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THE CYTOGEOGRAPHY OF *SYMPHYOTRICHUM LATERIFLORUM*, *S. ONTARIONIS*, *S. RACEMOSUM*, AND *S. TRADESCANTII* (ASTERACEAE: ASTEREAE)

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ABSTRACT

The cytogeographies of chromosome numbers for *Symphyotrichum lateriflorum* ($2n=8_{II}$, 16, 16_{II}, 32, 40, 24_{II}, 48, 64), *S. ontarionis* ($2n$=16, 16_{II}, 32), *S. racemosum* ($2n=8_{II}$, 16, 16_{II}, 32), and *S. tradescantii* ($2n$=16, 32) are presented based on 198 previously published reports and 166 new reports for a total of 364 counts for the four species.

Symphyotrichum lateriflorum (L.) Love & Love (Fig. 1), *S. ontarionis* (Wieg.) Nesom (Fig. 2), *S. racemosum* (Ell.) Nesom (Fig. 3), and *S. tradescantii* (L.) Nesom (Fig. 4) are four similar and closely related, small-headed, white-rayed aster species native to eastern North America. They occur in a range of habitats including deciduous woodlands, thickets and fields, and in wet, often alluvial soils along streams or lake shores, marshes, savannas, bogs, wet meadows, prairie swales, swamps, open bottom woods, and roadsides (Brouillet et al. 2006), each species differing in preferred habitats.

Symphyotrichum lateriflorum is distinguished by having corolla lobes that are ½ to ¾ the length of the upper enlarged portion of the disc corolla; these are white initially and become pink to deep pink at time of pollination (Fig 1D), i.e. when pollen has been presented and the stigmas are receptive. In other species in the genus, disk corollas become a deeper red because they are pale to deep yellow before anthesis — this difference is constant among the taxa. The lower leaf surface usually has hairs along the midvein, usually dense but sometimes moderate to sparse. The corolla lobes of the other three species are shorter and usually only ¼ to 1/3 the length of the enlarged tube portion of the upper corolla (Figs. 2E and 3C). Most individuals of typical *S. ontarionis* have short curved hairs of varying densities on the entire under leaf surface as opposed to just along the veins; the more northern var. *glabratum* Semple is similar but glabrous. The majority of individuals of *S. racemosum* are minutely pilose or glabrous on the lower leaf faces and usually have heads on short to very short peduncles on multiple, long, arching lateral inflorescence branches (Figs. 3A, 3B). Plants

of *S. tradescantii* are mostly short-stemmed with generally short, ascending inflorescence branches and yellow disc florets with 0.5-1.0 mm long lobes (Fig. 4).

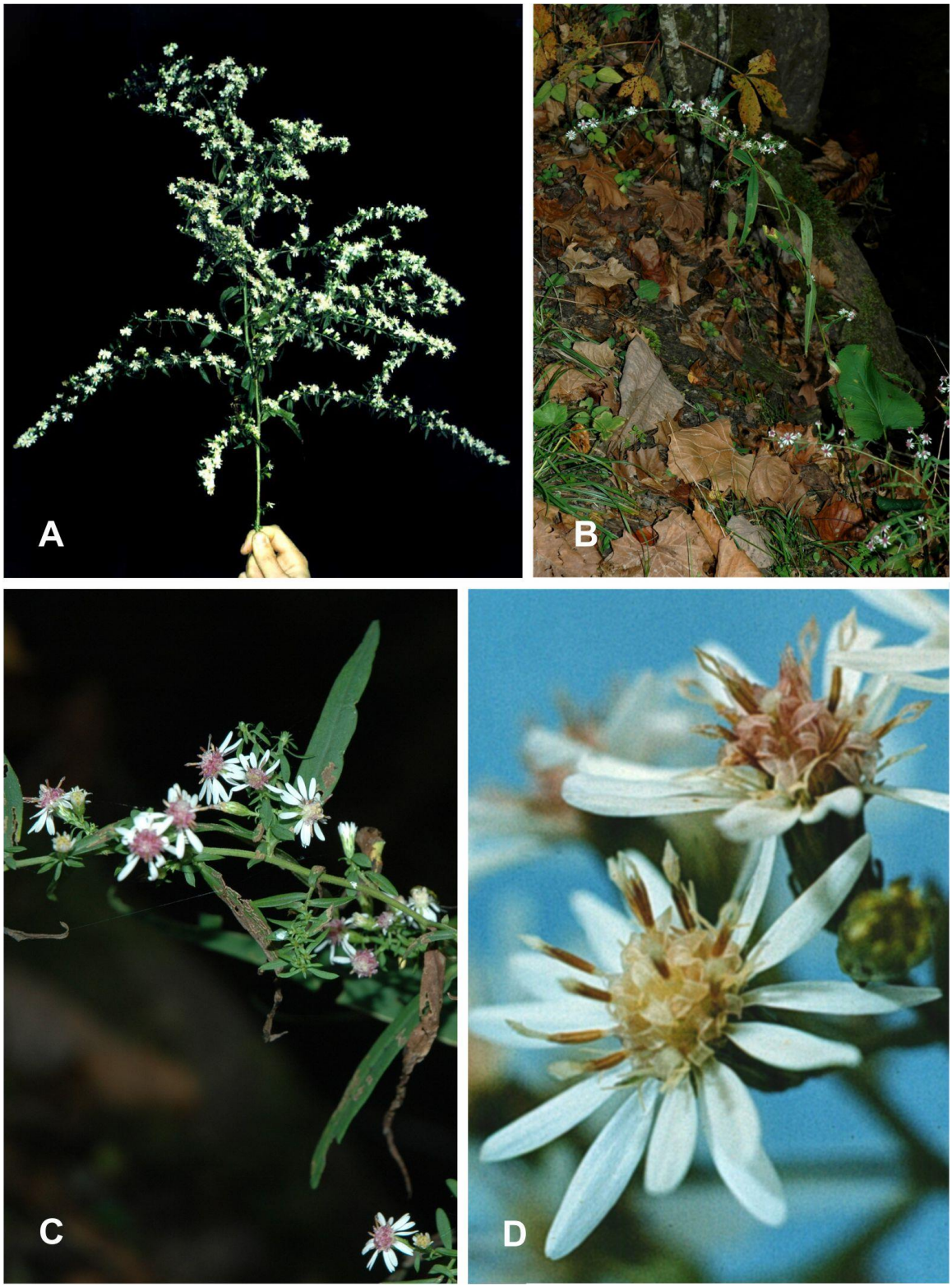

Figure 1. *Symphyotrichum lateriflorum*. **A.** Inflorescence with long lower *racemosum*-like branches, *Semple & Brammall 3087*, New York. **B-C.** Habit and heads, Kentucky. **D.** Heads, Ontario.

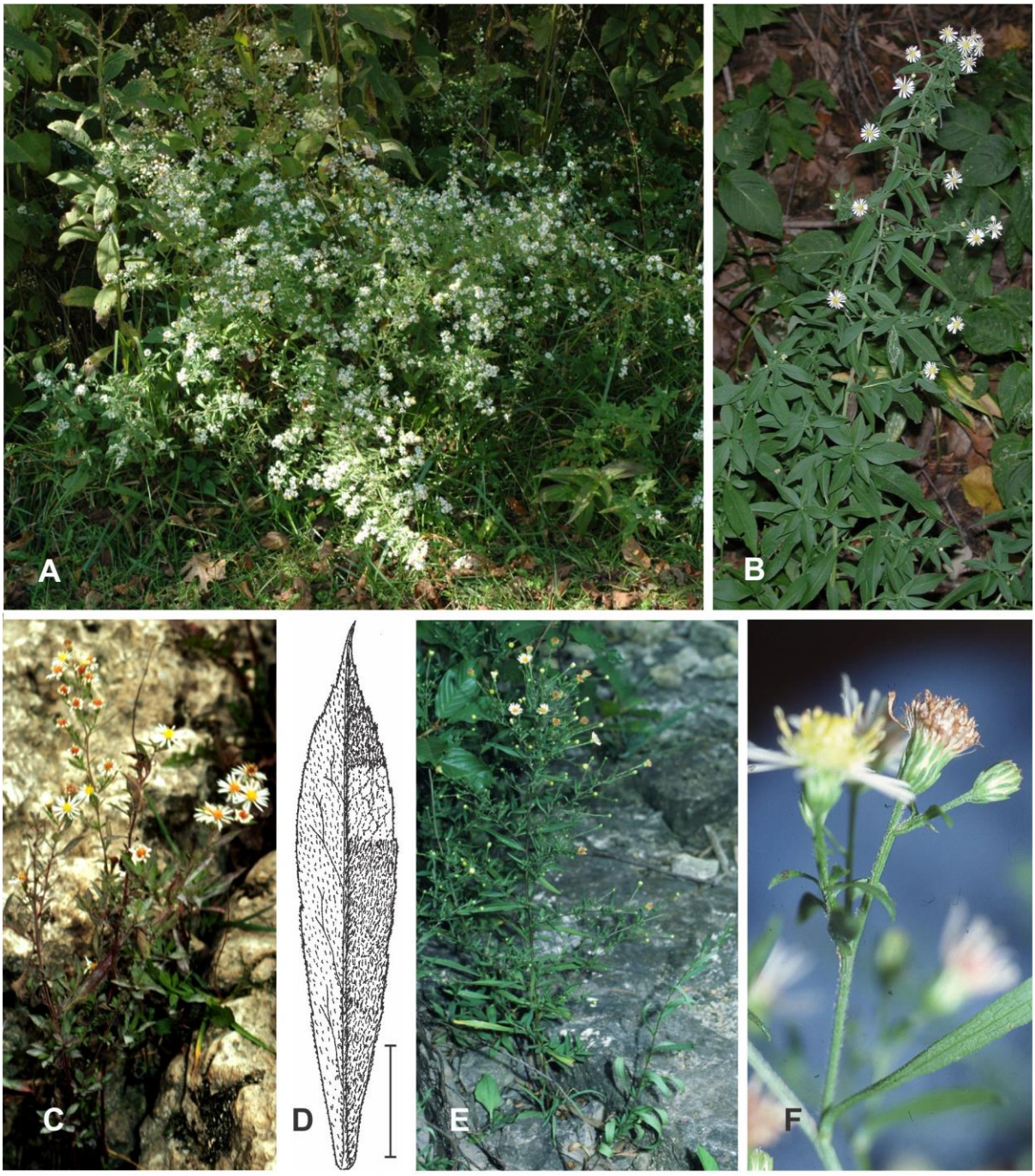

Figure 2. *Symphyotrichum ontarionsis*. **A-D.** Var. *ontarionis*. **A.** Habit, *Semple 11547*, Kentucky. **B.** Habit, *Semple 11312*, Minnesota. **C**. Small plants on limestone by Sauble River, Ontario. **D.** Hairy upper mid stem leaf; adaxial on left side, abaxial on right side (portion without hairs to reveal venation; scale bar = 1 cm. **D-E.** Var. *glabratum*, habit and upper stem leaf and heads, *Semple 4583*, Ontario.

