saxifrage, saxifrage penchée

Significance of the Report: The first report of the disjunct arctic-alpine plant *Saxifraga cernua* in Ontario in over 70 years is indicated from the Thunder Bay District. This is an approximately 8000 year-old arctic-alpine relict that is important for (1) conservation both *in situ* and *ex situ* with respect to global decline of arctic-alpine flora (Watts 2022), and (2) for research on genetic variation and post-glacial plant evolution (Kapalov et al. 2006, Kapralov 2004).

Previous Knowledge: *Saxifraga cernua* is a circumpolar arctic-alpine plant found throughout montane regions and tundra environments of the Northern Hemisphere including North America, Greenland, Iceland, Svalbard, Europe, Russia, China, Japan, Mongolia and Korea (Aiken et al. 2007, Jintang et al. 2001). In North America, it ranges widely across all northern provinces and territories of Canada except Saskatchewan, west to Alaska, and south through the Rocky Mountains to New Mexico (Fortson Wells and Elvander 2009). Disjunct, isolated peripheral populations have been reported from montane areas of the Black Hills of South Dakota (Rydberg 1896), Mt. Washington in New Hampshire (Churchill 1967), the Gaspé Peninsula in Québec (Scoggan 1950), and the Cape Breton Highlands of Nova Scotia (Mazerolle et al. 2014). A single disjunct population also occurs in Cook County, Minnesota (Butters & Abbe 1953) on the Rove Formation, a Precambrian bedrock-controlled landscape characterized by steep, north-facing rock ridges in the southern Boreal Forest extending east to the Thunder Bay District in Ontario (Morey 1969).

Saxifraga cernua is a short-lived herbaceous perennial that occurs as solitary individuals or in clonal patches of up to 15–20 stems connected via rhizomes (Elven et al. 2020). Plants may be androdioecious (having staminate and perfect

flowers on separate plants), hermaphroditic (flowers with both staminate and carpellate parts), or completely sterile (Brochmann and Håpnes, 2002, Molau and Prentice 1992). While it commonly produces flowers, it has not been observed to set mature seed in the Canadian population (Aiken et al. 2007, Polunin 1940) and this is true for other parts of its range as well (Elven et al. 2020, Molau and Prentice 1992). The primary reproductive mode for this species is believed to be asexual, occurring through the proliferation of bulbils in the stem leaf axils (e.g. Gabrielsen and Brochmann 1998). A reliance on asexual reproduction is common in high-altitude and arctic plants, where low temperatures and short growing seasons limit sexual reproduction via seeds (Wehrmeister and Bonde 1977, Kjølner et al. 2006). High-altitude plants often employ vivipary as a strategy to cope with harsher climates and shorter growing seasons (Körner 2003). This is the case for *Saxifraga cernua* which reproduces via pseudovivipary (Kapralov 2004), where the asexual bulbils replace sexual reproductive structures (Elmqvist and Cox 1996).

The only previous record from Ontario is a 1953 collection made near the mouth of the Black Duck River roughly one kilometre inland of the Hudson Bay coast (Moir 1958). The newly reported location is disjunct from its main range to the north by approx. 1000 km (Figure 1). Its presence in the Great Lakes Basin was first reported from nearby Minnesota by Butters and Abbe (1953) where it still occurs presently at the only other Great Lakes Basin location in similar habitat roughly 20 km to the west (J. Thayer pers. comm.). Its isolated occurrence here is remarkable and mirrors the distribution of numerous other disjunct arctic-alpine vascular plants found in the Thunder Bay District, e.g. *Carex saxatilis* L. (Given and Soper 1981), *Chamerion latifolium* (L.) Holub. (Brinker 2017), *Dryas drummondii* Richardson ex Hooker (Fernald 1935), *Pyrola grandiflora* Radius (Given and Soper 1981), *Saxifraga oppositifolia* L. (Oldham 2002), and *Silene acaulis* (Oldham 2000).

Discussion: *Saxifraga cernua* was discovered at one location during a brief reconnaissance floristic survey of Fraleigh Lake Provincial Park in 2024 (Figure 2). The small population of just two plants was found on a mossy ledge of a north facing cliff with localized seepage. A specimen was not taken given the extremely small population size, instead a photographic voucher was made. This new Ontario population is in a reasonably remote area and not directly threatened by human activities. However, because the population occupies a very small footprint, it is vulnerable to singular events that could alter its habitat. Several sections of recent mass-wasting or rockfall of the occupied cliff was observed in 2024. If additional rockfall occurs it most likely would destroy the plants.

