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ON *SOLIDAGO ASPERATA* (ASTERACEAE: ASTEREAE), THE OLDEST NAME IN THE *S. BARTRAMIANA*, *S. BRENDAE*, *S. FALLAX* COMPLEX

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ABSTRACT

Solidago asperata Banks ex Pursh is the oldest name published that applies to the complex of taxa that have been treated as *S. bartramiana* Fern., *S. brendae* Semple, and *S. fallax* Fern. The holotype of *S. asperata* is from somewhere along the coast of Hudson's Bay in Canada, likely near James Bay and possibly near Moosonee in northern Ontario at the historical site of the Hudson's Bay company factory. As interpreted here, *Solidago asperata* is the correct name for typical *S. fallax* (Fern.) Semple; *Solidago fallax* var. *molina* is **Solidago asperata** Banks ex Pursh var. **molina** (Fern.) Semple, **comb nov.**

Solidago asperata Banks ex Pursh is the oldest name published that applies to the complex of taxa that have been treated as *S. bartramiana* Fern., *S. brendae* Semple, and *S. fallax* Fern. The name *S. asperata* was coined by Solander, but in his book, Pursh merely mentioned "Herb. Banks Mss." After the entry for *Solidago asperata* Banks ex Pursh, Gray stated (1882, p.187) that it "is *S. patula*, Muhl. not now observed in the Banksian herbarium, but was once identified there by Dr. Boott, and it was named by Pursh in that of Lambert."

Solidago asperata Banks ex Pursh, Fl. Amer. Sept. 2: 538. 1814. **TYPE**: **CANADA**. Hudsons Bay, 1773 {back of sheet}, (**holotype**: BM000799907! ex Herb. Banks (Figs. 1-3), "Taken up by Pursh {from Sol. mss.}. "It is a form of *S. altissima* L. — A. Gray" in Gray's handwriting without date). The holotype also includes an annotation label in handscript referencing Gray (1882).

The species epithet refers to the presence of short stiff hairs on the abaxial leaf surfaces and the adaxial leaf veins varying from very sparsely to moderately dense. Upper stems on the holotype are moderately strigose while lower stems are glabrous. The two flowering upper stems present on the holotype are overall rather open, leafy examples of the slightly secund conical inflorescences typical of members of the *Solidago canadensis* complex of species (*Solidago* ser. *Canadensae* Semple & J.B. Beck) occurring across much of North America. Semple and Beck (2021) included the following species in ser. *Canadensae*: *S. canadensis* L. (holotype species), *S. altissima* L., *S. brendae* Semple (= *S. bartramiana* Fern. following Semple 2023), *S. elongata* Nutt., *S. fallax* (Fern.) Semple, *S. lepida* DC., *S. rupestris* Raf., and *S. shortii* Torrey & Gray. The ranges of distribution of these species are illustrated in Figure 4, which also includes the range of the subsequently published *S. turneri* Semple (2021).

The symbol  is present in the bottom righthand corner of the holotype. Kanchi Gandhi (personal communication) interpreted the first sign appearing as "2" to be that it was written in error for the perennial sign; it does not look like the sign for Venus (= shrubby); the central symbol is a sign for perennial; and the third sign (v) = vidi = seen.

A more recent collection from the possible source area of the type of *Solidago asperata* is the specimen *Melville & Blok 1674* WAT in MT (Fig. 5), which has been treated as *S. fallax* var. *molina* (Fernald) Semple (annotated as a variety of *S. lepida* in 2012). This is a tall hexaploid (2*n*=54) plant from Moose Factory, Ontario, Canada, and has a larger but similarly branched inflorescence to those on shoots on the type of *S. asperata.* The involucres of flowering heads are 4.0