Figure 3. *Symphyotrichum racemosum*. **A.** *Semple 11627*, North Carolina. **B.** Inflorescence branch, *Semple & Chmielewski 6001*, North Carolina. **C.** Head, cultivar "Golden Spray", Waterloo, Ontario.

Symphyotrichum lateriflorum was treated as *Aster miser* L. by Torrey and Gray (1841), as *A. diffusus* Ait. by Gray (1884), and subsequently as *Aster lateriflorus* (L.) Britt. (Britton and Brown 1898; Fernald 1950; Cronquist 1968; Cronquist 1980; Gleason and Cronquist 1991) and as *Symphyotrichum lateriflorum* (Löve and Löve 1982; Nesom 1994; Semple et al. 2002; Brouillet et al. 2006; Weakley et al. 2024 and in multiple local floras not listed here). Lectotypification was proposed by Reveal and Jarvis (2009), who selected LINN 998.6 (a specimen of *Solidago altissima*

L.) and relectotypified by Semple (2024) who selected LINN 998.9 (an aster annotated by A. Gray "Est *A. miser* T. & G./ *A. diffusus* Ait.) as the lectotype of *Solidago lateriflorum*, the basionym of *Symphyotrichum lateriflorum*.

Figure 4. *Symphyotrichum tradescantii*. **A-D.** Whole plants. **A.** New Brunswick, *Semple & Keir 4900* WAT). **B.** Québec, *Semple & Brouillet 3406* (WAT). **C-D.** Québec, *Semple & Brouillet 3395* (WAT). **E.** Mid stem, Nova Scotia, cultivated greenhouse WAT, *Semple & Keir 4860* (WAT).

In total, 94 chromosome number reports have been published previously (Appendix 2) for individuals of *Symphyotrichum lateriflorum* (many to variety as indicated in Appendix 2), 67 counts for *S. ontarionis*, 28 for *S. racemosum* (mostly reported under the names *Aster lateriflorus* (L.) Britt., *Aster ontarionis* Wieg., *Aster racemosus* Ell., and *A. vimineus* Lam.), and 9 counts for *S. tradescantii* (all as *Aster tradescantii*). Thirty-six diploid counts ($2n=8_{II}$, 16) were reported for *Aster lateriflorus* or *S. lateriflorum* by Van Faasen (1963), Jones (1980), Semple and Brouillet (1980), Morton (1981), Semple (1985), Semple and Chmielewski (1987), Semple et al. (1989, 1992, 1993), Semple and Cook (2004), and Semple et al. (2015, 2019). Fifty-five tetraploid counts ($2n=16_{II}$, 32) were reported for *A. lateriflorus* or *S. lateriflorum* by Anderson et al. (1974), Jones (1980), Semple and Brouillet (1980), Semple and Brammall (1982), Kapoor and Gervais (1982), Semple and Brammall (1983), Van Faasen and Sterk (1983), Semple et al. (1983) Semple (1985), Semple et al. (1989, 1992, 2003), Semple and Cook (2004), and Semple et al. (2015, 2019). Two hexaploid counts ($2n=24_{II}$) were reported for *A. lateriflorus* by Van Faasen (1963). One octoploid count ($2n=64$) was reported for *A. lateriflorus* by Semple et al. (1983). Chmielewski and Semple (2001) included a cytogeographic map of *A. lateriflorus* that showed the locations of all known counts up to the date of publication but did not provide data on locations or collections.

Sixty-three tetraploid counts ($2n=16_{II}$, 32) were reported for *Aster ontarionis* var. *ontarionis* by Jones (1980), Semple et al. (1983), Semple (1985), Chmielewski (1987), Semple et al. 1989), and for *S. ontarionsis* var. *ontarionis* by Semple and Cook (2004), and Semple et al. (2015). One diploid count ($2n=16$) and 3 tetraploid counts ($2n=32$) were reported for *A. ontarionis* var. *glabratus* by Semple et al. (1983, 1989, 1996) and for *Symphyotrichum ontarionis* var. *glabratum* (Semple) Brouillet & Bouchard by Semple et al. (2015). Tetraploids are the only ploidy level known in var. *ontarionis* from thoughout its range. No counts have been reported for Arkansas, Wisconsin, Michigan, and Pennsylvania. The cytogeography of the species has not been presented previously. Semple and Brouillet (1980) suggested that the $2n=40$ count for *A. ontarionis* by Huziwara (1965) was an *Aster lanceolalus* ($6x$) × *A. lateriflorus* (4x) hybrid.

Twenty-two diploid counts ($2n=8_{II}$, $2n=16$) were reported for *Symphyotrichum racemosum* by Jones (1980 as *Aster vimineus*), Semple and Brouillet (1980 as *A. vimineus*), Semple et al. (1983 as *A. vimineus*), Semple et al. (1989 as *A. vimineus*), and Semple et al. (2015, 2019). Five tetraploid counts ($2n=16_{II}$, $2n=32$) were reported for *S. racemosum* by Jones (1980 as *A. vimineus* perhaps intergrading with *A. lateriflorus*), Semple et al. (1983 as *A. vimineus*), and Semple et al. (2019). One tetraploid count ($2n=32$) was reported for the *S. racemosum* cultivar "Golden Spray" by Semple et al. (2019). The cytogeography of the species has not been presented previously.

Eight diploid counts ($2n=16$) and one tetraploid count ($2n=32$) were reported for *Symphyotrichum tradescantii* by Semple and Brouillet (1980 as *A. tradescantii*), Semple (1985 as *A. tradescantii*), Semple et al. (1992 as *A. tradescantii*), and Semple and Cook (2004). The cytogeography of the species has not been presented previously.

MATERIALS AND METHODS

Meiotic counts were made from pollen mother cells (PMCs) dissected from buds fixed in the field in 3:1 ethanol (EtOH): glacial acetic acid for a minimum of 24 hours under refrigeration and subsequently stored under refrigeration in 70% EtOH. Mitotic counts were made from root tip cells taken from transplanted wild rootstocks or from seedlings grown from achenes collected in the wild. Root tips were pretreated in 0.01% colchicine or saturated paradichlorobenzene for 2–3 hours, fixed in either Modified Carnoy's Fixative (4:3:1 chloroform:EtOH:glacial acetic acid) or Acetic Alcohol Fixative (3:1 EtOH:glacial acetic acid) for a minimum of 24 hours under refrigeration and hydrolyzed in 1N HCl for 30 min at 60°C before squashing. Anther sacs containing PMCs and meristematic root tips were squashed in 1% acetic orcein and counts of chromosomes were made from freshly prepared material.

Vouchers for all previously unpublished counts were deposited int WAT in MT (or will be and are currently in the possession of the first author) or at MT. Identifications were reconfirmed for this study by the first author either from collections on hand in Waterloo, from digital images taken by the first author, from images available on line through SERNEC (2022), from digital images provided by the staff of the Marie-Victorin Herbarium (MT), and from digital images provided by Jamie Minnaert-Grot at ILL.

RESULTS AND DISCUSSION

Multiple varieties have been proposed for *Symphyotrichum lateriflorum* but no detailed multivariate morphometric or biochemical study has been published indicating which are sufficiently distinct to warrant recognition. A list of basionyms and combinations thought to be part of the *S. lateriflorum* nomenclatural problem is presented in Appendix 1. Density and location of stem hairs varies greatly among individuals of *S. lateriflorum* and was included in a preliminary multivariate morphometric study by the Astereae Lab at U. Waterloo that was not completed in part due to the complexity of the problem and the amount of work needed to complete a full analysis of all proposed varieties. Hair length was highly variable in the species with some plants having long dense hairs over much of the stem (var. *hirsuticaule* (Lindl.) Nesom), and other plants having very short hairs on lower and upper stems. Some plants lacked hairs, or nearly so, on the lower portions of stem while upper stems and stems in the inflorescences were sparsely to densely hairy (var. *lateriflorum*). Shinners (1953) recognized two varieties with long (var. *flagellaris* Shinners) and short (var. *indutus* Shinners) lateral branches in the inflorescence that are likely just extreme growth forms. Leaf width to length ratios varied greatly and there appeared to be a gradient from narrow to broad stem leaves making recognition of var. *angustifolium* (Wieg.) Nesom as a separate variety rather arbitrary. For this cytogeographic study, varieties of *S. lateriflorum* could not be assigned to vouchers with confidence although some individuals were similar to type material and others appeared to be intermediate or lacked some of the features. Clearly more research involving a large number of specimens is needed to determine if any of the proposed varieties are really distinct and warrant recognition.

Identification of the cytovouchers for 255 (70%) of the 364 counts for specimens of *Symphyotrichum lateriflorum*, *S. ontarionis*, *S. racemosum*, and *S. tradescantii* were visually confirmed in April-June of 2024. Images of vouchers not seen were not located during searches on line (SERNEC) or at ILL or MT (where all Chmielewski collections have been sent but are not yet incorporated into WAT in MT), or among unmounted specimens still at U. Waterloo. The majority of the unseen collections were made by the authors of this report and were likely correctly identified to species decades ago. Images of many but not all vouchers for counts by Almut Jones were seen and provided recently by ILL. Vouchers for the small number of van Fassen, Kapoor, and Löve counts were not located or seen. Thus, locating and confirming the identifications of all cytovouchers listed in Appendix 2 and 3 is an on-going task.

The cytogeography of *Symphyotrichum lateriflorum* is shown in Fig. 5 and includes 141 new reports (Appendix 3). The northern limits of the range of *S. lateriflorum* are based on reports mapped in Canadensys (https://www.canadensys.net/occurrence/search?taxonKey=7832723). Diploids (2*n*=16) are most common in northern Michigan, Ontario and southern Québec but do occur scattered throughout the range of the species. Diploids appear to be common in the southern Appalachian Mountains. The three samples from Mississippi are diploid. Tetraploids (2*n*=32) occur throughout most of the range and are the only ploidy level known from Wisconsin, Iowa, Illinois, Indiana, Ohio, and Pennsylvania, and are dominant in Nova Scotia and much of the range in the USA. Tetraploids in Québec occur in two disjunct areas: the Ottawa and the Richelieu River valleys. A morphometric analysis of Québec specimens showed that they were slightly morphologically different (Bouchard 1994), suggesting distinct origins for these populations. Legault and Brouillet (1989) also found a post glaciation

cytotype migration pattern into Québec in *Symphyotrichum cordifolium* (L.) Nesom. The dominance of diploids in the northwest portion of the range, of tetraploid in the east, and two distinct tetraploid populations in Québec are likely all the result of the patterns of post-glacial migrations into the glaciated northern portions of the range of the species. Sampling in Minnesota, Oklahoma, Arkansas, Texas, Louisiana, and Florida is limited and no counts have been reported for *S. lateriflorum* from along the western range limits in eastern Kansas and Nebraska. Hexaploid counts (2*n*=48) have been reported from southeastern Manitoba, several from south-central Michigan, and one from northern Virginia. Two octoploid individuals (2*n*=64) were sampled in the mountains of northwestern South Carolina and the piedmont of northern Alabama.

