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Sambucus canadensis × *S. nigra* (Sambucaceae): a hybrid Elder in northern Scotland

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Abstract
A *Sambucus* (Elder) taxon is reported from four locations in northern Scotland. On morphological grounds this is considered to be the hybrid of *S. canadensis* and *S. nigra*. It is likely that some records of *S. canadensis* from Great Britain actually refer to this hybrid.

Keywords: Beachen Wood; neophyte; morphological evidence

Introduction

Four species of Elder (*Sambucus* L.) are recorded in the wild in Great Britain and Ireland: the native *S. nigra* L., an archaeophyte *S. ebulus* L., and two neophytes, *S. racemosa* L. and *S. canadensis* L.

Sambucus canadensis is a scarce alien in Great Britain. The first record in cultivation was in 1761 in the Chelsea Physic Garden (Wilmer, 1762). It has been recorded from 58 hectads in Great Britain, and in 28 hectads post-1999 (Stroh *et al.*, 2023). It has not been recorded from Ireland. This species is distinguished from *S. nigra* by, *inter alia,* growth form, number of leaflets per leaf, leaflet teeth shape, flowering time, and fruit colour and size (Table 1). It was first recorded in the wild in 1946, near Bradford (v.c.63; Stroh *et al.*, 2023) and is reported to have extensively colonised the railway network in County Durham (v.c.66) since *c.*1974 (Graham, 1988).

The taxonomic rank of *S. canadensis* is disputed. Plants of the World Online (POWO) accepts it at species rank, as does Stace (2019), while commenting that *S. canadensis* may be better treated as a subspecies of *S. nigra*. Bolli (1994) reduced *S. canadensis* to a subspecies of *S. nigra*, and Applequist (2015) agreed that recognition of the American elder as *S. nigra subsp. canadensis* (L.) Bolli is reasonable. The Royal Horticultural Society (Cubey, 2023) also treat it is a subspecies of *S. nigra*.

Discovery of putative *Sambucus canadensis* × *S. nigra*

Elder bushes are uncommon in the immediate area where I live (inland in v.c.95, Scotland), but I recalled seeing bushes in woodland within 1km of my house. These bushes are near a track, and there is evidence of past dumping of soil and material of garden origin, e.g. there are patches of *Symphoricarpos albus* (L.) S.F.Blake, (Snowberry), *Lysimachia punctata* L. (Dotted Loosestrife) and *Malva moschata* L.

(Musk-mallow) close by. On 9th August 2022, I examined this group of *c.*8 bushes growing in 6 clumps in Beachen Wood, NJ020268, v.c.95. The bushes still had approximately a quarter to a third of the inflorescences in flower, while all *S. nigra* in the local area were well past flowering. These bushes continued to produce new inflorescences until at least mid-September (Fig. 1). In 2023, the last few inflorescences were still present on 5th October.

Figure 1. *Sambucus canadensis* × *S. nigra*. September 2022

Figure 2. *Sambucus canadensis* × *S. nigra*

The majority of the leaves comprised 7 leaflets, occasionally 5, and sometimes more than 7 (Figs. 2 and 3). The bushes were multi-stemmed from the base, forming rounded bushes, 4-5m. tall (Figs. 1 and 4).

Figure 3. ***Sambucus canadensis* × *S. nigra***

Figure 4. *Sambucus canadensis* × *S. nigra*

Using the key and description in Stace (2019) I thought these bushes to be candidates for *S. canadensis*.

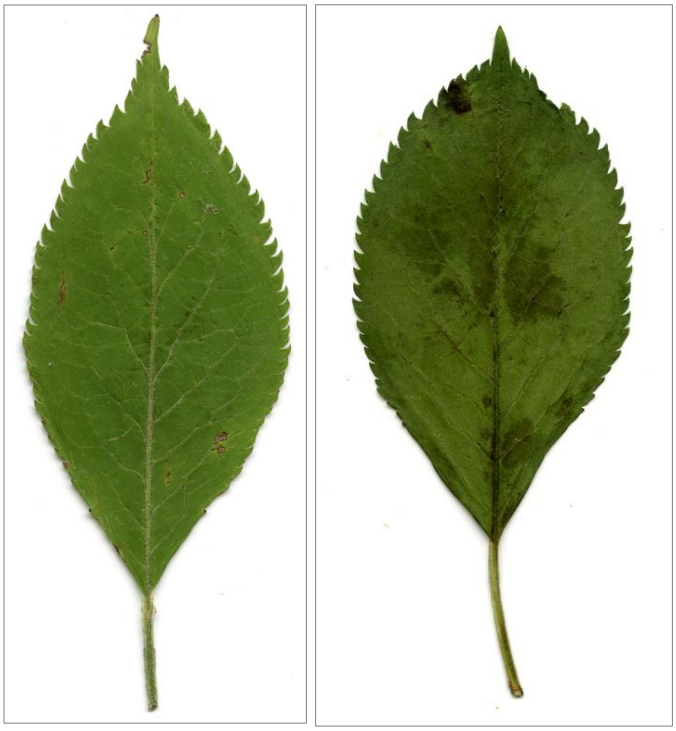

Figure 5. *Sambucus nigra*. Left: Grantown-on-Spey: A95 (footpath W. of) (NJ02442645), v.c.95. Right: Tissington Trail (ex-rail line) (SK1747), v.c.57

Careful comparison with *S. nigra* revealed some consistent differences. The *S. nigra* bushes mostly had 5 leaflets per leaf, while the putative *S. canadensis* almost always had 7 leaflets (Fig. 3), occasionally more. *Sambucus nigra* had leaflet teeth that were more obviously hooked than were those of the putative *S. canadensis*, and the individual teeth were larger (Figs. 5 and 6 c.f. Fig. 7). There appeared to be some additional differences; 2–3-year-old parts of the branches of the putative *S. canadensis* had slightly fewer lenticels than *S. nigra*, and in *S. nigra* the lenticels were raised higher above the bark surface, so the twigs felt rougher; the leaflets of the putative *S. canadensis* bushes were more translucent than those of *S. nigra*, such that tertiary veins were (just) visible.