Until now, its status in Ontario was “SH” or “Possibly Extirpated,” which indicates there have been no confirmed records in the province in at least 20-40 years (NatureServe 2025) despite some searching. The general location of the original 1953 collection and other suitable habitat along a narrow band of maritime tundra along Ontario’s Hudson Bay coastline spanning roughly 500 km has been studied by many botanists since then. A series of botanical studies and unpublished field collections have been carried out by the likes of Cowell (1968, 1969), Dutilly et al. (1959), Jeglum (1971), Maycock (1974) and Sims et al.

FIGURE 1. North American range map of *Saxifraga cernua* (adopted from Hultén 1968, Porsild and Cody 1980, Aiken et al. 2007, Payette 2015). Black circles (●) are previously known peripheral populations. The Fraleigh Lake site is represented by a white star. The Great Lakes Basin is represented by a dashed line.

(1987). More extensive floristic surveys were completed by John Riley in 1972, 1976-1980 and 1990 (Riley 2003). More recently, Ministry of Natural Resources (MNR) botanists Wasyl Bakowsky, Samuel Brinker, William Crins, Michael Oldham and Donald Sutherland collected extensively at various locations in maritime tundra along Hudson Bay and James Bay during the years 2000–2001, 2003, and 2009–2014 and failed to document the presence of *S. cernua*. Considerable searching of diabase cliffs in the Thunder Bay District have also been carried out over the last 25 years by MNR and Thunder Bay region botanists with no other records, confirming that the species is very rare in the region.

Acting as a climate buffer, the massive expanse of Lake Superior and its cool summer waters have maintained habitats suitable for disjunct populations of arctic-alpine plants on its rocky coastline and surrounding inland areas since the last deglaciation (Hillman and Nielsen 2023). These species likely survived here, in areas too harsh for woody tree or shrub encroachment since ice-margin tundra

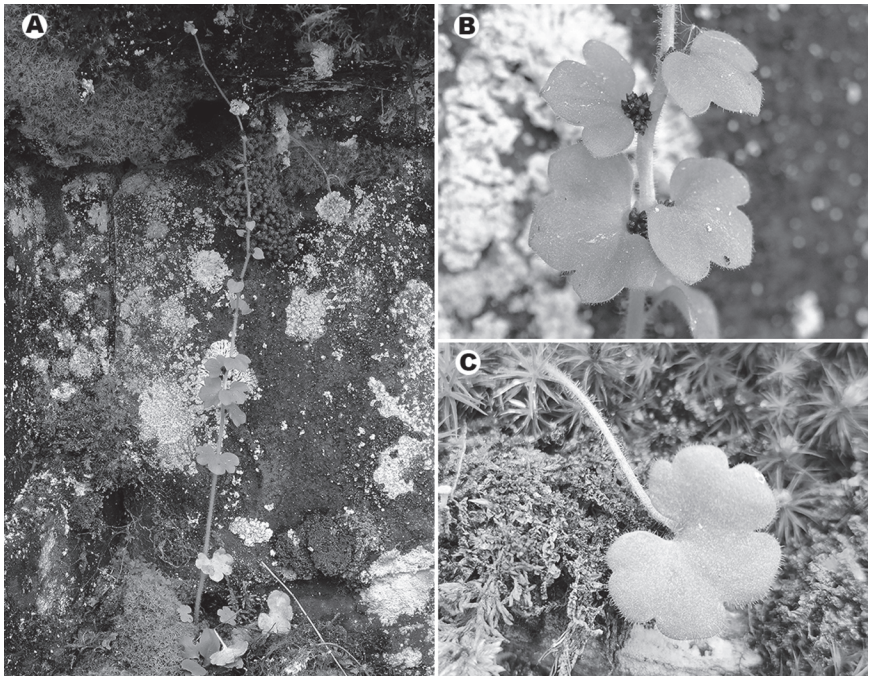

FIGURE 2. *Saxifraga cernua* rediscovered in Ontario from the Thunder Bay District. **A,** plant growing on moist, mossy cliff shelf. **B,** closeup of stem leaves showing bulbils in leaf axils. **C,** closeup of basal leaf. Photos by Samuel Brinker.