The cytogeography of *Symphyotrichum ontarionis* is shown in Fig. 6, which includes 5 new reports (Appendix 3) and the ranges of var. *ontarionis* and var. *glabratum*. The species occurs in eastern North America from Manitoba to Québec south to eastern Louisiana and northern Florida. Diploids (2*n*=16) are unknown in var. *ontarionis*, while tetraploids (2*n*=32) are known throughout the range of the variety. Diploids and tetraploids occur in var. *glabratum.* the former all within the formerly glaciated northern range of the species. No counts are known for Wisconsin, Michigan, Pennsylvania, Arkansas, and along the western limits of the variety.

The cytogeography of *Symphyotrichum racemosum* is shown in Fig. 7 and includes 8 new reports (Appendix 3). The species occurs in the eastern USA from Illinois to southern New Hampshire south to northern Florida and west to eastern Oklahoma and Texas. Disjunct populations occur in southeastern Québec. Diploids (2*n*=16) were sampled more frequently than tetraploids (2*n*=32), but sampling was relatively limited in most areas of the range. Diploids were the only ploidy level sampled in Louisiana, Mississippi, Alabama, South Carolina, Delaware, New Jersey, Pennsylvania, and the southern New England states. Tetraploids were the only samples in Oklahoma, Georgia, and southern New York. More intensive sampling is needed in most parts of the range.

The cytogeography of *Symphyotrichum tradescanti* is shown in Fig. 8 and includes 12 new reports (Appendix 3). The cytogeography of the species has not been presented previously. All cytological samples come from the northern two thirds of the range on rocky margins of rivers or gravelly shore lines of ponds. Only diploids (2*n*=16) are known from northeastern New York, Vermont, and Québec. Diploids were also found in New Brunswick (once) and Nova Scotia (3 scattered locations). Tetraploids were found twice in Maine, once in New Brunswick, and once in Nova Scotia, but sample sizes in Maine and New Brunswick are limited. Herbarium specimens (not cytological vouchers) from southern New York, northern New Jersey, and northeastern Massachusetts were all collected in the 1800s and early 1900s. Some non-cytovoucher collections seen were from northcentral Massachusetts made in 1977-1978 e.g. *Ahles 85827* NEBC 26 Jul 1978 from a rock outcrop on the Connecticut River near Holyoke, Massachusetts. Two non-cytovoucher collections from Connecticut were seen via SERNEC. The *Hayden 217* UVMVT voucher was collected in 1877 and appears to be *S. racemosum* and is a small plant with long diverging inflorescence branches with heads on short peduncles. The *Young 21* LSU voucher collected in New Haven, Connecticut, in September 1874 is an even smaller plant but also appears to be *S. racemosum* with short divergent inflorescence branches with multiple heads on short peduncles. Thus, *S. tradescantii* may be extinct in Connecticut, if it was ever present. The species may be extinct in the southern part of the range due to loss of habitats as the result of man-made disturbances of appropriate habitats. Overall, the species is not common throughout its range except perhaps along the St. Lawrence River margins east and south of the Québec City region. Finding collections for this study often involved considerable searching along the rocky margins of streams or ponds.

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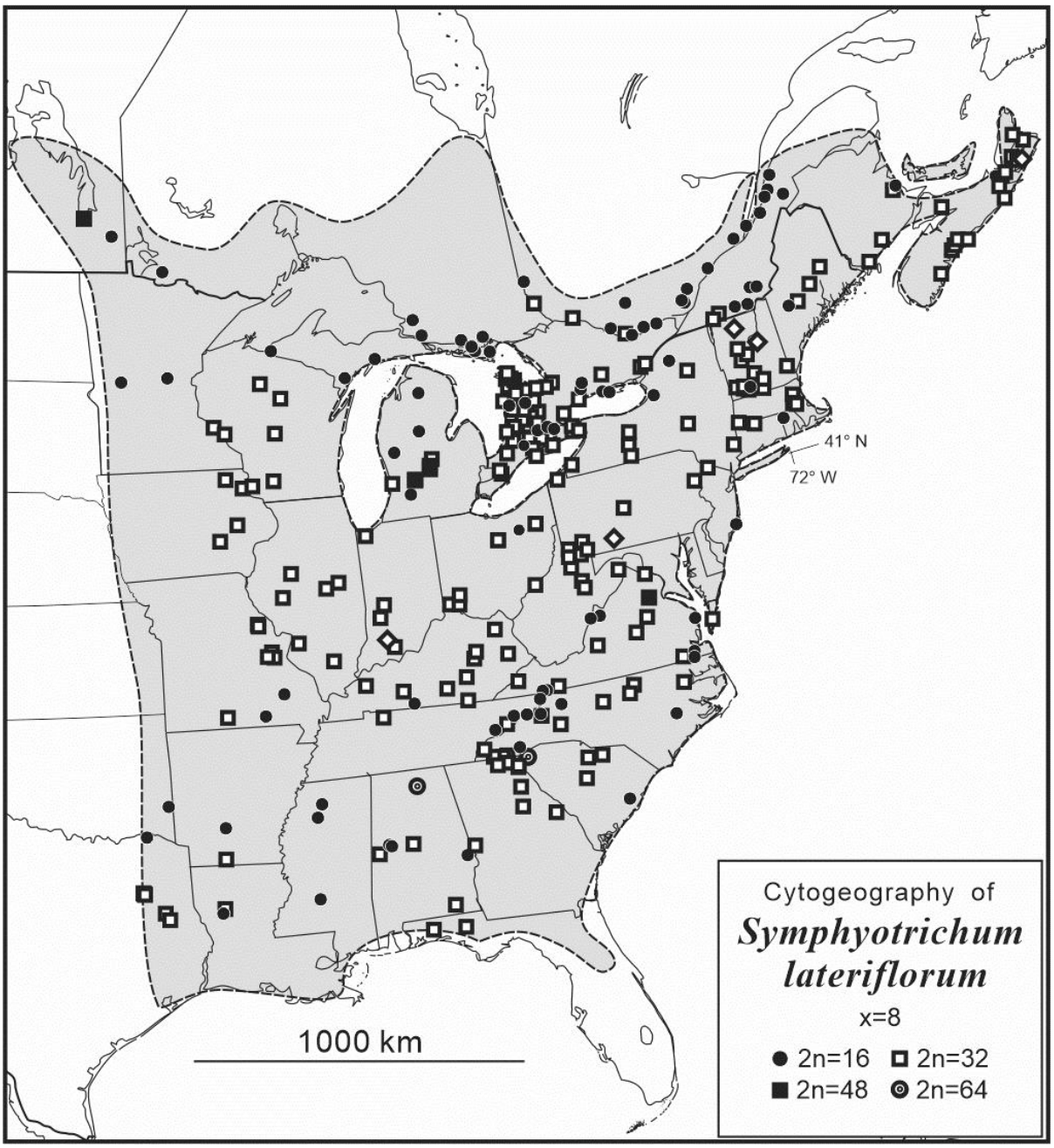

Figure 5. Distribution of cytotypes of *Symphyotrichum lateriflorum*; 2*x* black dots, 4*x* white squares with black outlines, 6*x* black squares, 8*x* black circle in large black circles; range based on all collections seen and literature.

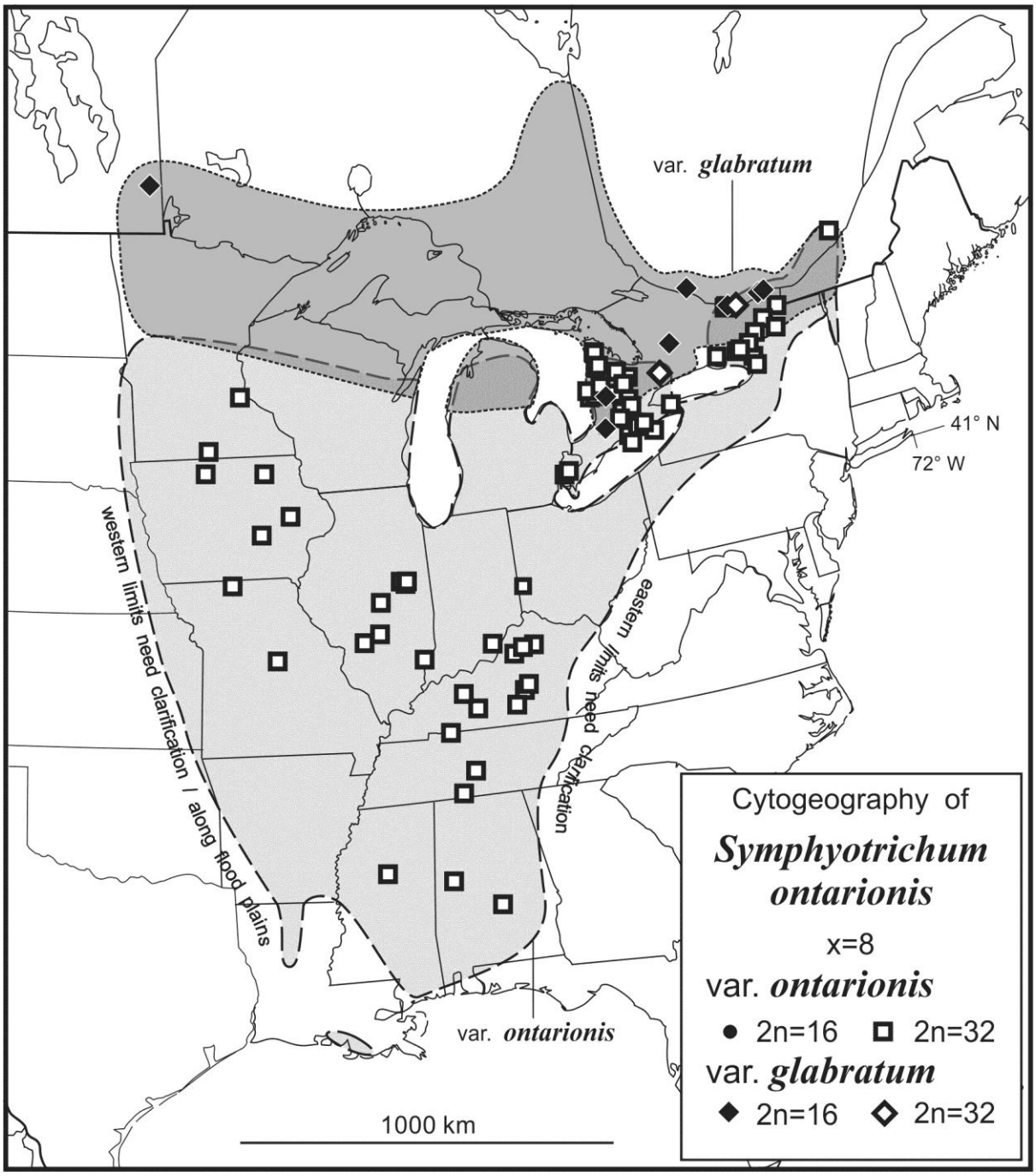

Figure 6. Distribution of cytotypes of *Symphyotrichum ontarionis*: var. *ontarionis* 2*x* black dots, 4*x* white squares with black outlines, var. *glabratum* 2*x* black diamonds, 4x white diamonds with black outlines); ranges based on all collections seen and literature.

