

**The Curious Distribution of *Geum urbanum* (Rosaceae) and *Lapsana communis* (Asteraceae) in the Niagara Gorge**

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The flora of the Niagara River gorge on both the Canadian and American sides of the river is the object of one of the first historic efforts of the Canadian and American people to protect their significant natural history resources through preservation. It is for this reason that I took up a survey of the gorge for the past several decades.

One section of the American gorge had recently been open to the public as a walking area, which is rather problematic because this sector is also home to several rare vascular plant species that would have been better off left in isolation (the Niagara gorge is around 7 miles long, or 14 if you include both sides of the river). As I was monitoring the condition of the flora in this section, I noticed a species growing in a linear fashion all along the footpath at the gorge base that had recently been put in place, and discovered a new noxious weed there: *Lapsana communis* (Nipplewort). On that day, I proceeded to do my civic duty and pull them up, if I could. This species is rather easy to pull up, which is one of the main ways to control it. All the way from the Whirlpool to the DeVeaux steps I weeded them, stuffing them in a plastic bag. I proceeded up the stone steps, pulling as I went, and grew aware that this weed was closely associated with the footpath, which is a rather common occurrence for the introduction of invasive species.

My plan of work for the day included walking through Whirlpool State Park, which bordered on the upper gorge rim, then to proceed across the Robert Moses Parkway into DeVeaux Woods State Park going east. The trail of *Lapsana* continued across both parks. I was especially dismayed to see it in the old growth of DeVeaux and picked up as much as I could. I began to notice that the occurrences of this plant increased as I went east. The plants were transferred to a large refuse bag and I began to select only the largest specimens as I had only one day to study in the field. The populations increased in number as I approached Lewiston Road (a northern extension of Main Street) that lay through the DeVeaux neighborhood of Niagara Falls. On the corner of DeVeaux State Park and College Avenue at the farther extreme of my transect from the gorge base to Lewiston Road, there is a lovely, shady wood of native trees, shrubs and herbs between the park and the neighborhood. I was disturbed to find almost a pure population of *Lapsana communis*, as though it were a crop, located in this mostly clean wood. I realized that there was a vector of density reaching from this crop-like population trending west to the gorge through DeVeaux and Whirlpool woods.

It did not appear that this distribution was natural. It even seemed as though after distributing this weed in the woods, someone had scattered *Lapsana* seed across the natural areas of two State parks down to the base of the River. I disposed of the heavy biomass of weedy material off-site and wondered about this curious dispersal of this one plant.

As a continuation of the field work for the next day, I began to survey what appeared to be a native species of *Geum*, starting at DeVaux woods on the periphery of the old-growth, southern wooded section. There was a fine collection of yellow-flowered Geums there. Over the next few days I studied the flora proceeding south several miles to the world-famous cataracts. As I explored the gorge rim as part of a study that concentrated on its characteristics I ended at the Schoelkopf Geological Center just north of the Rainbow Bridge and above the old stone remains of the Schoelkopf electric generating plant. To my astonishment, in an area right at the edge of the gorge rim surrounded by chain-link fence there was a dense patch of yellow-flowered *Geum*. It was another crop, and it was nearly unmixed with other weed and native species. Furthermore, a small horticultural garden beside the public Gorge hiking facility beside the Geological Center and near the overpass across the Parkway displayed this yellow-flowered *Geum* all around its periphery.

In the Niagara Frontier Region there are two native *Geum* species that have golden yellow flowers: *G. macrophyllum* Willd. and *G. aleppicum* Jacq. There is a third, the introduced *G. urbanum*. Other species in the genus have essentially white flowers. *Geum macrophyllum* is not reported from the Niagara River gorge. It occurs only in Orleans County in western New York State, and is an endangered species in the State (Weldy et al. 2017). Zenkert (1934) excluded it from the Niagara Frontier Region, as the only specimen cited by Day (1882) could not be found.

*Geum allepicum* Jacq. is, however, reported as common in the Niagara Frontier region by both Zenkert (1934) and Oldham (2010). The third *Geum* species, *Geum urbanum* L., had only been reported for the Niagara Frontier region in 2000 (Eckel 2000) and seemed unlikely to be the abundant yellow-flowered *Geum* I had noticed in the field, and growing in a densely growing plot near the Schoelkopf Geological Center. *Geum urbanum* is reported for only five counties in the State by Weldy et al. (2010), none of which is in the six western counties in the Niagara Frontier Region, and is reported by Oldham (2010) as a “rare introduction.” The species was not reported by Zenkert in his 1934 or subsequent publications, nor for Chautauqua County by Eaton and Schrot (1987). Eaton and Schrot, however, report *Geum aleppicum*, perhaps unintentionally, as an introduced species, but the species is indicated as native by Weldy et al. (2017), being common throughout the state, including the counties inside and surrounding Chautauqua Co. The species is “common along roadsides and fields” (Eaton & Schrot 1987). Weldy et al. report its field characteristics as “Populations ... often small in number and individual plants are widely spaced.”