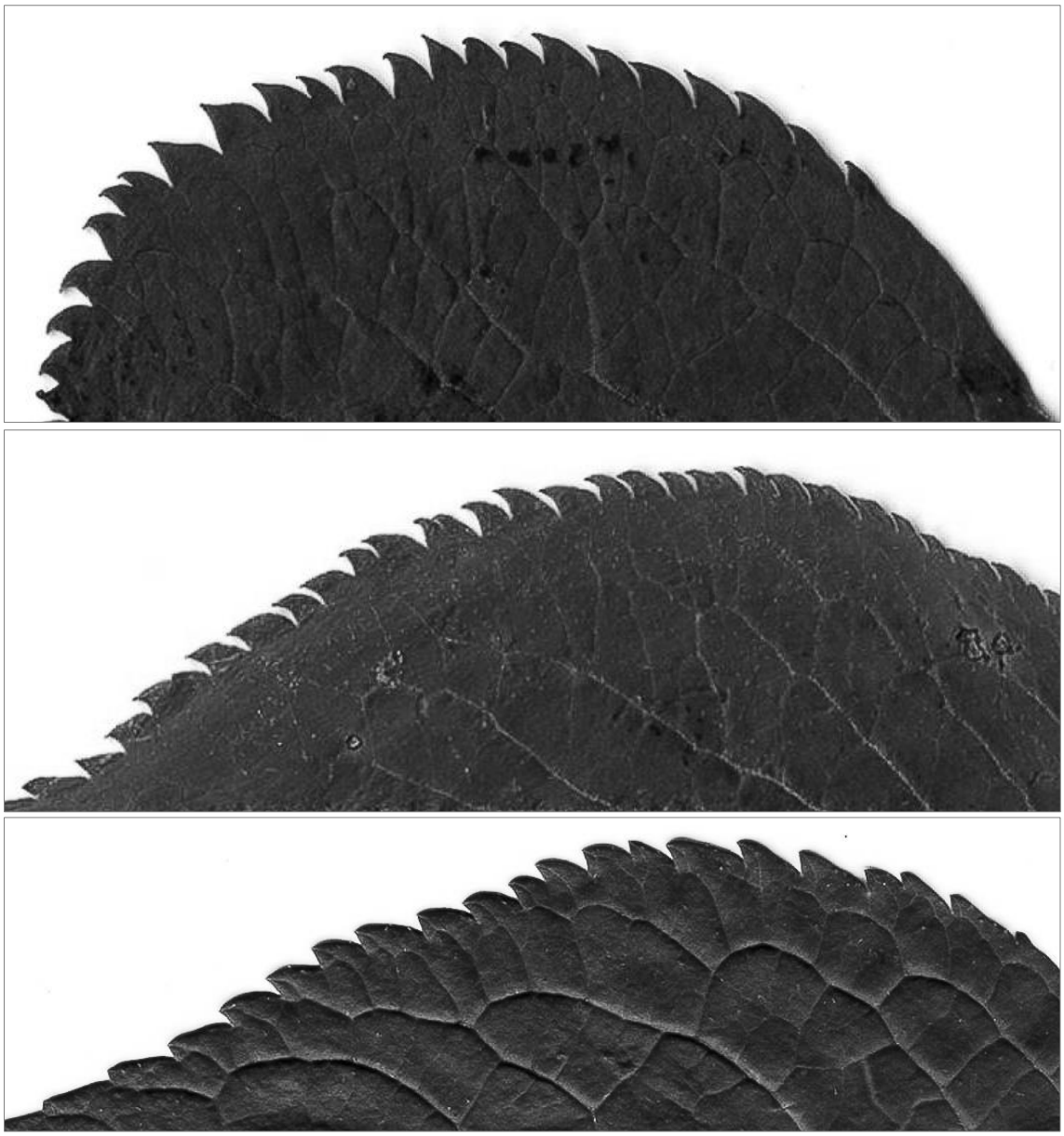

Figure 6. *Sambucus nigra* leaflet teeth

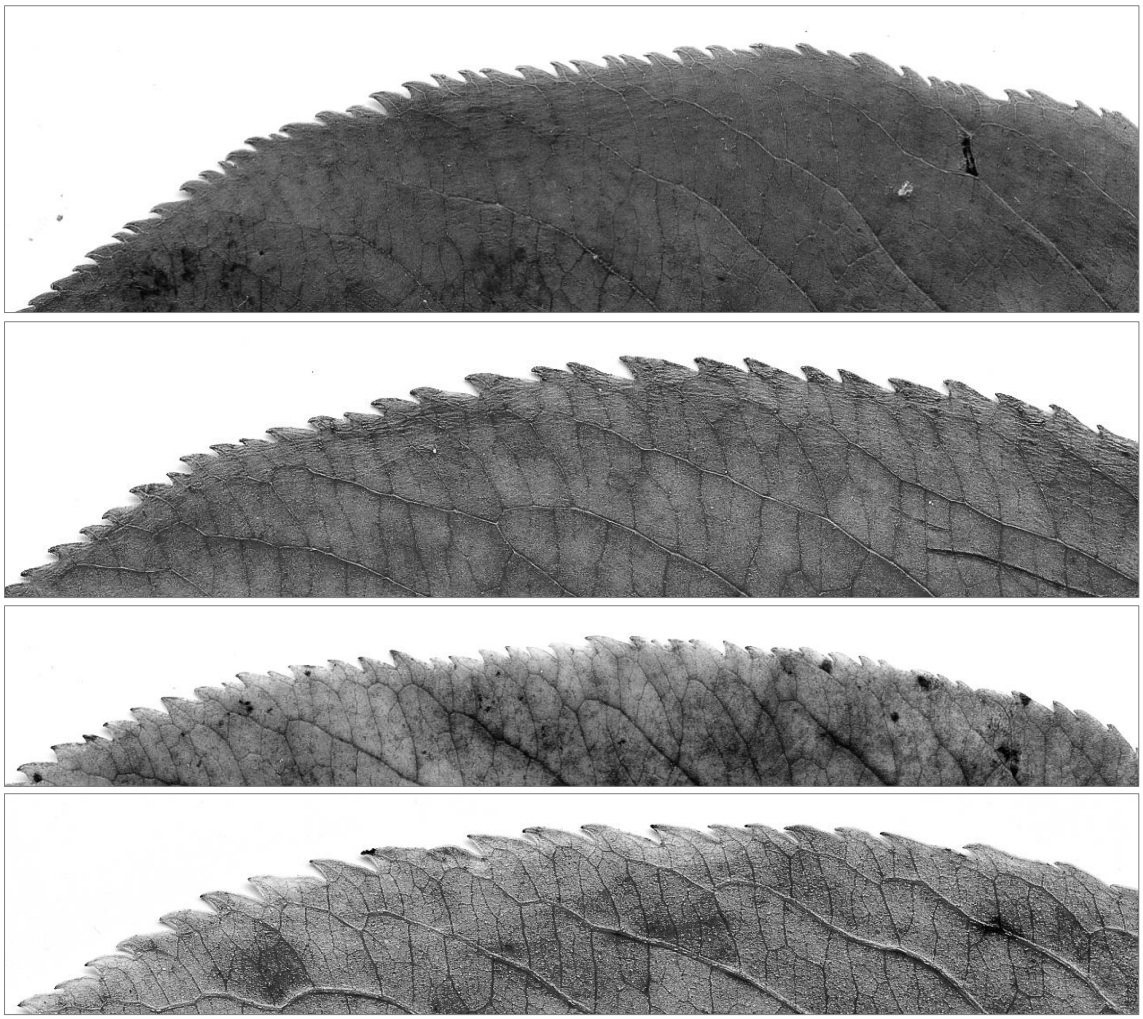

Figure 7. *Sambucus canadensis* × *S. nigra* leaflet teeth. Top two images, Beachen Wood; lower two images Elgin

While I was satisfied that the unusual Beachen Wood bushes did not fall within the observed variation of *S. nigra*, there were two main discrepancies c.f. *S. canadensis*. Firstly, the bushes I had found, though multi-stemmed from the base, gave no indication of being rhizomatous or stoloniferous, having very few or no suckers. Secondly, published descriptions stated (Table 1; Thompson, 2020) that *S. canadensis* had leaflets with very sharp marginal teeth. Images of herbarium specimens online from North American herbaria (Appendix 1) showed that most specimens named as such, had the characteristic sharp teeth (Figs. 8 and 9). The marginal leaflet teeth of the Beachen Wood bushes, while less hook-shaped than those of *S. nigra* were not as straight sided or acute as those of *S. canadensis* (Figs. 7, 8 & 9).