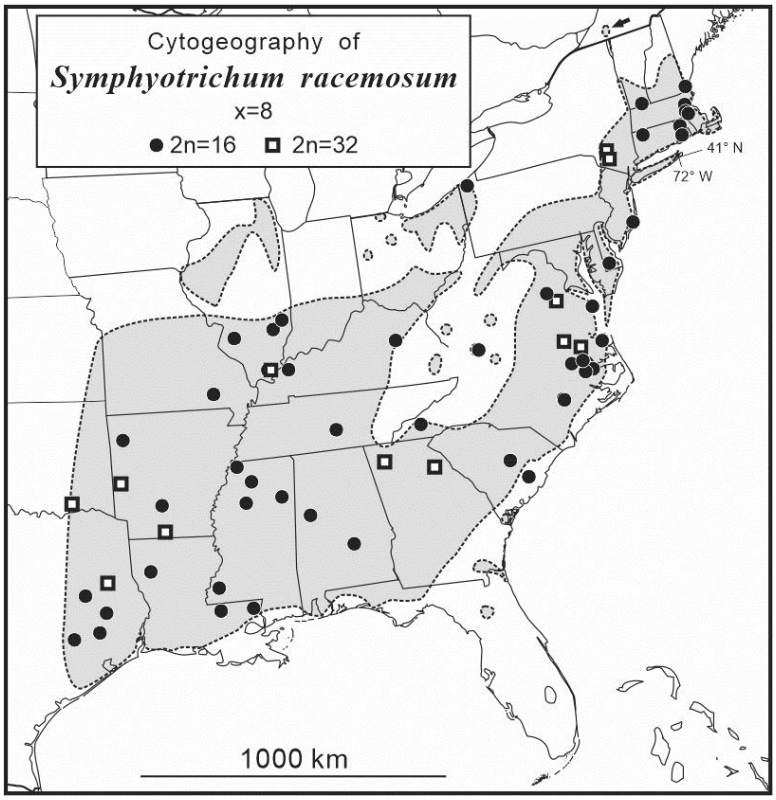

Figure 7. Distribution of cytotypes of *Symphyotrichum racemosum*; arrow indicates disjunction population in Québec; 2*x* black dots, 4*x* white squares with black outlines; range based on all collections seen and literature.

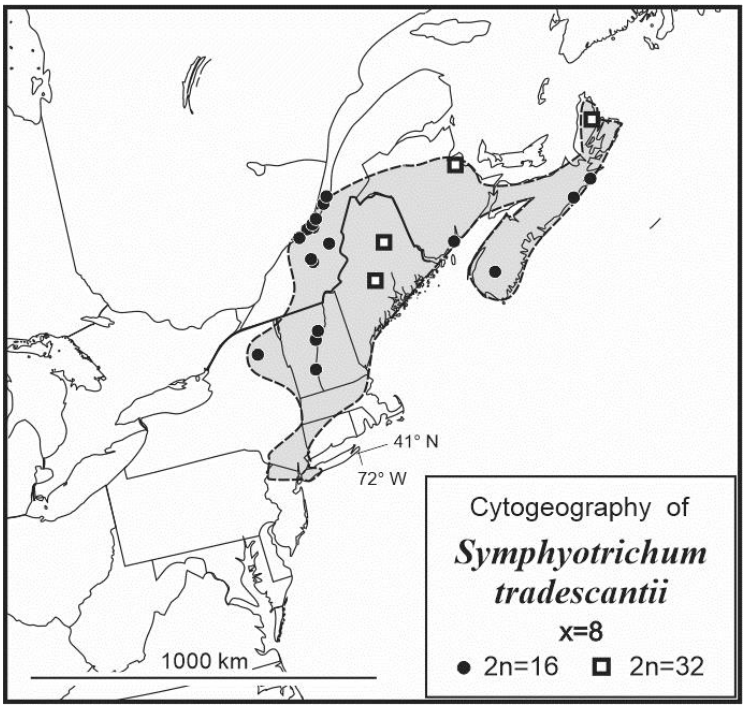

Figure 8. Distribution of cytotypes of *Symphyotrichum tradescantii*; 2*x* black dots, 4*x* white squares with black outlines, 6*x* black squares; range based on all collections seen and literature. The species grows along streams and rivers in cracks in rocks or in sand and gravel pond margins.

Appendix 1. Basionyms and combinations that have been proposed for plants treated here as *Symphyotrichum lateriflorum*. Names are listed in chronological order of the basionyms.

Solidago lateriflora L., Sp. Pl. 879. 1753. non Ait. (1789), nec Willd. (1803), nec Raf. ex DC. (1836). *Aster lateriflorus* (L.) Britt., Trans. N.Y. Acad. Sci. 9(1): 11. 1889. ***Symphyotrichum lateriflorum*** (L.) Löve & Löve, Taxon 32: 359. 1982. TYPE: *Kalm s.n.*, LINN. 998.6 (lectotype selection by Reveal and Jarvis 2009; this is *Solidago altissima* L.). Semple (2024) selected LINN 998.9! because this is a specimen of *Symphyotrichum lateriflorum*. LINN 998.9 was annotated by A. Gray as "Est A. miser T & G./ *diffusus* Ait. AG " without date and is better alternative lectotype because it is a specimen of *Symphyotrichum lateriflorum*..

Aster miser L., Sp. Pl. 877. 1753. TYPE: "Aster ericoides, meliloti agrariae umbone", Dillenius, Hort. eltham. 40, t. 35, f. 39. 1732 (LT [A. Gray, 1882]. Based on Dillenius, nom. rej. by Gray (1882). Topotype: Herb. Sherard. 1780 (OXF). = A. *dumosus* according to LTP (Jarvis, printout: Aug 1994).

Aster diffusus Dryand. in Ait., Hort. Kew. ed.1. 3: 205. 1789. *A. miser* L. [g] *diffusus* (Dryand. in Ait.) Torr. & Gray, Fl. N. Amer. 2: 130. 1841. TYPE: "Nat. North America. Intro. 1777, Kennedy & Lee" (HT: Hort. Kew, not seen)

Aster divergens Dryand. in Ait., Hort. Kew. I. 205. 1789. *Aster miser* var. *divergens* (Dryand.) L.C.Beck, Bot. North. Middle States [Beck] 186 (1833). TYPE: "Nat. North America. Cult. 1758, by Mr. P. Miller" (HT: Hort. Kew, not seen)

Aster scoparius Nees, Syn. Aster. 28. 1818. non DC. (1836) TYPE: not seen.

Aster divaricatus Raf. ex DC., Prod. 5: 241. 1836. non L. (1753), nec (Nutt.) Torr. & Gray (1841). TYPE: not seen

Aster miser L. var. *abbreviatus* DC., Prod. 5: 243. 1836. TYPE: not seen.

Aster vimineus Lam., Encycl. Meth. 1: 306. 1783. non Nees, (1818), nec Willd. (date?). *A. miser* L. var. *vimineus* (Lam.) Farwell, Ann. Rep. Mich. Acad. Sci. 6: 214. 1904. SYNTYPES: "originaire du Canada, & cultivée au Jardin du Roi."(LT [A.Jones 1984. Phytologia 55: 373-388.]: "H.R." P-LA!; ILT: P-LA!). "Virga aurea Canadensis ... Juss." P-JU. [The type material =? *A. lateriflorus* var. *lateriflorus* - Jones 1986) is not *A. vimineus* sensu auct. Jones (1980a,b & 1984) believes that *A. vimineus* sensu auct. = *A. fragilis* Willd.] Authentic specimen: P-LA!, vegetative =? *A. lateriflorus* var. *angustifolius*. jcs = *A. dumosus* L. or close, belongs with plants called *A. vimineus* var. *subdumosus*, but not like type of that varietal name.

Aster ramosissimus Mill., Gard. Dict. ed. 8. no. 21. 1783. TYPE: "Hort." (HT: BM!, "Type Specimen" label; "Aster ramossimus Mill. Dict. no. 21! 1768)"; "Aster pendulus Mss.-Sol. in Hort. Kew. iii. 204! (1789).

Aster pendulus Dryand. in Ait., Hort. Kew. ed.1. 3: 205. 1789. *Aster lateriflorus* (L.) Britt. var. *pendulus* (Ait.) Burgess in B. & B. Il. Fl. 3: 380. 1898. SYNTYPES: "Nat. North America, cult. 1758 by Mr. P. Miller". LT JCS on sheet 7 July 2003: BM!, same as *A. ramosissimus* Mill.) "Hort. Collins." (BM!, "*Aster diffusus* [crossed out]/ *pendulus* Sol. in Hort. Kew." [above "diffusus]). Shinners (1953) in protologue of *A. eulae* states he does not feel var. *pendulus* deserves recognition.

Aster myrtifolius Willd., Enum. hort. Berol., Suppl. 59. 1814. nom. nud. *A. miser* L. β *myrtifolius* (Willd.) DC., Prod. 5: 243. 1836. TYPE: Schl.No. 15934 (HT: B!) ¡

Jones & Hiepko (1981) assign the HT to *A. lateriflorus*. The corollas are deeply lobed, the capitulescence is vimineoid, the leaves are serrate and wide. This may be the best existing name for vimineus sensu auct. G. Don in Loudon (1830) listed publ. date as 1812.

Aster horizontalis Desf., Cat. Hort. Par. ed. 3. 402. 1829. *Aster lateriflorus* (L.) Britt. var. *horizontalis* (Desf.) Farwell, Asa Gray Bull. 3: 21. 1895. *Aster diffusus* Dryand. in Ait. var. *horizontalis* (Desf.) A. Gray, Synop. Fl. N. Amer. 1,2: 187. 1884. ***Symphyotrichum lateriflorum*** (L.) Löve & Löve **var. *horizontale*** (Desf.) Nesom, Phytologia 77: 285. 1994. TYPE: (T: not seen)

Aster hirsuticaulis Lindl. in DC., Prod. 5: 242. 1836. *A. miser* L. *hirsuticaulis* (Lindl. in DC.) Torr. & Gray, Fl. N. Amer. 2: 131. 1841. *A. diffusus* Dryand. in Ait. var. *hirsuticaulis* (Lindl. in DC.) A. Gray, Synop. Fl. N. Amer. 1,2: 187. 1884. *A. diffusus* Ait. var. *thyrsoideus* A. Gray f. *hirsuticaulis* (Lindl. in DC.) Voss, Vilmorin. Blumengartn. (ed. 3) 1: 467. 1894. *Aster lateriflorus* (L.) Britt. var. *hirsuticaulis* (Lindl.) Porter, Mem. Torrey Bot. Club 5: 324. 1894. ***Symphyotrichum lateriflorum*** (L.) Löve & Löve **var. *hirsuticaule*** (Lindl.) Nesom, Phytologia 77: 285. 1994.TYPE: USA. NEW YORK. "juxta Albany", *Torrey s.n.* (HT/LT: CGE!)

