NOTEWORTHY COLLECTIONS

RECORDS OF SOME ADVENTIVE OR NATURALIZED PLANT SPECIES IN ONTARIO

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Anthyllis vulneraria L. (Figure 1)
Fabaceae
Common Kidney-vetch, Woundwort, Lady's-fingers.

Significance of the report. *Anthyllis vulneraria* is rarely adventive or naturalized in the Great Lakes region. Prior to this report there had been no reports of this species from Ontario for over a century.

Previous knowledge. *Anthyllis vulneraria* is native to much of Europe and the Mediterranean region. Introduced populations have been reported from widely scattered sites in North America but have remained few and highly localized. Most records of *A. vulneraria* in North America have been from ephemeral occurrences, in some cases derived from contaminants in clover seed, rather than representing established populations. As of 2022, according to the Natural Heritage Information Centre (2022), no recent records of *A. vulneraria* in Ontario were known. The most recent report listed was from Oxford County, where it had been found in 1909 (Mitchell 1910). Older records were listed only from Oxford and Wellington counties and what is now the Regional Municipality of Waterloo. In Michigan, MICHIGAN FLORA ONLINE (2011) recorded *A. vulneraria* only from Mackinac County, where it had been found at one locality in 1934 and another in 2008, but Voss (1985) also noted an ephemeral occurrence in Ingham County in 1897. It has been reported from six counties in New York, but according to Werier et al. (2022) its naturalization status there is not known. Cooperrider (1995) did not list this species in the flora of Ohio, although it had previously been reported from Lake County by Shaffner (1932). The Ohio State University herbarium (OS) web site (Museum of Biological Diversity 2023) shows two specimens from a single collection in Lake County in 1927.

Discussion. At the site reported here, plants of *Anthyllis vulneraria* were present along an old farm road, now a trail, well outside Hamilton's urban boundary, on Hamilton Conservation Authority land. Although the population extended over a wide area, there were no large or dense stands. The plants were in open areas in a successional plant community with scattered buckthorns and young white cedars and sugar maples, in rocky, calcareous soils, among other natural-

FIGURE 1. *Anthyllis vulneraria*, Hamilton, Ontario. Photograph by the author.

ized species, including *Lotus corniculatus* L. and *Securigera varia* (L.) Lassen. Whereas Montgomery (1957) said that in Ontario, *A. vulneraria* was "an occasional introduction but never persisting," this Ontario population is well established, having spread throughout an area ca. 0.6 km long and having persisted for more than 21 years. Eventually it will probably be vulnerable to increasing shade if vegetational succession is permitted to advance at the site.

As populations of *Anthyllis vulneraria* in North America have remained few,

scattered, and usually of short duration, and the plants do not form dense stands, this species seems unlikely to become an aggressive colonizer.

In Europe, *Anthyllis vulneraria* has been divided into numerous subspecies, differing in characters including plant size, stem branching, numbers of leaflets per leaf, calyx vestiture, and red vs. yellow corollas. Intermediates are so common, however, that formal infraspecific classification sometimes appears hardly feasible, especially since some of the subspecies are cultivated for fodder beyond their native ranges, increasing the opportunities for interbreeding (Cullen 1968). North American references generally do not distinguish subspecies of *A. vulneraria*. The morphology of the plants reported here suggests that they may be derived from past interbreeding of subsp. *vulneraria* and the widely cultivated subsp. *carpatica* (Pant.) Nyman. This combination is common in parts of Europe.

Diagnostic characters. Naturalized populations of *Anthyllis vulneraria* are variable, depending on their geographic origin; this description is based largely on the population reported here. Plants of *A. vulneraria* are herbaceous perennials, one- or few-stemmed, 20–50 cm tall, with the stem simple or occasionally few-branched. The basal leaves are usually simple, elliptic-oblong, often with a few small lobes near the base of the blade, or occasionally with a few minute leaflets; the cauline leaves are few, alternate, odd-pinnately compound. The leaflets of the cauline leaves are usually 3 to 7, narrowly elliptic or the smaller leaflets linear, with the terminal leaflet usually longer than the lateral leaflets. The inflorescence is a dense, terminal head subtended by two deeply palmately lobed bracts, or more often two heads, sometimes so close together that they appear as one, comprising numerous flowers. The flowers are pentamerous, papilionaceous, 12–15 mm long. The sepals are united, silky-haired. The petals are separate, each narrowed proximally into a very slender claw, bright yellow, the banner petal with red markings. The fruit is a short-stipitate, indehiscent legume with one or occasionally two seeds.

