The whitebeam, *Sorbus heseltinei* Rushforth, from Xizang (Tibet) is illustrated and details of its morphology and distribution are given. Closely related species from the Himalaya are compared.

In the 19th century, rowans and whitebeams, along with apples and loquats, were placed as sections in the genus *Pyrus* L., following De Candolle’s *Prodromus* (1825) (Robertson et al., 1991). This treatment survived well into the 20th century, e.g. Elwes & Henry (1910, volume vi), Brandis (1921, fourth impression) and Bean (1914, 1933); other treatments like those of Roemer (1847) and Decaisne (1874), which separated the rowans (*Sorbus s.s.*) and whitebeams (*Aria, Micromeles*) both from *Pyrus* and into separate genera, made little popular headway. Wenzig’s (1883) generic concept treated *Malus* and *Sorbus* as separate genera to *Pyrus* but included *Aria* and *Micromeles* (*inter alia*) in *Sorbus s.l.*, a treatment largely followed by Rehder (1940). Since sometime in the 20th century this has been the predominant treatment, e.g. Bean (1951, 1980). Robertson et al. (1991) reinstated *Aria* as a separate genus from *Sorbus* but included *Micromeles* as a section in *Aria*.1 This treatment was followed by Ohashi & Iketani (1993) but was rejected by Aldasoro et al. (2004) who treated *Aria* as a subgenus of *Sorbus*. However, McAllister (2005) treated only rowans in his monograph on *Sorbus s.s.*

I find the evidence which shows the whitebeams as generically separate from the rowans compelling. I accept the view of Robertson et al. (1991) that the whitebeams are much closer to *Malus* than to *Sorbus*. However, I remain sceptical that they are correct in placing all the whitebeams in the one genus *Aria*. Apart from the differences in flower, fruit and leaf, I find it odd that they accept three whitebeam genera in Europe and southwest Asia (*Aria, Torminalis, Chamaemespilus*), a region generally poorly represented by temperate woody genera, but include all the variation in subtropical to cold temperate Asia in *Aria*.

1 Phipps et al. (1990) provided an invalid lectotype for *Micromeles*, selecting a species specifically excluded from *Micromeles* by Decaisne when he established the genus. The earliest valid lectotype for the genus is by Ohashi & Iketani (1993) and based on *Micromeles rhamnoides* Decaisne, and therefore has priority over the selection of *Micromeles verrucosa* Decaisne by Aldasoro et al. (2004).
Therefore I consider the inclusion of the whitebeams in *Sorbus* indefensible, except that I am not yet convinced that *Aria* is any better as the correct genus for the whitebeams (apart from *Sorbus aria* (*Aria nivea*) and its close relatives). For this reason when presenting a preliminary revision of the whitebeams belonging to *Sorbus* section *Thibeticae* (T.T. Yü) Aldasoro, Aedo & C. Navarro in the 2009 *International Dendrology Society Yearbook* (Rushforth, 2010a), I used *Sorbus* as the genus.

Section *Thibeticae* is found along the Himalayan chain into southwest China at least to Hubei and Guizhou, occurring in the cold temperate to subalpine zones. The group can be defined by the combination of the leaves white hairy on the abaxial surface, the styles close or only fused at the very base, the carpels superposed, and the pomes with persistent calyces and ripening to a generally russet colour. The species may occur with, or close to, other whitebeams, but are generally at higher altitudes above other whitebeam species.

The account I presented (Rushforth, 2010a) showed that the morphological characters, presented primarily by fruit and foliage, correlated with the geographical distributions. The species are all believed to be sexual diploids. Therefore apomixis, which makes the variation in the sympatric species of *Sorbus s.s* a nightmare, is not a factor in the distributions. What appear to be pertinent in explaining the variation is the geographical or ecological isolation of the populations coupled with a short range seed dispersal. As the flowers are insect pollinated, pollen is unlikely to be widely dispersed.