Aster miser L. *miserrimus* Torr. & Gray, Fl. N. Amer. 2: 130. 1841. TYPE: USA. LOUISIANA. Jacksonville, 1831, *Drummond s.n.* (HT/LT: not seen)

Aster miser L. β *glomerellus* Torr. & Gray, Fl. N. Amer. 2: 130. 1841. *A. lateriflorus* (L.) Britt. var. *glomerellus* (Torr. & Gray) Burgess, B. & B. 3: 365. 1898. TYPE: USA. MISSOURI. St. Louis, 1831, *Drummond s.n.* (HT/LT: not seen)

Aster diffusus Dryand. in Ait. var. *variifolius* Peck, N.Y. St. Mus. Rep. 1892: 46. 1893. TYPE: USA. NEW YORK. "Sand Lake and Catskill mountains. September." (HT: not seen)

Aster agrostifolius Burgess in Small, Fl. S.E.U.S. 1226, 1340. 1903. TYPE: USA. MASSACHUSETTS. Martha's Vineyard: 1888, *Burgess s.n.* (T: "in Herb. Burgess," not seen)

Aster spatelliformis Burgess in Small, Fl. S.E.U.S. 1225, 1340. 1903. *Aster lateriflorus (L.) Britt. var. spatelliformis* (Burgess in Small) A.G. Jones, Phytologia 55: 379. 1984. ***Symphyotrichum lateriflorum*** (L.) Löve & Löve **var. *spatelliforme*** (Burgess in Small) Nesom, Phytologia 77: 285. 1994. TYPE: USA. FLORIDA. Jacksonville, 1895, *A.H. Curtiss s.n.* (HT: NY!) Jones, Phytologia 55: 379. 1984.

Aster lateriflorus (L.) Britt. var. *angustifolius* Wieg., Rhodora 30: 174. 1928. TYPE: USA. MASSACHUSETTS. Cheshire, 1915, *Churchill s.n.* "in herb. N. Eng. Bot. Club". ***Symphyotrichum lateriflorum*** (L.) Löve & Löve **var. *angustifolium*** (Wieg.) Nesom, Phytologia 77: 285. 1994. (HT: GH!)

Aster lateriflorus (L.) Britt. var. *tenuipes* Wieg., Rhodora 30: 174. 1928. *Aster tenuipes* (Wieg.) Shinners, Rhodora 45: 346. 1943. non Makino (1898). TYPE: CANADA. PRINCE EDWARD ISLAND. Dundee, 1912, ?*Fernald, Long & St. John 8140* (HT: GH!). ***Symphyotrichum lateriflorum*** (L.) Löve & Löve **var. *tenuipes*** (Wieg.) Nesom, Phytologia 77: 285. 1994 PTs: PRINCE EDWARD ISLAND. Kings Co., Dundee, Larch swamp, 26 Aug 1912, *Fernald, Long & St. John 8138* (CAN!) [A.G. Jones annotation of type places this as synonym under var. *hirsuticaulis*]

Aster acadiensis Shinners, Rhodora 46: 31. 1944. New name for *Aster tenuipes* (Wieg.) Shinners (1943), non *Aster tenuipes* Makino (1898. Bot. Mag. Tokyo 12: 64.).

Aster lateriflorus (L.) Britt. var. *flagellaris* Shinners, Field & Lab. 21: 157. 1953. ***Symphyotrichum lateriflorum*** (L.) Löve & Löve var. ***flagellare*** (Shinners) Nesom, Phytologia 77: 285. 1994. TYPE: USA. TEXAS. Henderson Co.: 2.5 mi SE of Eustace, 2 Nov 1947, *Shinners 9589* (HT: BRIT ex SMU!)

Aster lateriflorus (L.) Britt. var. *indutus* Shinners, Field & Lab. 21: 158. 1953. TYPE: USA. TEXAS. Daingerfield State Park, 2 mi SE of Daingerfield, 31 Oct 1946, *Whitehouse 17641* (HT: BRIT ex SMU!)

Apendix 2. Previously reported chromosome number determinations in *Symphyotrihcum lateriflorum*, *S. ontarionis*, and *S. racemosum* from Canada and the USA; all vouchers in WAT; *Bt* = L. Brouillet; *C*, J. Canne; *Ch* = J. Chmielewski; *H*, C. Hart; *S* = J.C. Semple; *S & S* = J.C. & B. Semple.

Symphyotrichum lateriflorum (L.) Love & Love — $2n= 7_{II}+2_{I}$ or 8_{II} USA. **Louisiana**. Natchitoches Par.:, *A.Jones 4883* orig. *4458* ILL **((**Jones 1980 as *A. lat.* var. *flagellaris*). **Oklahoma**. Choctaw Co., *A.Jones 5311* orig. *Taylor 27371* ILL (Jones 1980 as *A. lat.* var. *flagellaris*). — $2n=8_{II}$ CANADA. **Nova Scotia**. Halifax Co., *A.Jones 4308* ILL (Jones 80 as *A. lat.* var. *tenuipes*). **Québec.** Riviere du Loup Co., *A.Jones 4251* ILL (Jones as *A. lat.* var. *tenuipes*), *A.Jones 4258* ILL (Jones as *A. lat.* var. *tenuipes*). USA. **Michigan.** Kalamazoo Co., *Van Faasen 108* herb-vanf. (Van Faasen 1963 to sp.); Newaygo Co., *Van Faasen 344* herb-vanf. (Van Faasen 1963 to sp.). **Mississippi.** Lafayette Co., *A.Jones 4876* orig. *4419* ILL (Jones 1980 intergrading with *A. vimineus* var. *subdumosus*). — $2n=8_{II}$+1B super. USA. **Texas**. Smith Co., *A.Jones 4785* orig. *4448* ILL, *A.Jones 4689* orig. *4437* ILL (Jones 1980 as *A. lat.* var. *indutus*). **Texas.** Smith Co., *A.Jones 4828* orig. part of *4444* ILL (Jones 1980 as A. lat. var. indutus). — $2n$=16 CANADA. **Manitoba.** Delta, *Löve & Löve 5253* (not found) (Löve and Löve 1982a as *S. lat.*). **New Brunswick**. Westmoreland Co., *S & B. Semple 11469* WAT. (Semple et al., 2019 as *S. lat.* var. *lat.*). **Nova Scotia**. Picton, Co., *Morton & Venn NA12505* WAT (Semple & Brouillet 1980 as *A. lat.*). **Ontario.** Algoma Dist., *S 11092* WAT (Semple et al. 2015 as. *S. lat.* var. *hirsuticaule*); Brant Co., *S 2398* WAT (Semple and Brouillet 1980 as. *A. lat.*); Peterborough Co., *Semple 2064* WAT (Semple and Cook 2004 as *S. lat.* var. *lat.*), *S & B. Semple 11046* WAT (Semple et al. 2015 as *S. lat.* var. *lat*); Sudbury Dist., *S 11078* WAT (Semple et al. 2015 as. *S. lat.* var. *hirsuticaule*). **Québec**. Wolfe Co., *S & K 4604* WAT (Semple and Cook 2004 as *S. lat.* var. *lat.*). USA. **Maine**. Franklin Co., *S & K 4628* WAT (Semple et al.1983 to sp.). **Minnesota**. Mille Lacs Co., *S 9065* WAT (Semple et al. 1989 as *A. lat.* var. *lat.*). **New York.** St. Lawrence Co., *S & Bt 3685* WAT (Semple & Brouillet 1980 as *A. lat.*). **North Carolina**. Henderson Co., *Semple 10823* WAT (Semple and Cook 2004 as *S. lat. var. lat.*); Wilson Co., *S & Ch 6009* WAT (Semple et al. 1992 as *A. lat.*). **Oklahoma**. Flore Co., *S & Suripto 9984* WAT (Semple et al. 1993 as *A. lat.*). **Tennessee.** Blount Co., *Cook & Tereszchuk 276* WAT (Semple at al. 2015 as *S. lat. var. lat.*); Cooke Co., *Cook & Tereszchuk 280* WAT (Semple at al. 2015 as *S. lat. var. lat.*); Johnson Co., *Cook & Tereszchuk 324* WAT (Semple et al. 2015 as *S. lat. var. lat.*); Unicoi Co., *S 10819* WAT (Semple and Cook 2004 as *S. lat. var. lat.*). **Virginia**. Bath Co., W of Mountain Grove, *S 10724* WAT (Semple and Cook 2004 as *S. lat. var. lat.*); Washington Co., *S 10762* WAT (Semple and Cook 2004 as *S. lat. var. lat.*), *S 10766* WAT (Semple and Cook 2004 as *S. lat. var. lat.*). — $2n$=16+2-4 supers. USA. **Michigan.** Gogebic Co., Ironwood, *Morton s.n.* WAT (Morton 1981 as *A. lat.*). — $2n=16_{II}$ CANADA. **New Brunswick**. Charlotte Co., *A.Jones 4319* ILL (Jones 1980 as var. *tenuipes*); Kent Co., *A.Jones 4299* ILL (Jones 1980 as var. *tenuipes*). USA. **Alabama**. Shelby Co., *A.Jones 4838* orig. *4476* ILL (Jones 1980 as *A. lat.* var. *lat.*). **Illinois.** Champaign Co., *Nurtjahjo* (several no. not given) ILL (Jones 1980 as *A. lat.* var. *lat.*); Madison Co., St. Jacob, *A.Jones 3697* ILL (Jones 1980 as *A. lat.* var. *lat.*); Piatt Co., *A.Jones 1240* orig. *382, 2531* orig. *337* ILL (Jones 1980 as *A. lat.* var. *lat.*). **Indiana.** Floyd Co., *A.Jones 3734* orig. *AGJ & Nurtjahjo 3683* ILL (Jones 1980 as *A. lat.* var. *lat.*). **Kentucky.** Carter Co., A.Jones *4801* orig. *s.n.* ILL (Jones 1980 as *A. lat.* var. *lat.*). **Louisiana**. Natchitoches Par.: *A.Jones 4871* orig. *4453* ILL (Jones 1980 as *A. lat.* var. *flagellaris*). **Massachusetts.** Middlesex Co., *A.Jones 3287* orig. *Sheviak 882* ILL (Jones 1980 as *A. lat.* var. *lat.*). **Michigan**. Clinton Co., St. Johns, Van Faasen 116 herb-vanf. (Van Faasen'63 as *A. lat.*); Gratiot Co., 7 mi NE of Ashley, Van Faasen 128 herb-vanf. (Van Faasen'63 as *A. lat.*). **New Hampshire**. Cheshire Co., Gregory 506 NY (Anderson et al. 1974 as *A. lat.*); Strattford Co., *A.Jones 4339* ILL (Jones 1980 as var. *tenuipes*); Sullivan Co., *A.Jones 5436* orig. *Sheviak 879* ILL (Jones 1980 as *A. lat.* var. *angustifolius*). **New Jersey.** Sussex Co., *Van Faasen 2780* herb-vanf. (Van Faasen and Sterk 1973 as *A. lat.*). **Pennsylvania**. Monroe Co., Van Faasen 2763 herb-vanf. (Van Faasen & Sterk 1973 as *A. lat.*). **Vermont**. Windham Co., *A.Jones 4536* orig. *4350* ILL (Jones 1980 as *A. lat.* var. *angustifolius*), A.Jones *4589* orig. *4351* ILL (Jones 1980). **Wisconsin**. Price Co., *A.Jones 4396* orig. *Jelinek 339* ILL (Jones 1980 as var. *tenuipes*). — $2n$=32 CANADA. **New Brunswick**. York Co., *Semple & B. Semple 11522* WAT (Semple et al. 2019 as *S. lat.* var. *lat.*). **Nova Scotia**. Halifax Co., *Kapoor 80-04* kapoor-herb (Kapoor and Gervais 1982 as *A. lat.*), *Kapoor 80-05* kapoor-herb (Kapoor and Gervais 1982 as *A. lat.*); Queens Co., *S & B. Semple 11505* WAT (Semple et al. 2019 as *S. lat.* var. *lat.*). **Ontario**. Bruce Co., *Bt & S 717* WAT (Semple and Brouillet 1980 as *A. lat.*), *S &*