In the Great Lakes region, the species with which *Anthyllis vulneraria* would most likely be confused is *Lotus corniculatus* L., bird's-foot trefoil, which likewise has papilionaceous flowers in heads, with wholly or predominantly yellow corollas similar in size to those of *A. vulneraria*. When these species grow in the same habitat, as at the site reported here, *A. vulneraria* is generally taller than *L. corniculatus*. Unlike those of *A. vulneraria*, the leaves of *L. corniculatus* are consistently trifoliolate. The inflorescences of *L. corniculatus* are not subtended by deeply cleft bracts, nor are the calyces silky-haired. The fruits of *L. corniculatus* are elongated, multi-seeded pods. Forms of *Medicago sativa* L. s. lat., alfalfa, with yellow corollas likewise differ in having trifoliolate leaves and in lacking silky hairs on the calyx. *Medicago lupulina* L., black medic, and the several species of *Trifolium* L., clovers, with yellow corollas, have trifoliolate leaves and much smaller flowers, 2.5–6.5 mm long.

Specimen citations. CANADA. ONTARIO. City of Hamilton (historically Wentworth Co., West Flamborough Twp.): Along the trail north from Safari Road at address sign 1535, west of Westover Road, in open sites in an area with shrubs and scattered trees, in rocky, calcareous soil, 43.35°N, 80.11°W, June 25, 2021, *Pringle 2692* (HAM) and June 14, 2022, *Pringle 2694* (HAM).

Although there have been no published reports of *Anthyllis vulneraria* in Ontario since 1910, there are three specimens at HAM that date from 2002 through 2013, all from the same site as those cited above: *Rothfels & Hunsberger CJR143*, *Rothfels et al. 744*, and *Doherty & Stone 2*.

Sedum sexangulare L. (Figure 2).
Crassulaceae
Six-angled Stonecrop, Hexagon Stonecrop

Significance of the report. In the Great Lakes region, *Sedum sexangulare* is known to occur outside of cultivation in only a few scattered localities. In Ontario it has previously been reported only from the vicinity of Ottawa.

Previous knowledge. *Sedum sexangulare* is native to continental Europe and is cultivated elsewhere as a rock-garden plant. There are few reports of its occurrence outside of cultivation in North America, although *S. sexangulare* may sometimes have been misidentified as *S. acre* L., a similar species that has been included in regional floras for many years whereas until recently *S. sexangulare* has not been included in such references.

Sedum sexangulare was first reported as naturalized in North America by Hodgdon (1959), who had found it in New Hampshire in 1942 but did not identify it as *S. sexangulare* until 1958, at which time it was still present where he had found it 16 years earlier. In 1976, I was the first to recognize it in Michigan, when I was shown a collection that was misidentified at the time as *S. acre*, and which was subsequently reported as *S. sexangulare* by Voss (1977, 1985). By 2011, it was known from five counties in Michigan (MICHIGAN FLORA ONLINE 2011). In New York, it has been reported only from Rensselaer County (Werier et al. 2022). There are now reports from scattered localities in a few other states, from New England west to Illinois (Ohba 2009). It was first reported from Ontario and from Canada by White (1979; see also Brunton 1985), who found it near Ottawa in 1979. In 2022 the Natural Heritage Information Centre (2022) listed it only from the vicinity of Ottawa, ca. 460 km east-northeast of the locality reported here.

Discussion. At the site reported here, *Sedum sexangulare* grew in an open, disturbed area, largely dominating an area ca. 12 × 12 m, along with grasses and a few other herbaceous plants, near a paved trail on the site of a former railroad. This site was on the sandbar called the "Beach Strip" that separates Hamilton Harbour from Lake Ontario. Although this site was uncultivated, a "waste place" in the wording of old floras, parts of the Hamilton "Beach Strip" west of the north-south trail include roads and residential and commercial buildings.

Sedum sexangulare is well adapted to survival and spreading in sunny areas where the soil rapidly becomes dry, but, like *S. acre*, is it unlikely to compete with native species unless perhaps in alvars.

Diagnostic characters. *Sedum sexangulare* is similar to *Sedum acre.* Plants of *S. sexangulare* are perennial, rooting from the decumbent stem bases and forming clumps, patches, and mats (Figure 2). The vegetative stems are numerous, distally erect, mostly 2–7 cm; the flowering stems are up to 10(–15) cm tall. The leaves are closely spaced on the vegetative stems and proximally on the

FIGURE 2. *Sedum sexangulare*, Hamilton, Ontario. Photograph by the author.

flowering stems; those on the vegetative stems are usually in six ranks, succulent, bright green, cylindric or nearly so, 3–6 × 0.7–1.2 mm. The inflorescence is a more or less flat-topped cyme of 1 to 25 flowers, with all but the smallest inflorescences usually having three major divisions. The flowers are actinomorphic, with the sepals and petals all separate. There are 5 sepals, which are inconspicuous, yellowish green, narrowly oblong, 0.8–1 × 0.4–0.5 mm; 5 petals, which are bright yellow, lanceolate, 3–4 mm long × 0.8–1.1 mm where widest; ten stamens, with both the filaments and the anthers yellow; and 5 pistils. The fruits are septicidal, several-seeded capsules.

From the more widely cultivated and naturalized *Sedum acre*, which is also present on the Hamilton "Beach Strip" (*Iwanycki & Pringle 268*, HAM) and other nearby sites, *S. sexangulare* is most readily distinguished by the shape of its leaves. In contrast to the cylindric leaves of *S. sexangulare*, which are commonly described as being shaped like slightly compressed sausages, the leaves of *S. acre* are ovate (or nearly ovoid, considering their thickness), widest proximal to mid-length. The flowers of *S. sexangulare* are smaller than those of *S. acre*, the latter having petals 5–9 mm long.