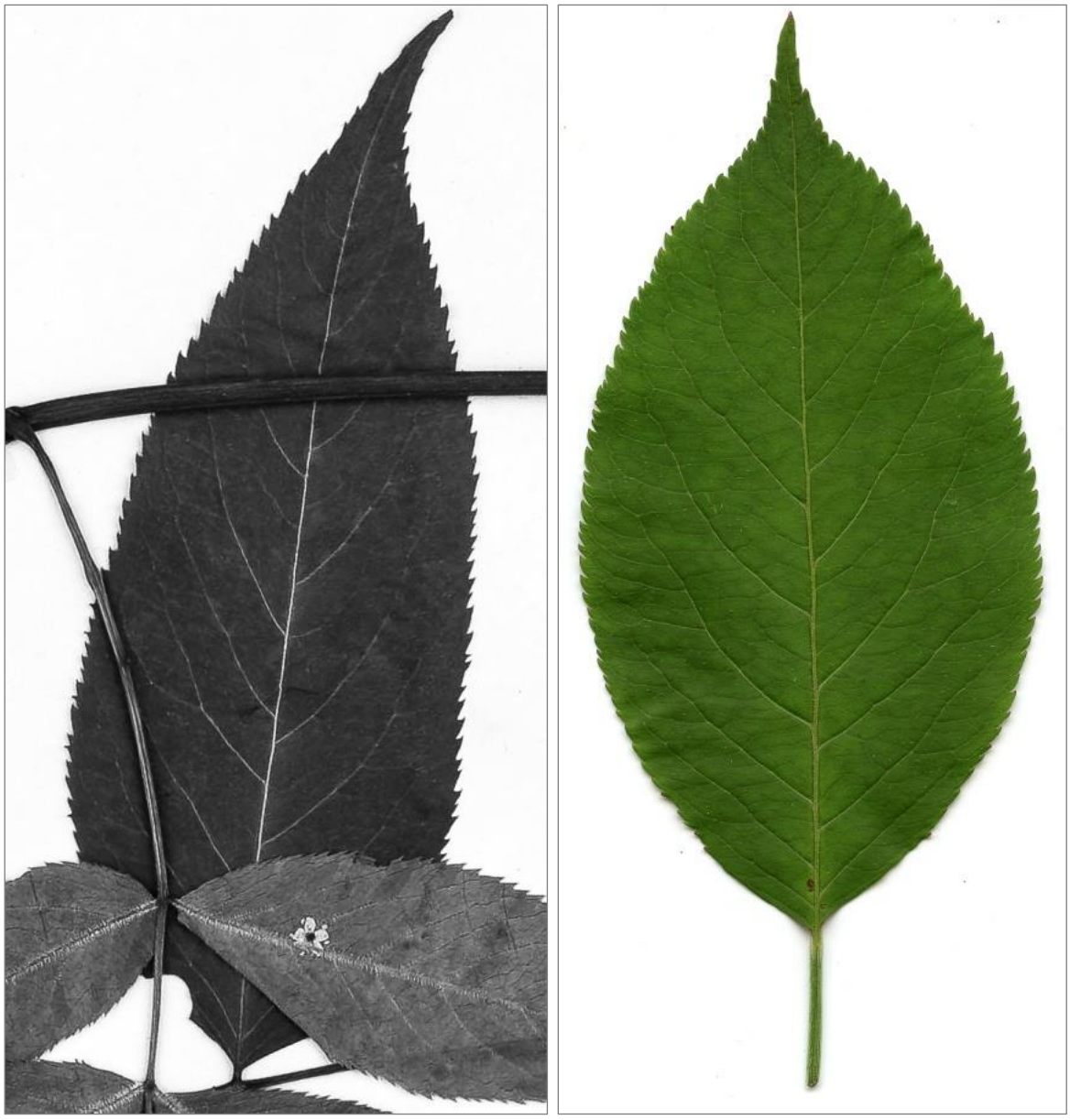

Figure 8. Left: *Sambucus canadensis*. Bear Creek, Tishomingo State Park, Mississippi. 15th June 1956. Ray, J.D. (Det. Gleason, H.A.). University of South Florida Herbarium - https://cdn.plantatlas.org/img/specimens/USF/17211.jpg. Right: *Sambucus canadensis* × *S. nigra*. Beachen Wood (NJ02032680), v.c.95, August 2022

Figure 9. Details of leaflet teeth of *Sambucus canadensis*. Top two images Bear Creek, Tishomingo State Park, Mississippi. 15th June 1956. Ray, J.D. (Det. Gleason, H.A.). University of South Florida Herbarium - https://cdn.plantatlas.org/img/specimens/USF/17211.jpg. Lower image, screenshot from Thompson (2020)

Distinguishing features of *S. canadensis* and *S. nigra* from the British literature are summarised in Table 1. The detailed description of *S. canadensis* by McClintock & Hollick (1981) was the earliest that British botanists were likely to have come across. The brief mention in Clapham *et al.* (1987) was too meagre to allow for more than a tentative identification. Since 1991, most field botanists in Britain and Ireland will have used or consulted Stace's New Flora. In each of the four editions of this Flora, the description of *S. canadensis* excluded mention of the leaflet teeth shape, an important identification feature.

Table 1. Distinguishing features of *Sambucus canadensis* and *S. nigra*.

	Sambucus canadensis				***Sambucus nigra***	
	McClintock & Hollick (1981), repeated in Rich & Jermy (1998)	**Clapham *et al.* (1987)**	**Stace (1991-2019)**	**Sell & Murrell (2006)**	**Sell & Murrell (2006)**	**Stace (2019)**
Height & form	Bushy to 4 m tall, stoloniferous & clump-forming, bushes having a number of trunks.		Rhizomatous, suckering shrub to 4 m.	Shrub to 3m. tall, spreading by rhizomes and suckers.	Shrub or small tree to 12 m. tall	Shrub or small tree to 6 (16) m. Not rhizomatous.
Twigs			2nd year twigs with few lenticels	Few lenticels	Numerous lenticels	2nd year twigs with numerous lenticels
Leaflets	(5-) 7 (-11), the lowest pair frequently 2-3 lobed. Leaf points attenuated.	Leaflet apices attenuate	(5-) 7 (-11)	(5-) 7 (-11), the lowermost pair sometimes divided again	(3-) 5 (-7)	(3-) 5 (-7)
Leaflet teeth	Small and sharp.	Smaller & sharper than those of S. nigra.		Serrate with very sharp teeth	Crenate or serrate with rather blunt hooked teeth, rarely laciniate.	
Drupe	Purplish-black when ripe, but very often remain greenish.		Purplish-black, rarely red	4-6 mm diameter, usually dark purple	(4.5-) 6-8 mm, usually turning wine-red then black	Black, sometimes (rarely) greenish yellow or white
Flowering	7-9. It is not unusual to see flowers and ripening fruit in late September. (c.f. S. nigra which has a single flush of flowers in mid-summer).	7-9	7-9	7-9	6-7	6-7

While no *Sambucus* hybrids have been previously reported in Britain or Ireland (Atkinson & Atkinson, 2002; Stace, 2019) I suspected that the Beachen Wood bushes that resembled *S. canadensis* were in fact the hybrid of *S. canadensis* and *S. nigra*, as they seemed to combine features of both species. Applequist (2015) noted that *S. nigra* and *S. canadensis* hybridise readily, though she only accepted these two taxa at subspecies rank.

I discussed the identification of the Beachen Wood bushes with Ed Brown who holds the national collection of *Sambucus* in Worcestershire, England, who agreed that they were *S. canadensis* × *S. nigra* a hybrid he has raised himself. I have not been able to trace a hybrid binomial for this taxon.

Further searches in my local area revealed that what appeared to be the same hybrid *Sambucus* had been recently planted as part of a screen around the football ground in Grantown on Spey at NJ036280 and NJ037280 (v.c.95). Audrey Turner then found similar bushes planted in a roadside screen in Aviemore at NH896137 (v.c.95), and Ian Green reported similar bushes planted as a roadside screen in Elgin at NJ232619 and NJ232620 (v.c.95).