developed roughly 11,000 years ago (Saarnisto 1974). Inland cliffs in the region also act as plant refugia, but usually tend to be dry, lacking soil development restricting woody growth and are better known for their disjunct western xerophytes, such as *Calamagrostis purpurascens* R. Br., *Carex rossii* Boott, *Oxytropis borealis* DC., *Festuca richardsonii* Hook., or *Woodsia oregana* D.C. Eat. (Bakowsky 2002, Drummond et al. 2022). *Saxifraga cernua* is one of a few disjunct arctic-alpine plants in the region entirely restricted to cliffs. Other arctic-alpine plant species in the Lake Superior region that appear mostly or entirely confined to cliffs include *Carex scirpoidea* Michaux ssp. *scirpoidea*, *Chamerion latifolium*, *Moehringia macrophylla* (Hook.) Fenzl, *Saxifraga oppositifolia*, *Solidago multiradiata* Aiton. and *Woodsia alpina* (Bolton) S.F. Gray. Cliff sites that tend to harbour these species are often shaded, north-facing, and are typically moister and may have local groundwater seepage or seasonal surficial runoff. At the Fraleigh Lake site, other taxa of provincial conservation concern found in the same cliff habitat included *Huperzia porophila* (Lloyd and Underwood) Holub and *Gymnocarpium continetale* (Petrov) Pojarkova.

The rediscovery of this very rare plant presents an opportunity for conservation. Although it is sometimes said to reproduce only by bulblets, it does also occasionally flower and produce seed (Kapralov et al. 2006) making genetic en-

richment a possibility. Regardless the abundant bulbils may be treated as seeds for long-term kryogenic preservation in gene banks (Breman et al. 2019). These possibilities are under consideration.

Diagnostic Characters: Stems slender, erect, simple or sometimes branched, glandular-pubescent, reddish in colour, 10–25 cm tall, perennial, sometimes vegetatively proliferating by bulbils on stems or leaves, arising annually from a perennial bulb or short rhizome on the ground. Leaves alternate, heterophyllous; basal leaves and often mid-flowering stem leaves petiolate, 3–5 lobed, reniform; upper flowering stem leaves reduced, bract-like, sessile, unlobed, subtending clusters of small reddish to purple bulblets. Flowers solitary (or lacking), terminal, with 5 petals, 5–12mm long, white, about 4 times as long as the calyx lobes. Fruit with calyx persisting; forming a capsule likely with numerous seeds, but the fruit very rarely develops to maturity, dehiscent, splitting to the base into separate segments (Hultén 1968, Aiken et al. 2007, Fortson Wells and Elvander 2009, Payette 2015, Porsild and Cody 1980).

Saxifraga cernua is not likely to be confused with any other *Saxifraga* species known from the Lake Superior region which includes *S. oppositifolia* L., *S. paniculata* Miller, and *S. tricuspidata* Rottb. When stems are present, *S. cernua* can be readily distinguished from other members of the genus by having an inflorescence with bulbils. The leaves of *S. oppositifolia* as the name implies are opposite vs. alternate in *S. cernua*. The leaves of *S. paniculata* are distinct from *S. cernua* being unlobed, finely serrate, and leathery, in addition to having lime-secreting pores along the leaf margins. The leaves of *S. tricuspidata* are distinct from *S. cernua* in having 1–3 lobes, and a distinct mucronate tip.

Saxifraga rivularis R. Brown, a species not known from the Great Lakes Basin has a similar appearance particularly when vegetative and could be confused with *S. cernua*. It occurs in Ontario in the Hudson Bay Lowland (Oldham and Brinker 2011) and may be found in the region since it occurs elsewhere in the northeast in peripheral southern populations (Tiffney 1973). It has an inflorescence lacking bulbils, 1–4 flowers, with shorter, 3–5 mm petals, and shorter stems, 2–10 cm tall. Small, vegetative plants of *Heuchera richardsonii* R. Brown occur in the same cliff habitat in the region and could also be mistaken for *S. cernua* as it also has cordate, 5–7-lobed basal leaves. However the margins of these leaves are dentate and have an acute apex, and are overall thin and papery, whereas the basal leaves of *S. cernua* are entire, have a rounded apex, and are slightly fleshy.

Specimen Citation: ONTARIO, THUNDER BAY DISTRICT: Fraleigh Lake Provincial Park, 8 km SE of Silver Mountain, 1 km E of Fraleigh Lake, mossy north-facing cliff ledge in boreal forest with *Betula papyrifera*, *Picea glauca*, *Abies balsamea* and *Woodsia ilvensis*. Two individuals (1 flowering stem with bulbils, one plant with only basal leaves), June 20, 2024, *S. Brinker 10542 with C. Robillard* (MICH, NHIC).

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