The names "tasteless stonecrop" for *Sedum sexangulare* and "bitter stonecrop" or "biting stonecrop" for *S. acre* indicate another difference between these species, as the specific epithet *acre*, like its English cognate *acrid*, means "having a strong, irritating, unpleasant taste."

Specimen citations. CANADA. ONTARIO. City of Hamilton: "Beach Strip" between Hamilton Harbour and Lake Ontario, west side of Breezeway Trail a short distance south of the trail information centre, in a sunny site with sandy soil, with grasses, 43.29°N, 79.79°W, July 6, 2022, *Pringle 2696* (HAM).

A Noteworthy Non-record:

Achyranthes japonica (Miq.) Nakai
Amaranthaceae
Japanese chaff-flower

Achyranthes japonica (Miq.) Nakai, a species native to eastern Asia, was first found as a naturalized species in North America in 1981 along a tributary of the upper Ohio River in Kentucky (Medley et al. 1985; Kamstra 2020). It is now recognized as a highly invasive species, primarily invading natural areas, in which it forms dense, extensive colonies that disrupt ecosystems and displace native species, and thus may adversely affect rare and endangered species (Schwartz et al. 2016; Kamstra 2020).

As of 2003 *Achyranthes japonica* was still known in North America only from the Ohio River watershed in Kentucky, Ohio, and West Virginia (Robertson 2003), but soon thereafter it was found to have spread downstream to the lower Mississippi River valley and to be present in additional scattered localities in the southeastern United States. It was found in Canada in 2018 by Kamstra (2019, 2020) on two of the Erie Islands, Ontario. Kamstra reported that *A. japonica* had spread alarmingly on East Sister Island, a Provincial Nature Reserve, and Middle Island, part of Point Pelee National Park, where it had formed patches consisting of thousands of plants. Control measures using herbicide were initiated following these discoveries.

In 2020, in an online posted response to Kamstra (2020), Kathy Ouellette reported having seen *Achyranthes japonica* in Harrow, Essex County, Ontario. This was the first report of this species from the Ontario mainland. Because she neither cited herbarium specimens nor provided photographic documentation, I visited the site to document this report, if it was correct, because several native species, especially *Phryma leptostachya* L. (lopseed), resemble *A. japonica* and may be confused with it.

Ouelette's report included detailed locality data: Along the Chrysler Canada Greenway, a trail following a former railroad bed, behind Robinson's Transport. On September 25, 2022, I searched the sides of the trail south from Concession Road 4 to a point beyond the section of the trail where the Robinson's Transport property abuts the former railroad right-of-way and found no *Achyranthes japonica.* I did find *Phryma leptostachya* (documented at this site by *Pringle 2697*, HAM), a species that Medley et al. (1985) and Kamstra (2020) had mentioned as resembling *A. japonica* in appearance. In the absence of *A. japonica* at the site, as indicated by my search, and the presence of a species with which *A. japonica* is easily confused, I believe that this report of *A. japonica* on the Ontario mainland should be discounted unless documentation can be provided. It

also seems appropriate to provide here a more thorough contrast between *P. leptostachya* and *A. japonica* than previous reports have included.

Both *Phryma leptostachya* and *Achyranthes japonica* have simple, opposite, short-petioled leaves with acuminate apices, and both bear flowers and fruits in long, slender spikes. In both species, the fruits are strongly deflexed at maturity, and readily become caught in fur, feathers, and clothing. The leaf blades of *P. leptostachya* are ovate, widest proximal to mid-length, with prominently serrate margins; those of *A. japonica* are elliptic or nearly so, widest near mid-length and tapering nearly symmetrically to the petiole and apex, with margins that are entire or slightly wavy but not toothed. The flowers and fruits of *P. leptostachya* are in distinct pairs, each pair at right angles to the pairs above and below it; those of *A. japonica* are not in pairs, but instead spiral individually around the axis of the inflorescence. (In *A. japonica* this arrangement may be evident only in fruit; the flowers are densely crowded, but the fruits become more widely separated as the axis of the inflorescence elongates.) In flower, *P. leptostachya* can be distinguished from *A. japonica* by its small, bilabiate, purple-and-white corolla. *Achyranthes japonica* has no corolla; the perianth consists of pale green sepals largely concealed by bracteoles.

The disseminules of both species comprise a one-seeded indehiscent fruit plus the persistent calyx and bracteoles at the base. In *Phryma leptostachya* the bracteoles, unlike those of *Achyranthes japonica*, are minute; the disseminules adhere to fur and clothing by hooks at the apices of the three dorsal lobes of the calyx, which consists of sepals united much of their length. In *A. japonica*, the disseminules include not only the fruit and the persistent sepals, which are united only basally, but also two firm, spinelike bracteoles that can become caught in fur, feathers, or fabric.

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