mm tall and thus slightly larger than involucres of about 3.0 mm on the *S. asperata* type. Other collections from northern Ontario and adjacent Québec are known (Semple & Chmielewski 2022) to be diploid (2*n*=18) and tetraploid (2*n*=36). Involucre height of the type of *S. asperata* might indicate that the plant(s) was (were) possibly diploid or tetraploid. Diploids are most frequent in the *S. asperata* complex identified as *S. brendae*, *S. canadensis*, and *S. fallax* (Beaudry & Chabot 1959; Melville & Morton 1982; Semple et al. 1984; Semple 2013; Morton, Venn and Semple 2022). Cytovouchers of *S. bartramiana* (published as *S. brendae*) have narrower leaves than the holotype of *S. asperata*. Cytovouchers of *S. fallax* have broader leaves similar to the leaves on the holotype of *S. asperata*; diploid counts of 2*n*=18 (Beaudry & Chabot 1959; Melville & Morton 1982 as *S. canadensis*; Semple et al. 1993 as *S. lepida*; Semple et al. 2019; Morton, Venn and Semple 2022; Semple and Chmielewski 2022), 2*n*=36 (Morton, Venn, and Semple 2022), and 2*n*=54 (Melville and Morton 1982) as *S. altissima*; Semple et al. 2019; Morton, Venn, & Semple 2022).

Plants in several populations of *Solidago bartramiana*/*S. fallax* were observed in September 2022 in Corner Brook, Newfoundland and photographed in various stages of flowering and fruiting, but were not pressed and dried (Fig. 6). Plants included a range of variation, with some plants with narrow leaves and less hairy stems (*S. bartramiana*) and plants with somewhat broader leaves with more hairy stems (treated at the time *S. fallax* var. *molina*), with the latter tending to be at earlier stages of flowering. All might be assigned to a broadly defined *S. asperata*. Ploidy levels were not determined.

Further biosystematic studies are needed to fully resolve relations in the *Solidago asperata* complex. A more detailed morphological study is needed to resolve how many species or varieties should be recognized. A fuller sampling of the ranges of *S. bartramiana* (including *S. brendae*) and *S. asperata* (including *S. fallax*) than was included in Semple et al. (2013) should be undertaken to more fully explore variation across the entire ranges of both species in relation to the possibility that both intergrade with the type material of *S. asperata*. While in Semple et al. (2013), *S. bartramiana* (as *S. brendae*) was strongly supported as distinct (89% correct placement *a posteriori* of the *S. bartramiana* specimens to that species), only 67% of the var. *fallax* (i.e. *S. asperata*) specimens were assigned to the taxon, and only 63% of the var. *molina* specimens were assigned to this latter variety. Also, a ploygenomic DNA sequence study of numerous samples of the complex and members of *S. canadensis* should be undertaken to document relationships within the complex with *S. altissima* L. and *S. lepida* as more basal taxa as shown in Semple et al. (2023).

The following new combination is proposed:

Solidago asperata Pursh **var. *molina*** (Fern.) Semple **comb nov.** *Solidago lepida* DC. var. *molina* Fern., Rhodora 17: 9. 1915. *Solidago fallax* (Fern.) Semple var. *molina* (Fern.) Semple, Phytoneuron 2013-57: 8. 2013. **TYPE**: **CANADA**. **Quebec**. Percé, Cap Barré, 16 Aug 1904, *Collins, Fernald, & Pease s.n.* (holotype: GH!; isotype: GH!). Paratype: Percé, Les Murailles, gravelly slopes, 17 Aug 1904, *Collins, Fernald & Pease (*Pease No.) *6220* (GH!).

Solidago fallax var. *fallax* should be treated as a synonym of *Solidago asperata* var. *asperata*.

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Figure 1. Holotype of *Solidago asperata* Pursh BM! ex Herb. Banks, from Hudson's Bay, Canada.