Morphological evidence of hybridity

In August and September 2022, samples of 126 leaflets from the four sites of the putative hybrid, and 116 leaflets from five localities of *S. nigra* in north Scotland (v.c.95, 96) were collected, choosing the largest leaflet per leaf. In November 2023, an additional sample of 100 leaflets of *S. nigra* was collected in Derbyshire (v.c.57), one leaflet per bush. The mean number of teeth per leaflet side did not differ between the north Scotland and Derbyshire *S. nigra*, (29.8 (99% CL ±2.0) c.f. 30.45 (99% CL ±1.81), and so the data were combined (n=216). The marginal teeth were counted on both sides of the leaflets, and the maximum number recorded. Although the data show a considerable overlap (Fig. 10), the putative hybrid tends to have more marginal teeth than *S. nigra*: mean 43.3 (99% CL ±1.7) c.f. 30.13 (99% CL ±1.36).

Marginal leaflet teeth were also counted from 20 North American herbarium specimens of *S. canadensis* (Appendix 1), recording the maximum count per specimen. This small sample had a mean of 32.55 teeth per leaflet side (95% CL ±3.44), close to the *S. nigra* mean, though the counts overlapped both those of *S. nigra* and the putative hybrid.

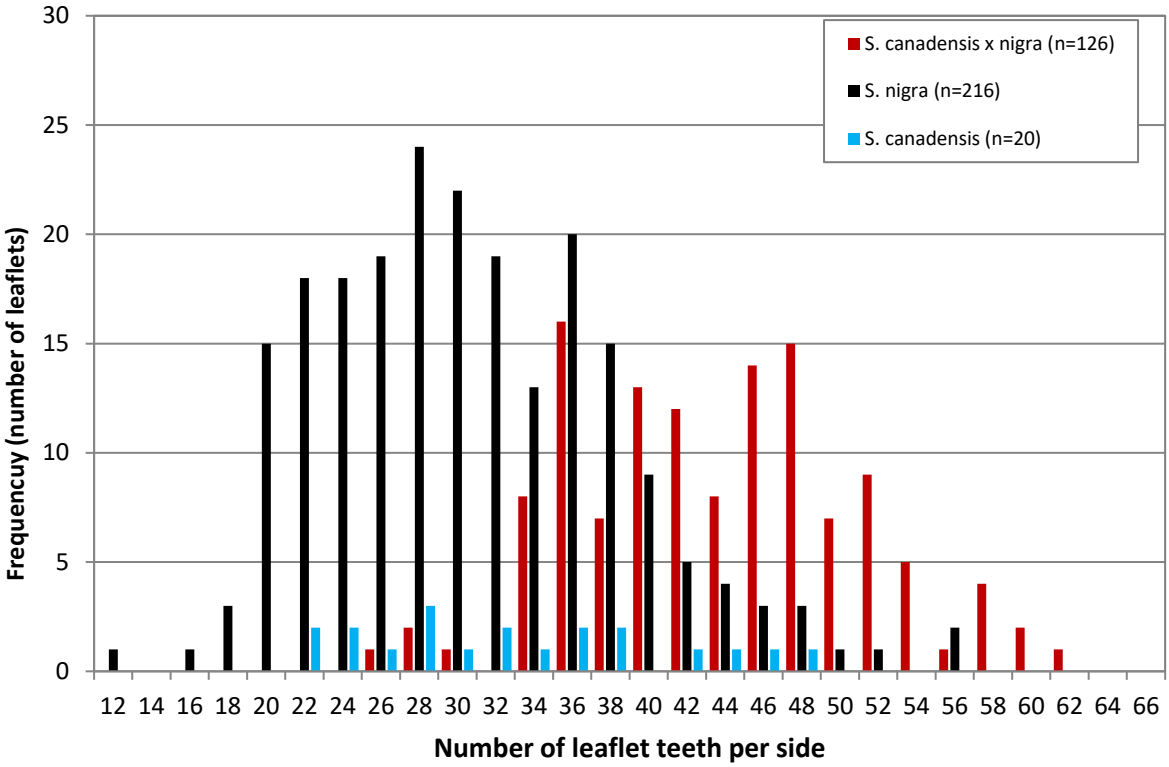

Figure 10. Number of marginal teeth per side of leaflet

Lamina lengths of the *S. nigra* leaflets from Derbyshire were measured. There is a weak positive correlation between lamina length and the number of marginal teeth: r=0.28, p<0.01, n=100 (Fig. 11).