The widespread species in the Sino-Himalaya are generally those from the warm temperate zone, such as *Betula alnoides* Buch.-Ham., *Tsuga dumosa* Eichl., *Pinus kesiya* Royle ex Gordon or *P. roxburghii* Sarg. In the cold temperate zone and above, woody plants tend to be restricted in distribution, such as most *Rhododendron*, *Sorbus s.s.*, *Abies* and *Picea*; of course, there are exceptions, such as *Acer caudatum* Wall. which is widespread in its ecological zone.

I find that the Red River capture theory provides an explanation for how populations became disjunct and also suggests the time they had to evolve into separate entities. The theory was proposed by Clark *et al.* (2004), but is supported by molecular evidence, with fish (Rubber *et al.*, 2004; Guo *et al.*, 2005) and voles (Luo *et al.*, 2004), which allows some of the disjunctions to be dated. An *et al.* (2002)
show how the uplift of the Tibetan plateau affected the monsoon rain. See Rushforth (2008) for a fuller discussion of the theory.

The Red River capture theory identifies the lower Yarlung Tsangpo drainage in southeast Tibet as an isolated area. Within the drainage, several widespread genera are represented by local endemics, such as *Larix kongboensis* R. Mill, *Picea linzhiensis* (W.C. Cheng & L.K. Fu) Rushforth and *Abies fordei* Rushforth.

As far as we know now, *Sorbus heseltinei* is restricted to the Yarlung Tsangpo drainage. It is recorded from mixed forests on the northern flank of Namche Barwa near Gyala, from the lower Rong Chu and Tongkyuk valleys and from the Showa La in the Po Tsangpo valley. It is not recorded from further up the drainage, where the constraint could be a lack of sufficient moisture. It is possible that it occurs in the Medoc region of southeast Tibet south of Namche Barwa, but I have not seen any specimens from this area attributable to *S. heseltinei*.

*Sorbus heseltinei* shows affinities to both the *Sorbus thibetica* alliance and to the *Sorbus pallescens* group, particularly in its generally smaller leaves and more slender shoots. It is in cultivation from Chunyima and Showa. *Sorbus coronata* var. *glabrescens* T. T. Yü & L. T. Lu from Medog Xian (Acta Phytotaxonomica Sinica 18: 494, 1980) may belong here. Medog is on the southern side of the range adjacent to India and so this species may occur in India as well.

It is named for Michael Heseltine in appreciation of his support for study trips over the past two decades.

*Sorbus heseltinei* is characterised by its obovoid or pear-shaped fruit which is yellow or orange, with a few small round lenticels and is 1.1–1.6 cm by 0.8–1.1 cm at maturity. The fruit is held in small pendent clusters. The leaves are elliptic to lanceolate, 8–13 cm long, 3–6 cm wide, with 10–14 pairs of veins. The leaf margin is serrate or slightly doubly serrate with teeth to 3 mm, and the underside of the lamina is persistently grey-white lanate. These characters distinguish *S. heseltinei* from related species.

*Sorbus thibetica* (Cardot) Handel-Mazzetti, after which the section is named (and with which most species except *Sorbus pallescens* and those from the western Himalaya have been confused) is very distinct in the fruit being ovoid and without lenticels, and carried in much larger clusters. The mature herbarium fruiting specimens at Edinburgh (Forrest 13399 and 15087) from the same restricted area as the type,
Soulié 1237 (P), are remarkable for the bluish colour shown by the dried fruits, suggesting that in life they may have been reddish or purple. The leaves are 8–14 cm × 4–9.5 cm. *S. thibetica* is restricted to a small area around Tsekou in the Mekong valley.

*Sorbus pallescens* Rehder has leaves 3–5 cm × 1.5–3 cm on the fruiting spurs (although to 10 cm on extension shoots) and the fruits globose or ovoid and only 5–7 mm in size. It comes from west of Kangding, Sichuan.

*Sorbus ambrozyana* C.K. Schneider differs in the lanceolate to narrow elliptic leaves 5–15 cm × 2.5–4 cm with 10–15 pairs of veins, and in the globose fruit which is 1.2–1.5 cm × 1.5 cm; it is found in Yunnan around Lijiang and Dali.