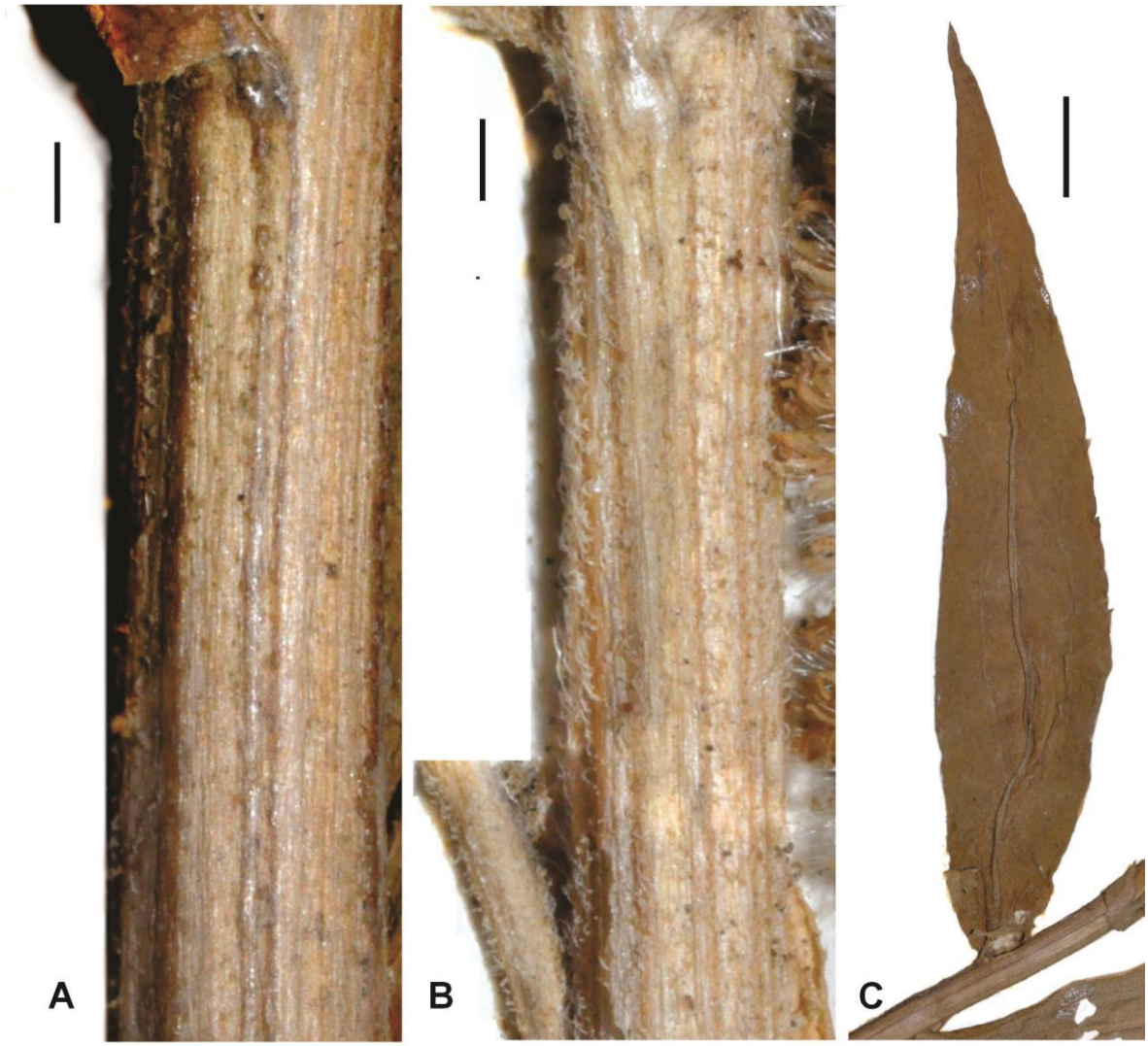

Figure 2. Details of stem morphology of the holotype of *Solidago asperata* Pursh. **A-B**. Mid and upper stems. **C.** Upper stem leaf below the inflorescence. Scale bar = 1 mm in A-B; = 1 cm in C.

Figure 3. Details of floral traits of the holotype of *Solidago asperata* Pursh. **A.** Flowering heads. **B.** Post anthesis disc corollas. **C.** Fruits. Scale bars = 1 mm.