Brammall 2443 WAT (Semple and Brammall 1983 as. *A. lat.*). USA. **Alabama.** Dale Co., *S & Suripto 10152* WAT (Semple et al. 1993 as *A. lat.*). **Connecticut**. Hartford Co., *S & Bt 3611* WAT (Semple & Brouillet 1980 as *A. lat.*). **Florida.** Washington Co., *S 10947* WAT (Semple and Cook 2004 as. *S. lat.* var. *lat.*). **Georgia**. Greene Co., *S 10869* WAT (Semple and Cook 2004 as *S. lat.* var. *lat.*); Harris Co., *S 10977* WAT (Semple et al. 2015 as *S. lat*. var. *lat*.); Richmond Co., *S et al. 4052* WAT (Semple and Brouillet 1980 as *A. lat.*); Union Co., *Cook & family 619* WAT (Semple et al. 2015 as *S. lat*. var. *lat*.). **Illinois.** Hamilton Co, *S & Suripto 9419* WAT (Semple et al. 1993 as *A. lat.*). **Kentucky**. Estill Co., *S & Suripto 9457* WAT (Semple et al. 1993 as *A. lat.*); Hopkins Co., *S & Suripto 9430* (WAT). (Semple et al. 1993 as *A. lat.*); Powell Co., *Cook & family 510* WAT (Semple et al. 2015 as *S. lat*. var. *lat*.); Pulaski Co, *& Suripto 9601* WAT (Semple et al. 1993 as *A. lat.*); Warren Co., *Ch & Hart 954* WAT (Semple et al, 1983 as *A. lat.*); Whitley Co., *S et al. 2995* WAT (Semple & Brouillet 1980 as *A. lat.*). **Missouri**. Douglas Co., *S & Suripto 9927* WAT (Semple et al. 1993 as *A. lat.*). **North Carolina**. Durham Co., *S & Suripto 9718* WAT (Semple et al. 1993 as *A. racemosus*); Henderson Co., *S 10824* WAT (Semple and Cook 2004 *S. lat.* var. *lat.*); Jackson Co., *S 11226* WAT Semple et al. 2015 as *S. lat.* var. *lat.*). **Ohio**. Portage Co., *Cook & Cook 49* WAT (Semple and Cook 2004 as *S. lat.* var. *lat.*); Richland Co., *Cook & Cook 31* WAT (Semple & Cook 2004 as *S. lat.* var. *lat.*); Warren Co., *Ch & Hart 991* WAT (Semple et al, 1983 as *A. lat.*). **Pennsylvania**. Centre Co., *S & Ringius 7602* WAT (Semple et al. 1992 as *A. lat.*); Greene Co., *S 10673* WAT (Semple and Cook 2004 as *S. lat.* var. *lat.*). **Tennessee**. Montgomery Co., *S & Suripto 9435* WAT (Semple et al. 1993 as *A. lat.*). **Vermont**. Franklin Co., *Cook & Terezschuk C-144* WAT (Semple et al. 2019 as *S. lat.* var. *lat.*). **West Virginia**. Marion Co., *S 10691* WAT (Semple & Cook 2004, as *S. lat.* var. *angustifolium*). **Wisconsin**. Crawford Co., *S & Ch 518*4 WAT (Semple 1985 as *A. lat.*). — 2*n*=40 — 2*n*=24$_{II}$ USA. **Michigan.** Barry Co., *Van Faasen 325* herb-vanf. (Van Faasen 1963 as *A. lat.*); Clinton Co.:, *Van Faasen 329* herb-vanf. (Van Faasen 1963 as *A. lat.*). — 2*n*=64 USA. **South** Carolina. Pickens Co., *S & Ch 6161* WAT (Semple et al. 1983 as. *A. lat.*).

Symphyotrichum ontarionis (Wieg.) Nesom var. ***glabratum*** (Semple) Brouillet & D. Bouchard — 2*n*=16 CANADA. **Ontario.** Renfrew Co., *Brunton & McIntosh 7536* WAT (Semple et al. 1989 as *A. lat.* var. *tenuipes*). — 2*n*=32 CANADA. **Ontario.** Peterborough Co., *S & B. Semple 11048* WAT. (Semple et al. 2015 as *S. ont.* var. *glab.*).

Symphyotrichum ontarionis (Wieg.) Nesom var. ***ontarionis*** — 2*n*=16$_{II}$ USA. **Alabama**. Montgomery Co., *A.Jones 4792* orig. *4466* ILL (Jones 1980 as *A. ont*.). **Ilinois**. Bond Co., *A.Jones 3693* ILL (Jones 1980 as *A. ont*.); Champaign Co., *Jelinek 212* ILL (Jones 1980 as *A. ont*.), *Nurtjahjo & Jekinek* ILL (Jones 1980 as *A. ont*.); Fayette Co. *A.Jones 4054* orig. *3046* ILL (Jones 1980 as *A. ont*.); Macon Co., *A.Jones 2085* orig. *Shildneck C-4610* ILL (Jones 1980 as *A. ont*.); Wabash Co., *A.Jones 4794 orig. AGJ & Nurtjahjo 3522* ILL (Jones 1980 as *A. ont*.). **Indiana**. Floyd Co., *A.Jones 4661 orig. AGJ & Nurtjahjo 3400* ILL (Jones 1980 as *A. ont*.). **Kentucky**. Franklin Co., *A.Jones 3713 orig. AGJ & Nurtjahjo* 3405 ILL (Jones 1980 as *A. ont*.); Shelby Co., *A.Jones & Nurtjahjo 3404* ILL (Jones 1980 as *A. ont*.). — 2*n*=32 CANADA. **Ontario.** Ottawa-Carleton R.M., *S & K 4578* WAT. (Semple et al. 1983 as *A. ont.*), *S & K 4580a, b, c* WAT (Semple et al. 1983 as *A. ont.*), *Semple & Keir 4583* (Holotype) WAT (Semple, Heard & Xiang 1996 as *A. ont*. var. *glab*.); Essex Co., *Cook & Parks 22* WAT. (TRIBCNTS-7); Leeds Co., *S 10655* WAT. (Semple and Cook 2004, as *S. ont.* var. *ont.*); Brant Co., *Ch 1431* WAT (Semple et al. 1989 as *A. ont.*), *Ch 497* WAT. (Chmielewski 1987, CISTI); Bruce Co., *Brouillet & Semple 706* WAT (Semple and Brouillet 1980 as *A. ont*.), *S & Brammall 2448* WAT. (Semple & Brammall 1982), *Bt & S 721c* WAT (Semple et al. 1983), Essex Co., *Ch 1525* WAT. (Chmielewski 1987, as *A. ont*.); Frontenac Co., *Bt & Brammall 604-B* WAT. (Semple and Brouillet 1980 as *A. ont*.); Glengary Co., *S 2408* WAT (Semple and Brouillet 1980 as *A. ont*.); Grey Co., *Ch 1713* WAT. (Chmielewski 1987, as *A. ont*.), *Ch 1827* WAT. (Chmielewski 1987, as *A. ont*.); Haldimand-Norfolk R.M., *Ch 1441* WAT. (Chmielewski 1987, as *A. ont*.), *Ch 1446* WAT. (Chmielewski 1987, as *A. ont*.), *Ch 1457* WAT. (Chmielewski 1987, as *A. ont*.), *Ch472* WAT. (Chmielewski 1987, as *A. ont*.), *Ch 1784* WAT. (Chmielewski 1987, as *A.* ont); Huron Co., *Ch 1655* WAT. (Chmielewski 1987, as *A. ont*,), *Ch 1666* WAT. (Chmielewski 1987, as *A. ont*.), *Ch 1674* WAT. (Chmielewski 1987, as *A. ont*.); Leeds Co., *S 2056* WAT (Semple and Brouillet 1980 AJB; *as A. lat*.); Niagara R.M.; *Ch 1761* WAT. (Chmielewski 1987, as *A. ont*.); Oxford Co., *Ch 1615* WAT. (Chmielewski 1987, as *A. ont.*), *Ch 1693* WAT. (Chmielewski 1987, as *A. ont*.); Perth Co., *Ch 1653* WAT. (Chmielewski 1987, as *A. ont*.), *Ch 1895* WAT (Chmielewski 1987, as *A. ont*.), *Ch & S. Chmielewski 1390* WAT. (Chmielewski 1987, as *A. ont*.); Waterloo R.M., *Ch 1636* WAT. (Chmielewski 1987, as *A. ont*.), *Ch 1700*