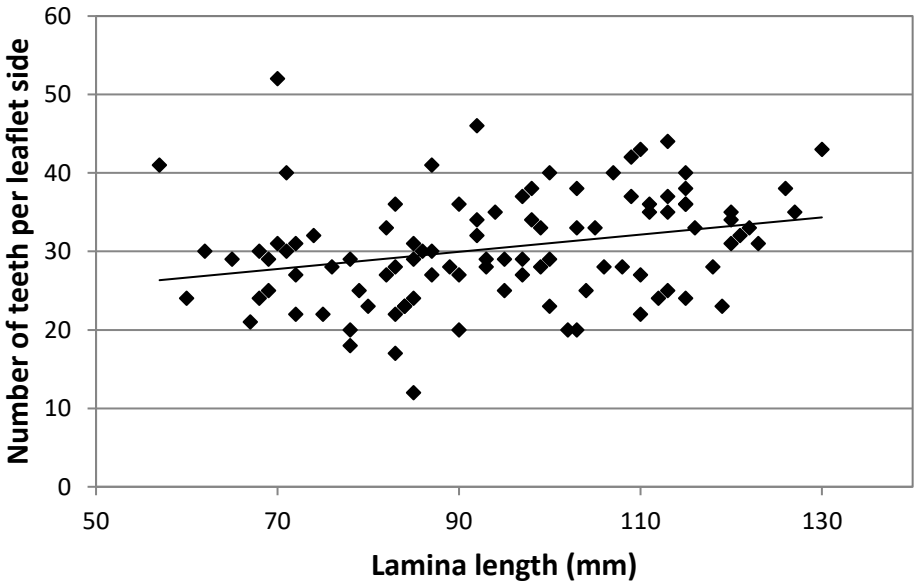

Figure 11. *Sambucus nigra*. Lamina length c.f. number of leaflet teeth

In October 2023 I collected single fruiting inflorescences from 25 bushes of the putative hybrid and 13 bushes of *S. nigra*. I measured the width of 10 fully ripened drupes per inflorescence (Fig. 12). Widths were measured using a calibrated digital

vernier caliper, at the widest point, perpendicular to the pedicel. The ripe fruits are soft, and to avoid squeezing the fruits and hence obtaining an inaccurate measurement, they were individually placed on a white sheet of paper in good illumination. While gradually closing the calipers the point at which both sides of the calipers touched the drupe could be accurately assessed. *Sambucus nigra* fruits earlier than the putative hybrid (or *S. canadensis*) and most bushes examined had few fruiting inflorescences, most having already been eaten by birds.

Hybrid bushes had smaller fruits that those of *S. nigra*, mean width 5.36 mm (99% CL ±0.06 mm) c.f. 5.91mm (99% CL ±0.08 mm), though there is considerable overlap in measurements (Fig. 12). If birds preferentially eat larger drupes, then the values recorded for *S. nigra* might be an underestimate.

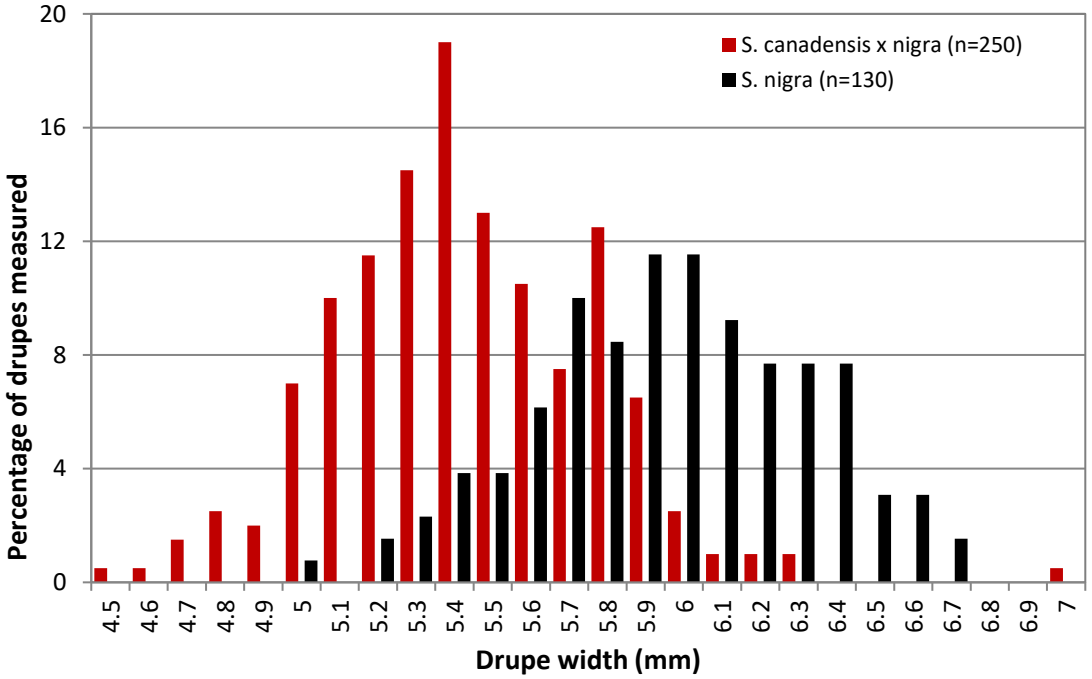

Figure 12. Drupe width

Drupe colour consistently differed. Ripe drupes of *S. nigra* are pure black, with no trace of any other colour, hence the specific name *nigra*. The remains of the sepals at the apex of the fruit are also usually black, occasionally dark red. Ripe drupes of the putative hybrid at the Beachen Wood, Grantown and Aviemore sites, while they may appear black from a distance, when examined in good light (especially under a x10 loupe), are a very dark reddish colour, which I would describe as maroon. The remains of the sepals are a dull red. The Elgin hybrids had drupes of a more marked rose-red colour, but which when very ripe turned black. These bushes fruited very heavily in 2023, and may be a different cultivar, but the drupe width, leaflet teeth number and shape were similar to the putative hybrids at the other three sites.

Many sources including, McClintock & Hollick (1981), Sell & Murrell (2006) and Stace (2019) describe the drupe colour of *S. canadensis* as dark purple or purplish-black. Online photographs of *S. canadensis* show drupes similar in colour to the hybrid reported here. Purple is a secondary colour, between red and blue, and the drupes of the hybrid (and of *S. canadensis*, from online photographs) show no

evidence of any blue tinge to their colouration. While subjective descriptions of colours are notoriously unreliable, the descriptions of drupe colour of *S. canadensis* as purple or purplish-black may be incorrect.