I had fully expected my field collections from Niagara to be *Geum aleppicum*, but they consistently keyed out to *Geum urbanum* instead. The two species superficially look very much alike. Species in the genus may be identified with only the floral parts, but the specimens forming the basis of this paper were identified using fruiting material, with late flowers, which, in the two species noted, are bright yellow. Descriptions of the two

species in keys may be confusing if one does not realize that it is the cauline, not the basal (rosette) leaves that best separate these two species.

*Geum aleppicum* has (lower) cauline leaves pinnately compound, often with tiny leaflets, but *G. urbanum* has 3-lobed (trifoliate) cauline leaves. The stipules at the base of the leaf-stalk where it attaches to the stem are very large in *G. urbanum* (10–40 × 5–35 mm), whereas in *G. aleppicum* they are smaller (8–28 × 5–22 mm) (Rohrer 2014 in FNA).

The fruits of *Geum*, which are achenes, are organized into a globose head. The achenes are collected together on the receptacle, which is elevated like that of a Blackberry. The achene itself is rather complex as it is topped by the remains of the style. This style consists of two parts, the basal (proximal) part that remains attached to the top of the achene, and an upper (distal) part that falls away and is often missing on old specimens. The persistent basal portion of the style is called the ‘beak’ and the hairs on it are diagnostic: in *G. aleppicum* the achene beak has a few long hairs at the base which are much longer than the width of the style, whereas in *G. urbanum* the beak is glabrous (or only minutely pubescent), the short hairs are shorter than the width of the style (Rohrer 2014; Voss 1985).

Perhaps these microscopic characters are difficult to treat or interpret with confidence (illustrations in major manuals are often confusing), but the final microscopic character is diagnostic: the length of the dense hairs on the fruiting receptacle, or torus: in *G. aleppicum* they are only 0.3–0.7 mm (never to 1 mm) and soft, whereas those of *G. urbanum* are much longer, 1–2.3 mm and stiffer.

The two species are, indeed, very difficult to tell apart - but not impossible. Once the difficulty of true identification is met, the real puzzle is why this species, relatively new to the flora of western New York and southern Ontario, has such a great crop along the American side of the Niagara River gorge. To be certain I was dealing with two species, I tried to collect one of each type when growing together to verify their identity. The overwhelming abundance of *Geum urbanum* compared to *G. aleppicum* was distinctive.

The three places where *Geum urbanum* grew with an odd abundance include the southern forest margin at DeVeaux College State Park, the stairs leading to the base of the gorge just south of the Lower Arch Railroad Suspension Bridge (where *G. aleppicum* grew with it) and most notably at the Schoelkopf Geological Center. The densely seeded area noted above at the last station occurred within a tall chain-link fence where it is unlikely the public could have access, and in full view of any Park staff. The site has since (in 2017) been bulldozed and the top layer of soil removed and resown to grass, but the populations around the horticultural garden around the stone-block garden by the Robert Moses overpass mentioned above are still flourishing. All three places are the site of various alien seed or root emplacements.

Note that New York State does not appear to have a noxious weed list in the USDA weed Database as a state: there does not appear to be a NY State noxious weed list.

Many nurseries sell *Geum urbanum* on-line, but one was seen to sell bare-root stock of *Geum aleppicum*. As the latter is a native species, many other states report it as part of their native flora. Nowhere is *Geum urbanum* native in North America. In the New York State floral Atlas, *Geum urbanum* “has become a very common introduction

and is no longer just an urban weed. It is potentially a highly invasive species.” (Weldy et al 2017), although only five counties report its occurrence in New York State. *Lapsana communis* may also be ordered by seed on-line in the United States, but also from Britain, where the species is native. Strangely, both alien, invasive species are listed as “heirloom species” by the American nurseries that sell them.

Again, these species seem to be favored over other native species because they closely resemble them, and so they can hide in the flora and expand without notice. One must ask, as in previous notes regarding the apparent introduction and intensive cultivation of invasive species at Niagara Falls (*Eupatorium serotinum*, Eckel 2017a; *Picris hieracoides*, Eckel 2017b), why might this be and who benefits?

#### Specimens:

*Geum urbanum* Jacq. USA. New York, Niagara Co., City of Niagara Falls just north of the Schoelkopf Geological elevator and museum buildings in boulder garden full of horticultural species. Abundant along fence at the gorge rim and on the boulder margins facing away from the public paths. A few years ago a great mass of this species grew in an open area beyond the chain-link fence, now bulldozed - these are the remnants of that population. Coll. P. M. Eckel, Aug. 14, 2017. Flowers bright, not pale, yellow (MO).

*Lapsana communis* L. USA. New York, Niagara Co., Town of Lewiston, Artpark State Park, gorge of the Niagara River, near the debouchment of the River out of its calcareous gorge, down on the lakeplain, Indian mound archeological area, incoming growth; with *Vinca minor* (planted), *Symphiotrichum lanceolatum*, *Solidago caesia*, *Smilax herbacea*, *Pyrus* cf. *communis*. Coll. P. M. Eckel Oct. 3, 2012 (BUF).

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