WAT. (Chmielewski 1987, as *A. ont.*); Wellington Co., *Ch 1909* WAT. (Chmielewski 1987, as *A. ont.*). USA. **Alabama**. Tuscaloosa Co., *S & Ch 6372* WAT. (Semple et al. 1983). **Iowa**. Floyd Co., *S & Ch 516*7 WAT (Semple et al. 1983); Linn Co., *Cook & Parks 447* WAT (Semple et al. 2015); Kossuth Co., *S & Chi 5154* WAT. (Semple et al. 1983 as *A. ont*); Poweshiek Co. *S & Bt 4510* WAT (Semple et al. 2015). **Kentucky**. Adair Co., *Ch & Hart 965* WAT (Semple et al. 1983 as *A. ont*); Casey Co., *Ch & Hart 971* WAT (Semple et al. 1983), *Ch & Hart 973* WAT (Semple et al. 1983 as *A. ont*); Ohio Co., *Ch & Hart 951* WAT (Semple et al. 1983 as *A. ont*); Scott Co., *Ch & Hart 977* WAT (Semple et al. 1983 as *A. ont*); Warren Co., *Semple & Ch 9104* WAT (Semple et al. 1989 as *A. ont.*). **Minnesota**. Faribault Co., *S & B. Semple 11312* WAT (Semple et al. 2019); Washington Co., *S & Ch*5084 WAT (Semple 1985 as *A. ont.*). **Missouri**. Callaway Co., *S & Ch 5306* WAT (Semple et al. 1983 as *A. ont.*); Mercer Co., *S & Ch 5223* WAT (Semple et al. 1983 as *A. ont.*). **Mississippi**. Montgomery Co., *S, Bt & Canne* 3803 WAT (Semple and Brouillet 1980 as *A. ont.*). **New York**. Hamilton Co., *S & Bt 3672* WAT (Semple and Brouillet 1980 as *A. ont.*); Lewis Co., *S & Bt 3652* WAT (Semple and Brouillet 1980 as *A. ont.*); St. Lawrence Co., *S & Bt 3689* WAT (Semple and Brouillet 1980 as *A. ont.*). **Tennessee**. Giles Co., *S & Ch 6292* WAT (Semple et al. 1983 as *A. ont.*); Marshall Co., *S & Chi 9117* WAT (Semple et al. 1993 as *A. ont.*).

Symphyotrichum racemosum (Small) Nesom — 2*n*=8_{II} USA. **Illinois.** De Soto Co., *A.Jones 5420* ILL (Jones 1980, as *A. vim.* var. *subdumosus*); Pope Co., *A. Jones 4691* orig. *Jelinek 217* ILL (Jones 1980, as *A. vim.*); Richland Co. Olney, *A.Jones 4581* orig. *Jelinek 173* ILL (Jones 1980 as *A. vim.*). **Massachusetts.** Middlesex Co., Woburn, *A.Jones 4549* orig. *Sheviak 883* ILL (Jones 1980 as *A. vimineus*)..**Mississipppi.** De Soto Co., near Hernando, *A.Jones 5420* ILL (A.G.Jones'80 as *A. vim* var. *subdumosus*); Lafayette Co., *A.Jones 4779* orig. *4428* ILL (Jones 1980 as *A. vim* var. *subdumosus*). **North Carolina.** Jackson Co., *A.Jones 375*1 orig. *AGJ & Nurtjahjo 3443* ILL (Jones 1980 as as *A. vimineus*). **Virginia.** Giles Co. *A.Jones 4671* orig. *4181* ILL (Jones 1980; as *A. vims*). — 2*n*=16 USA. **Massachusetts.** Norfolk Co., *S & Bt 3521* WAT (Semple and Brouillet 1980 as *A. vim.*), *S & Bt 3536* WAT (Semple and Brouillet 1980 as *A. vim.*). **New Jersey.** Ocean Co., *S 11810* WAT (Semple et al. 2019). **North Carolina.** Hertford Co., *S 11627* WAT (Semple et al. 2019); Northampton Co., *S & Ch 6001* WAT (Semple, Chmielewski & Chinnappa, 1983, as *A. vim*). **Pennsylvania.** Crawford Co., *S & Ch 5843* WAT (Semple, Chmielewski & Chinnappa, 1983 as *A. vim.*). **Rhode Island.** Kent Co., *S & Bt 3594* WAT (Semple and Brouillet 1980 as *A. vim.*); Providence Co., *S & Bt 3591* WAT (Semple and Brouillet 1980 as *A. vim.*). **South Carolina.** Sumter Co., *Cook & family 639* WAT (Semple et al. 2015). **Texas. P**olk Co., , *S & Ch 6429* WAT (Semple et al. 1983 as *A. vim.*). **Vermont.** Windham Co., *S 6879* WAT (Semple et al. 1983 as *A. vim.*). **Virginia.** Culpepper Co., *S & Ch 5949* WAT (Semple et al. 1983 as *A. vim.*); Norfolk-Suffolk Co., *S & Ch 6242* WAT (Semple et al. 1983 as *A. vimineus*); Northumberland Co., *S & Ch 5991* WAT (Semple et al. 1983 as *A. vim.*). — 2*n*=16_{II} USA. **Illinois.** Pope Co., *A.Jones 4800* orig. *Jelinek 221* ILL (Jones 1980 as *A. vim.* perhaps intergrading with *A. lateriflorus*). **Virginia**. Giles Co., *A.Jones 4671* orig. *4181* ILL (Jones 1980 as *A. vim.* perhaps intergrading with *A. lateriflorus*). — 2*n*=32 **Georgia**. Madison Co., *S & Ch 6155* WAT (Semple et al. 1983 as *A. vim.*). **Virginia.** Dinwiddie Co., *S 11769* WAT (Semple et al. 2019); Southampton Co., *S 11620* WAT (Semple et al. 2019).

Symphyotrichum tradescanti (L) Nesom — 2*n*=16 CANADA. **New Brunswick.,** Charlotte Co., Lake Utopia, *S & Keir 4900* WAT (Semple 1985). **Nova Scotia**. Yarmouth Co., NW of Carleton, NS-340 S of Richfield, *S & Keir 4860* WAT. (Semple, Chmielewski & Xiang 1992). **Québec.** Bellechasse Co., St. Vallier, end of rue de l'Eglise, S shore of St. Lawrence R., *S & Bt 3395* WAT (Semple and Brouillet 1980); Drummond Co., Drummondville, rapids on R. St. Francois, *S & Bt 3405* WAT (Semple and Brouillet 1980). USA. **New York**. Hamilton Co., SW end of Long Lake, rocky shore of island, *S & B 3674* WAT (Semple and Brouillet 1980). **Vermont**. Caledonia Co., Wells River, rocky island in Connecticut R, *S & Bt 3492* WAT (Semple and Brouillet 1980), W of Wells River, rocks along Wells R., *S & Bt 3517* WAT (Semple and Brouillet 1980); Windham Co., Rockingham, *S 6884* WAT. (Semple et al. 1992). — 2n=32 USA. **Maine.** Penobscot Co., Old Town, rock outcrop by Stilwater R., *Haines s.n.* WAT (Semple and Cook 2004).

Appendix 3. Previously unreported chromosome number determinations in *Symphyotrihcum lateriflorum*, *S. ontarionis*, and *S. racemosum* from Canada and the United States; all vouchers in WAT in MT unless otherwise indicated; *Bd* = D. Bouchard, *Br* = R. Brammall, *Bt* = L. Brouillet; *C*, J. Canne; *Ch* = J. Chmielewski; *H* = C. Hart; *K* = R. Keir; *S* = J.C. Semple; *S & S* = J.C. & B. Semple.