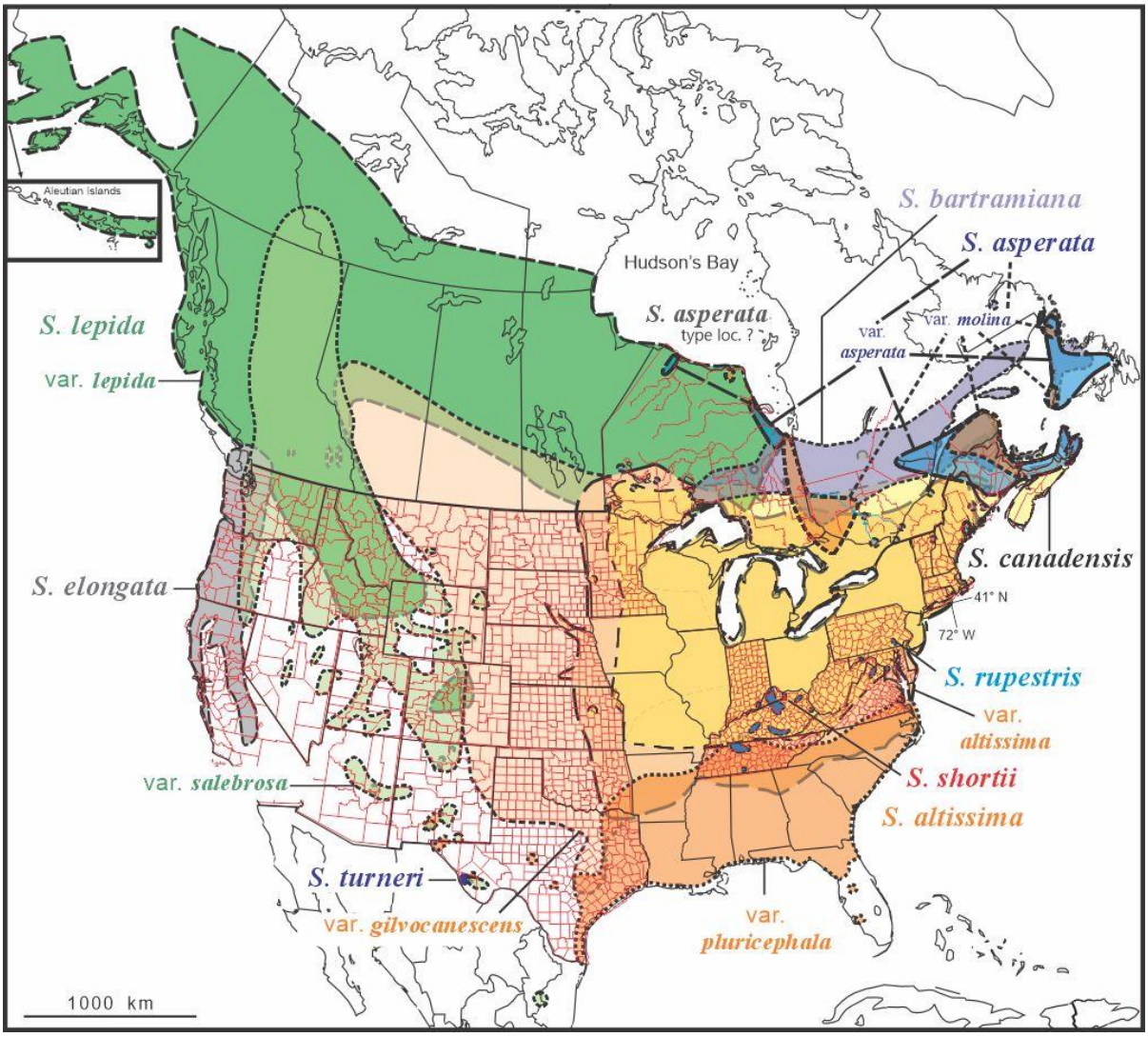

Figure 4. Ranges of distribution in North America of the species and varieties of *Solidago* ser. *Canadensae* based on Semple and Chmielewski (2022). *Solidago fallax* is placed here into synonymy under *S. asperata*.