There are many *Sambucus* taxa in cultivation in Britain. Cubey (2023) lists 113 taxa as being currently available, excluding synonyms. These comprise 13 species, one hybrid and 15 cultivars with no parentage given. In this work, *S. canadensis* (along with *S. caerulea*) are treated as subspecies of *S. nigra*, and 71 infraspecific cultivars of *S. nigra* (*sensu lato*) are listed. Consideration of all the other *Sambucus* species currently available from nurseries and garden suppliers in Great Britain, confirms that the hybrid *Sambucus* reported here falls within *S. nigra sensu lato*. I have been unable to equate the bushes seen with any of the cultivars, based on examination of online images.

Records of *Sambucus canadensis* from Great Britain

The drawing of *S. canadensis* in Clement *et al.* (2005), from a Derbyshire (v.c.57) specimen, shows both serrate-acute and hooked leaflet teeth, with five leaflets per leaf. The identification is not convincing.

There are two specimens at RBGE with online images (Figs. 13 and 14).

Figure 13. *Sambucus canadensis*. Escape outside Upper Park House, Low Moor, Odsal Rise, south of Bradford. v.c.63. 28/8/1962. Specimen in flower. M. McCallum Webster. Apical leaflet https://data.rbge.org.uk/herb/E01342450

Figure 14. *Sambucus canadensis* × *S. nigra.* Recorded as *Sambucus canadensis* var. aurea. 2 miles north of Brough. In hedge by road off to Warcop (v.c.69). 06/09/1986. Specimen in flower. O.M. Stewart
https://data.rbge.org.uk/herb/E01342451

The v.c.63 specimen (Fig. 13) is correctly identified. The specimen has a maximum of nine leaflets per leaf, with acute marginal teeth, and was collected when in flower on 28th August. The v.c.69 specimen (Fig. 14) has seven leaflets per leaf, and was collected in flower on 6th September. However, the marginal teeth are hooked. This specimen is the hybrid.

Images of several specimens named as *S. canadensis* or as *S. canadensis* / S. *nigra* from the Cambridge University Herbarium were examined (Figs. 15 & 16). Two sheets from within or adjacent to the Botanic Garden at Cambridge are correctly identified (Fig. 15). The specimens have 7 and 9 leaflets per leaf, with acute marginal teeth.

Figure 15. *Sambucus canadensis*. Off driveway adjacent to 47 Bateman Street, leading to experimental garden of the Botanic Garden, Cambridge (vc29). 10/08/1979. R.D. I'Ons. Specimen at University of Cambridge Herbarium

Specimens collected by A.C. Leslie from a ditch near the River Cam in Cambridge (TL 4461 5793) have 5-7 leaflets per leaf and were in flower on 30th July. The marginal teeth vary from ± acute to hooked. The plant(s) was grazed by cattle, and the identification is uncertain. It may be the hybrid.

Three sheets collected by P.D. Sell at Milton, Cambridgeshire (Fig. 16) have an

Figure 16. *Sambucus canadensis*. Planted on roadside, Milton (v.c.29). (P.D. Sell)

unusual leaflet shape, with a blunt ± apiculate apex, rather than long-attenuate. The leaves have 7-9 larger leaflets per leaf with up to 4 additional smaller leaflets. The marginal teeth are broadly triangular, not especially acute, and a few teeth are hooked. The leaflet shape is similar to specimens of *S. canadensis* at the University of South Florida herbarium - https://cdn.plantatlas.org/img/specimens/USF/272845.jpg, and at the New York Botanical Garden - https://sweetgum.nybg.org/science/vh/specimen-details/?irn=2330817, though those specimens have more acute marginal teeth.

In October 2023 John Durkin re-visited several locations where *S. canadensis* had been previously recorded in v.c.66 and supplied photographs of the leaves to the author. Of 11 bushes examined, only three had acute leaflet teeth, the other eight had hook-shaped teeth or teeth with intermediate shape. Therefore it seems likely that the hybrid will be found in v.c.66, once bushes are examined in detail.

Conclusion

The origin of the Beachen Wood bushes is unknown. They were almost certainly not planted, but may have originated from dumped soil, or seeds could have arrived via bird droppings. The bushes at the other three sites are all planted.

It is probable that at least some introductions of *S. canadensis* into Great Britain will have included cultivars, and therefore variation in the appearance of plants might be expected, and *S. canadensis* in Britain may not exactly match typical wild, native plants in North America. Several North American herbaria make high resolution scans of *S. canadensis* specimens available online. Appendix 1 lists hyperlinks to a number of specimens of typical *S. canadensis*.

It is highly likely that some records of *S. canadensis* from Great Britain actually refer to its putative hybrid with *S. nigra*. This mirrors the recent discovery (Lansdown & Ruhsam, 2022) that almost all extant populations of *Nuphar advena* (Aiton) W.T.Aiton (Spatter-dock) in Great Britain are actually the previously

undescribed hybrid *Nuphar lutea* × *advena* = *N.* × *porphyranthera* Lansdown & Ruhsam.

Half the records of *S. canadensis* on the BSBI database are from the period since 1991, and it is likely that many recorders will have used Stace's New Flora to identify these plants. As discussed, that account does not mention leaflet teeth shape which is a key distinguishing feature of the two species. *Sambucus canadensis* should only be recorded in Britain if it matches all the diagnostic features of that species.

The putative hybrid of S*. canadensis* and *S. nigra* can be distinguished as follows. Forms a large multi-stemmed bush, with no single dominant trunk. Suckers are absent or rare. Mostly 7 leaflets per leaf. Leaflet teeth ± hooked (intermediate between parents, and smaller than those of *S. nigra*). Flowering and fruiting later than *S. nigra*. Drupes smaller than those of *S. nigra*, and usually retain some red colour when ripe. *Sambucus canadensis* can be differentiated from the hybrid by the presence of suckers (it can form thickets) and by the leaflet teeth being acute and not hook-shaped.