Symphyotrichum lateriflorum (L.) Love & Love — $2n=8_{II}$ CANADA. **Ontario**. Algoma Dist.:, Sault Ste. Marie, *S 1882*, Hwy-17 W of Serpent River, *S & Br 2882*; Manitoulin Dist., Barrie Is., *S & Br 2318*, S of Manitowaning, *S & Br 2303*, W of West Bay, Hwy-540 0.5 mi E of Lake Shore Rd., *S & Br 2314*; Hamilton-Wentworth R.M., Beverly Twp, 0.6 km W of Westover, *Ch 1362*, West Flamborough Twp, Con. 6, 1.3 km W of Reg.Rd-4, *Ch 1359*; Northumberland Co., Presqu'ile Prov. Park, *S & Br 2943*; Ottawa-Carleton R.M.:, Ottawa, Cunningham Is., *S & K 4582*; Prince Edward Co., SE pf Carrying Place, Hwy-33 3.8 mi x of CoRd-29, *Bt & Br 587*; Rainy River Dist., W of Barwick, *S & Bt 4137*. **Québe**c. M.R.C. Basques, Rivière-Trois-Pistoles, rue du Sault (1 km au sud du village), rivière-Trois-Pistoles, *Bd & Cuerrier* 164-9 MT, *164-11* MT; Communauté urbaine de Québec, Québec, plaine d'Abradham, côte Gilmour, *Bd & Cuerrier 154-7* MT; Karmouraska, St-ALexandre, camping KOA, berge de la riviere Fouguette, *Bd & Cuerrier 159-10* MT, 159-11 MT; M.R.C. L'Islet, St-Jean-Port-Joli, domaine de Gaspé, *Bd & Cuerrier 157-4* MT, *157-7* MT, *157-9* MT; M.R.C. Memphrémagog, Bolton Sud, sur le bord de la riviere Missisquoi, *Bd & Coté 148-11* MT, *148-15* MT; M.R.C.Maskinongé, Yamachiche, route 138, rivière Yamachiche, *Bd & Cuerrier 170-4* MT, *170-6* MT, *170-10* MT, 170-11 MT ; Papineau Co., Masson, *S & K 4591*; M.R.C. Thérèse-de-Blainville, Rosemère, route 640, sortie 24, *Bd & Labrecque 173-6* MT, *173-7* MT, *173-9* MT, *173-15* MT; M.R.C.Témicouata, Cabano, rue Joseph Turcotte (au nord de Cabano par la route 232), *Bd & Cuerrier 160-4* MT, *160-1*4 MT. USA. **Alabama**. Russell Co., Phoenix City, *S & Ch* 6322; Tuscaloosa Co., N of Northport, *S & Ch 6371*, S & Ch 6374. **Arkansas**. Dallas Co., AR-9 N of AR-48, *S & Ch 6404*. **Kentucky**. Allen Co., US-231, 0.5 km SW of Scottsville, *S & Ch 9107*. **Michigan**. Otsego Co., S of Vanderbilt, *S & Ch 4986*; Schoolcraft Co., E of Gulliver, *S & Ch 5016*. **Minnesota.** Douglas Co., Garfield, *S & Bt 6943*. **Mississippi**. Simpson Co., S of Mendelhall, *S. Bt & C 3816*; Yalobusha Co., N of Tillatoba, *S, Bt & C 3790*. **Missouri.** Carter Co., US-60 1.8 km E of Van Buren, *S & Suripto 9907*; Madison Co., S of Cherokee Pass, *S, Bt & C 3776*. **New York.** Lewis Co., W of Lyons Falls, S & Bt 3653. **North Carolina.** Transylvania Co., Connestee Falls, *S & Ch 6172*; Wilkes Co., McGrady, *S, Bt & C 4085*. **Ohio**. Wayne Co., US-250, between Easton and Apple Crk., *S, Bt & C 4109*. **Rhode Island**. Providence Co., RI-102, S of RI-107W, *S & Bt 3589*. **South Carolina**. Berkeley Co., SE of Alvin, *S & Ch 6128*. **Virginia**. Lancaster Co., N of Whitestone, *S & Ch 5980*. — $2n=16 + 1$ supernumerary. CANADA. **Ontario**. Manitoulin Dist.:,Barrie Is., 1 mi from causeway, along gravel road, *S & Br 2319*. **Québe**c. M.R.C.Témicouata, Cabano, rue Joseph Turcotte (au nord de Cabano par la route 232), *Bd & Cuerrier 160-15* MT. USA. **Michigan**. Clare Co., N of Clare, *S & Ch 4968*. — $2n=32$ CANADA. **Nova Scotia**. Antigonish Co., N of Monastery, *S & K 4743*; Cape Breton Co., N of Enon, *S & K 4770*; Cumberland Co., W of Annandale, *S & K4723*; Guysborough Co., N of Aspen, *S & Keir 4785*, Liscomb Mills, *S & K 4793*, *S & K 4793-3*; Halifax Co., Musquodoboit Harbour, *S & K 481*1, *S & K 4812-2*; Inverness Co., ., Bucklaw, *S & Keir 4757a*, E of Port Hastings, *S & Keir 4750*; Richmond Co., Loch Lomond, *S & K 4777*. **Ontario**. Bruce Co., Sauble Falls, *S & K. Shea 2453*, N of Dyer Rd on Hwy-6, *S 2446*; Huron Co., S of Bayfield, ON-21 0.5 km N of Stanley Sideroad 3, *Bt & Seys 572*; Simcoe Co., Wasaga Beach, *S 2095*; Waterloo R.M., Waterloo, *S & Br 2897*; York Co. Hwy-48 (Markham Rd.) N of Toronto, *S, Toplack & Stranak 2081*. USA. **Alabama**. Greene Co., N of Eutaw, *S & Ch 6367*. **Florida**. Okaloosa Co., W of Crestview, *S, Bt & C 3886*. **Georgia**. Madison Co., NE of Comer, *S& Ch 6154*. **Illinois**. Cass. Co., N of Virginia, S & Ch 5320. **Indiana**. Martin Co., US-231 at IN-450, *Ch & H 947*; Owen Co., S of Freedom, Ch 941; Porter Co., US-20 at IN-49, *S & Bt 4522*; Putnam Co., SE of Cloverdale, IN-42 4.1 km W of US-231, *S & Suripto 9400*. **Iowa**. Clayton Co., W of McGregor, *S & Ch 5176*; Linn Co. Palisades Kepler State Park, *S & Ch 5213*; Poweshiek Co., IA-21 N of I-80, *S & Bt 4511*; Winneshiek Co., Fort Atkinson, *S & Ch 5169*. **Kentucky**. Adair Co., US-80 W of IN-127, *Ch & H 964*; Floyd Co., S of Wiley State Park, *S & Ch 6275*. **Maine**. Penobscot Co., N of Medway, *S & Keir 4657*, S of Ragged Mt., *S & Keir 4644*; Somerset Co., N of Athens, *S & Keir 4637*. **Massachusetts**. Berkshire Co., S of Otis, *S & Bt 3624*; Norfolk Co., Dover, *S & Bt 3545*, Needham, *S & Bt 3522*. **Missouri**. Cape Giradeau Co., MO-25 SW of Delta, Old Whitewater Roadside Park, *S & Suripto 9884*; Franklin Co., Manchester Rd. 0.6 mi NW of county line, steep slope, *Semple 3751*; Pike Co., E of Bowling Green, *S & Ch 5317*, *S & Ch 5327*; St. Louis

Co., NW of Eureka, *S & Bt 3745*, Fox Creek Rd 1.1 mi S of Manchester Rd., *S & Bt 3767*. **New Hampshire**. Grafton Co., SW of Bath, *S & Bt 3455*; Hillsborough Co., W of North Branch, *S & K 4940*. **New York**. Chautauqua Co., S of Dunkirk, *S, Brammall & Hart 3087*; Dutchess Co., Putnam Co. line on Taconic State Pkwy, *S 6834*; Hamilton Co., N of Long Lake, *S & Bt 3676*; Otsego Co., NNW of Oneonto, *S & Bt 3642*; Steuben Co., S of Kanona, *Ch 258*, N of Lindley, *Ch 262*. **North Carolina**. Bertie Co., N of Lewiston, *S & Ch 6239*; Catawba Co., S of Newton, *S, Bt & C 4074*; Graham Co., N of Stecoah, *S & Ch 6222*; Macon Co., N of Gneiss, *S & Ch 6220*. **Ohio**. Clermont Co., SW of Perintown, *Ch & H 984*; Hamilton Co., SW of Twenty Mile Stand, *Ch & H 988*. **Pennsylvania**. Bedford Co., N of Tatesville, *S & Ringius 7669*; Erie Co., Erie, *S, Brammall & Hart 3082*; Fayette Co., SE of Uniontown, *S & Ch 5849*, US-119, N of state line, *Ch* 427; Washington Co., US-40 just SE of Glyde, *S & Ch 5847*, S of Lorne Pines, *Ch 432***. South Carolina**. Chesterfield Co., SC-9, E of Lynches River, *S & Ch 6090*; Kershaw Co., SE of Liberty Hill, *S & Ch 6100*; Oconee Co., SE of Long Creek, *S & Ch 61*94; Richland Co. N of Columbia, *S, Bt & C 4058*. **Vermont**. Lamoille Co., NE of Eden Mills, *S & B 3433*; Orange Co., Bradford, *S & Bt 3497*, S of Chelsea, *S & Bt 3511*; Windham Co., W of Guilford, *S 6881*, W side of Hogback Mt., *S & K 4951*; Windsor Co., W of West Hartford, *S & B 3502*. **Virginia**. Botetourt Co., of Gala, *Ch 406*; US-21, Mt. Rogers Nat'l Rec. Area, *S, Bt & C 4089*; Louisa Co., N of Palmyra, *Ch 325*; Northampton Co., S of Eastville, *S & Ch 6244*; Wise Co., NE of Appalachia, *S & Ch 6282*. **West Virginia**. Barbour Co., N of Dent, *Ch 420*; Clarke Co., N of Paris, *S & Ch 5879*; Taylor Co., S of Gum Spring, *Ch & H 425*; Wood Co., junct. of I-77 and WV-31, S of Williamstown, Ohio, *S, Bt & C 4105*. **Wisconsin**. Iowa Co., N of Dodgeville, *S & Ch 5194*; Lincoln Co., Prairie Dell Park, *S & Ch 5045*; Pepin Co., Durand, *S & Ch 5076*, E of Plum City, *S & Ch 5079*; Wood Co., Babcock, *S & Ch 5061*. — 2*n*=40 CANADA. **Ontario.** Grey Co., North Kepple, edge of Big Bay, *S 2104c*. — 2*n*=48 U.S.A **Virginia**. Culpepper Co., NW of Lignum, *S & Ch 5948*. — 2*n*=64 USA. Alabama. Madison Co., Owens Crossing, *S & Ch 6296*.

Symphyotrichum ontarionis (Wieg.) Nesom var. ***glabratum*** (Semple) Brouillet & D. Bouchard — 2*n*=16 CANADA. **Ontario.** Middlesex Co., E of Elginfield, *S 2591*. **Québec.** Papineau Co., E of Pte. au Chene, *S & K 4594*, *S & K 4596*. — 2*n*=32 CANADA. **Ontario.** Muskoka Dist., N of Port Severn, Musquosh R., *Morton & Venn NA 9953* TRT.

Symphyotrichum ontarionis (Wieg.) Nesom var. ***ontarionis*** — 2*n*=32 CANADA. **Québec.** M.R.C. Le Haut-Richelieu, Notre-Dame-du-Mont-Carmel, *Bouchard & Lebreque 8-5* MT.

Symphyotrichum racemosum (Ell.) Nesom — 2n=16 U.S.A **Illinois**: Clark Co., E of Marshall, US-40 4.6 mi E of IL-1, *S, Bt & C 3737*. **Louisiana.** Washington Par., Bogaloosa, LA-21 0.4 mi S of LA-10, *S, Bt & C 3831*. **Mississippi.** Grenada Co., S of Grenada, *S, Bt & C 3792*. **New Hampshire.** Rockingham Co., W of Rye, industrial development road of US-1, *S & Suripto 9578*. **North Carolina.** Bertie Co., N of Lewiston, *S & Ch 6240*; Wilson Co., NE of Eureka, *S & Ch 6008*, *S & Ch 6010*. **South Carolina.** Berkeley Co., SE of Alvin, *S & Ch 6128*. — 2*n*=32 USA. **Arkansas**. Union Co., Eldorado, *S & Ch 6411*. **New York.** Sullivan Co., E of Wurtville, *S 6824*; Ulster Co., E of Woodburne, *S 6821*. **Virginia.** Spotsylvania Co., S of Fredericksburg, *S & Ch 5957*, *S & Ch 5958*.

Symphyotrichum tradescanti (L.) Nesom — 2n=16 CANADA. **Nova Scotia.** Inverness Co., Bucklaw, *S & Keir 11352*; Gusborough Co., Liscomb Mills, *S & Keir 4791*. — 2*n*=32 CANADA. **New Brunswick**. Kent Co., E of Grande Aldouance, *S & Keir 4702* WAT. **Québec**. M.R.C. Beauce-Centre, Breauceville, au sud de la ville, rapides du Diable, bord de la rivière Chaudièr, *Bouchard & Cuerrier H*-6 MT; Cap-Rouge, au bout de la plage Jacques-Cartier, bord du Saint-Laurent; *Bouchard & Cuerrier N-13* MT; M.R.C. Drummond: Drummondville, boul. Saint-Charles, sous le pont Curé-Marchand, rive de la rivière Saint-François, *Bouchard & Cuerrier F-7* MT; Lévis, Lévis, pointe de Lévis, bord du Saint-Laurent, *Bouchard & Cuerrier. K-14* MT; Saint-Nicolas, au bout du chemin des Martin-Pêcheurs, rive du Saint-Laurent, *Bouchard & Cuerrier. I-16* MT; St-Romuald, marina de la Chaudière, embouchure de la rivière Chaudière, *Bouchard & Cuerrier J-3*. MT; M.R.C. L'Île-d'Orléans, Sainte-Pétronille, pointe ouest, bord du Saint-Laurent, *Bouchard & Cuerrier M*-5 MT. **Nova Scotia**. Victoria Co. Indian Brook by Cabot Trail, *S & Keir 4763*. — 2*n*=c.32 USA. **Maine**, Penobscot Co., SW of Millinocket, *S & Keir 4651*.