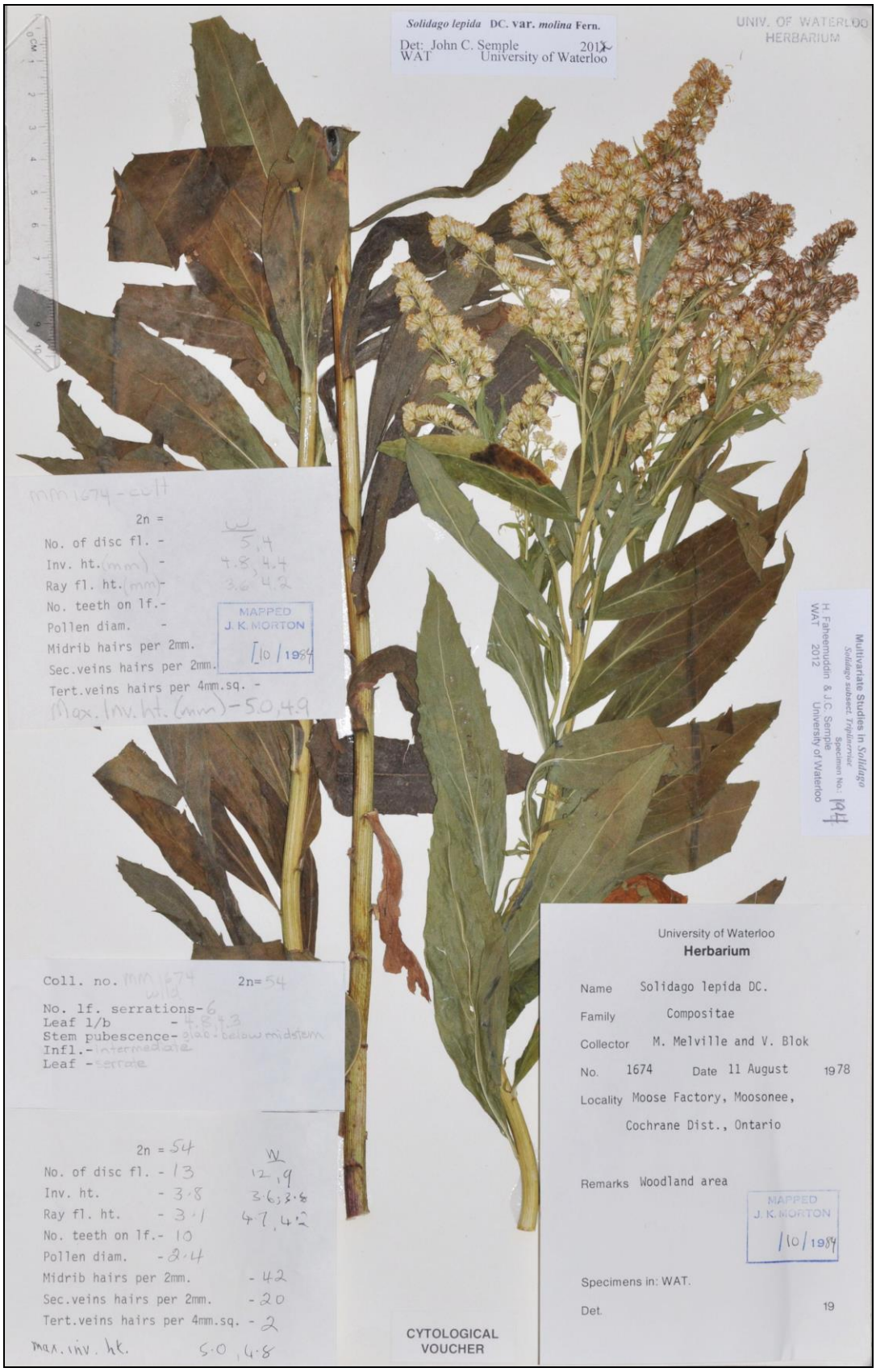

Figure 5. *Solidago asperata* from Moosonee, Ontario, *Melville & Blok 1674* WAT in MT, 2*n*=54.

Figure 6. Plants of the *Solidago asperata* complex along the Newfoundland T'Rail Path, Corner Brook, Newfoundland, Canada. **A-C.** *Solidago bartramiana* morphs. **A.** Multi-stemmed plant. **B-C.** Glabrate narrow-leaved open inflorescence morphs. **D-F.** *Solidago asperata* var. *molina* morphs. **D.** Solitary shoot with broad leaves. **E.** Hairy mid stem with broad serrate leaf. **F.** Open hairy-stemmed inflorescence.