A specimen of the hybrid has been lodged at the Royal Botanic Garden Edinburgh (RBGE) herbarium.

Acknowledgements

Chris Preston commented on an earlier draft of this paper, supplied photographs of specimens at Cambridge University Herbarium, and provided details of the earliest record of *S. canadensis* in cultivation in GB. John Durkin provided field photographs of v.c.66 specimens. Ed Brown, the holder of the National Collection of *Sambucus*, discussed my original finds with me. Audrey Edgar and Ian Green looked for and found additional sites for the hybrid *Sambucus*. An earlier draft of this paper was commented on by Clive Stace.

References

Applequist, W.L. 2015. A Brief Review of Recent Controversies in the Taxonomy and Nomenclature of *Sambucus nigra* sensu lato. *Acta Hortic.* 1061:25–33. https://doi.org/10.17660%2FActaHortic.2015.1061.1

Atkinson, M.D. & Atkinson, E. 2002, *Sambucus nigra* L. *Journal of Ecology* 90:895-923. https://doi.org/10.1046/j.1365-2745.2002.00698.x

Bolli R. 1994. Revision of the Genus *Sambucus*. *Dissertationes Botanicae*. Vol. 223. Berlin, Stuttgart: J. Cramer.

Clapham, A.R., Tutin, T.G. & Moore, D.M. 1987. *Flora of the British Isles*. Cambridge: Cambridge University Press.

Clement, E.J., Smith, D.P.J. & Thirlwell, I.R. 2005. *Illustrations of Alien Plants of the British Isles.* London: Botanical Society of the British Isles.

Cubey, J., ed. 2023. *Plant Finder 2023*. London: Royal Horticultural Society.

Graham, G.G. 1988. *The Flora & Vegetation of County Durham*. Durham: The Durham Flora Committee and the Durham County Conservation Trust.

Lansdown, R.V. & Ruhsam, M. 2022. Yellow Water lilies (*Nuphar*, *Nymphaeaceae*) in Great Britain: a new hybrid, a reappraisal of records, and a revised status of *N. advena*. *Edinburgh Journal of Botany* 79:1–15. https://doi.org/10.24823/EJB.2022.1925

McClintock, D. & Hollick, K. 1981. *Sambucus canadensis*. In, Wigginton, M.J. & Graham, G.G., *Guide to the Identification of some Difficult Plant Groups.* England Field Unit. Occasional paper No. 1. Nature Conservancy Council.

Plants of the World Online (POWO). *Sambucus canadensis* L. Accessed 29/10/2023. https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:321978-2

Rich, T.C.G. & Jermy, A.C. 1998. *Plant Crib 1998*. London: Botanical Society of the British Isles.

Sell, P. & Murrell, G. 2006. *Flora of Great Britain and Ireland, Volume 4.* Campanulaceae - Asteraceae. Cambridge: Cambridge University Press.

Stace, C. 2019. *New Flora of the British Isles*. 4th. ed. Middlewood Green, Suffolk: C&M Floristics.

Stroh, P.A., Walker, K.J., Humphrey, T.A., Pescott, O.L. & Burkmar, R.J. 2023. *Plant Atlas 2020: Mapping Changes in the Distribution of the British and Irish Flora*. Princeton: Princeton University Press.

Thompson, G.L. 2020. *Plant profile video for Iowa State University, Department of Horticulture class HORT 240*. [online]. [Accessed October 2024]. Available at: https://www.youtube.com/watch?v=QY6Lhppgd9M

Wilmer, J. 1762. A catalogue of the fifty plants from Chelsea garden, presented to the Royal Society by the Worshipful Company of Apothecaries, for the year 1761. *Philosophical Transactions of the Royal Society* 52:491-494. https://doi.org/10.1098/rstl.1761.0080

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Appendix 1. Online images of *Sambucus canadensis* in North American herbaria [Accessed 03/03/2024]

Atlas of Florida Plants
https://florida.plantatlas.usf.edu/
https://cdn.plantatlas.org/img/specimens/USF/276402.jpg
https://cdn.plantatlas.org/img/specimens/USF/265101.jpg
https://cdn.plantatlas.org/img/specimens/USF/259497.jpg
https://cdn.plantatlas.org/img/specimens/USF/253426.jpg
https://cdn.plantatlas.org/img/specimens/USF/249763.jpg
https://cdn.plantatlas.org/img/specimens/USF/17211.jpg
https://cdn.plantatlas.org/img/specimens/USF/17184.jpg
https://cdn.plantatlas.org/img/specimens/USF/151644.jpg

Alabama Plant Atlas
http://www.floraofalabama.org/Default.aspx
http://www.floraofalabama.org/img/specimens/JSU/JSU106337.jpg
http://www.floraofalabama.org/img/specimens/ALNHS/ALNHS00000671.jpg
http://www.floraofalabama.org/img/specimens/UNA/UNA00048699.jpg
http://www.floraofalabama.org/img/specimens/JSU/JSU106913.jpg

The William and Lynda Steere Herbarium of the New York Botanical Garden
https://sweetgum.nybg.org/science/vh/
https://sweetgum.nybg.org/science/vh/specimen-details/?irn=1250053
https://sweetgum.nybg.org/science/vh/specimen-details/?irn=1618222
https://sweetgum.nybg.org/science/vh/specimen-details/?irn=1296560
https://sweetgum.nybg.org/science/vh/specimen-details/?irn=2666209
https://sweetgum.nybg.org/science/vh/specimen-details/?irn=2666338
https://sweetgum.nybg.org/science/vh/specimen-details/?irn=2666598
https://sweetgum.nybg.org/science/vh/specimen-details/?irn=2666262
https://sweetgum.nybg.org/science/vh/specimen-details/?irn=2666299