*Sorbus coronata* (Cardot) T.T. Yū & Tsai has obovoid or globose fruits 0.7–0.9(−1.1) cm × 0.6–0.8 cm, and is found in the Lijiang area westwards. It is closely related to *Sorbus ambrozyana*.

*Sorbus needhamii* Rushforth² has leaves on fertile shoots and the first flush of new growth nearly glabrous, with 13–20 pairs of veins and globose to oblate fruits 0.8–1.2 cm. So far, it is only recorded from the Leigong Shan, Guizhou.

*Sorbus wardii* Merrill has leaves elliptic to obovate 6–12 cm × 3.5–6.6 cm with 10–12 pairs of veins and loosely woolly beneath. The fruit is globose or ovoid, 0.8–1.2 cm × 0.7–1.0 cm and ripens yellow with many small lenticels. It is found in northern Burma and northeastern India.

*Sorbus karchungii* Rushforth has larger leaves which are elliptic, ovate-oblong, obovate-oblong to sub-orbicular, from 9–17 cm × 4–12 cm and sharply doubly toothed in the apical half, with 11–18(−22) pairs of veins. The fruit is ovoid to obovoid, 1.4–2.0 cm × 1.1–1.4 cm, moderately lenticellate and, like *S. heseltinei*, ripens yellow or orange. It occurs across Bhutan, just extending into West Kameng, India.

*Sorbus burtonsmitiorum* Rushforth differs in the much larger, nearly orbicular leaves and globose lenticellate fruit 1.3–1.5 cm across. It is found at lower elevations than *Sorbus wardii* in northern Burma and the Dulong (Taron or Niukiang) valley in western Yunnan.

*Sorbus atrosanguinea* (Cardot) T.T. Yū & Tsai has leaves ovate, obovate to elliptic, with 14–17 pairs of veins, and ovoid to subglobose

²*Sorbus needhamii* was validly published in Rushforth (2010b).
fruits in much branched corymbs. It is recorded from western Yunnan.

*Sorbus vestita* (Wallich ex G. Don) Loddiges is separated by the leaves with 6–11 pairs of veins and the globose dark red fruit 1.5–2 cm across. It is recorded from central Nepal to northwest India.

*Sorbus sharmae* M. Watson, V. Manandhar & Rushforth has leaves 8–22 cm × 3.5–11 cm with ovoid fruits with many lenticels, ripening red-brown and 1–2 cm across. It is recorded from central to eastern Nepal.

*Sorbus lanata* (D. Don) Schaur from west Nepal and northwest India has lobulate leaf margins and fruits which are 1.3–3 cm across, and lacking lenticels.

*Sorbus hemsleyi* (C.K. Schneider) Rehder has russet lenticellate fruits to 0.9 cm and winter buds which are long pointed, 0.6–1.1 cm in length; the leaves are 11–17 cm × 3.5–10 cm, elliptic to obovate with a finely to coarsely toothed margin which is recurved. It is found in northern Hubei and adjacent Sichuan (Chongqing).

*Sorbus henryi* Rehder is a vicariad of *S. hemsleyi* from Sichuan around the Emei Shan which shares the recurved leaf margin. The buds are pointed but only to 0.7 cm (and thus comparable with those of *S. ambrozyana*). The leaves are obovate, less often elliptic and broadest at or just above the middle, 7–15 cm × 3.5–8 cm, with a margin doubly toothed to lobulate in the upper half. The fruit is globose, 1.2–1.3 cm long and wide. In both *S. henryi* and *S. hemsleyi* the calyx may occasionally be late deciduous.

The other species in the group (*S. hedlundii*, *S. guanii*, *S. hudsonii*, *S. yondeensis* and *S. spongbergii*) all differ in having rufous hairs on the leaves of fruiting spurs rather than the grey/white hairs found in the other species. Additionally they are distinguished from *S. heseltinei* by the following characters:

*Sorbus hedlundii* C.K. Schneider has leaves 18–30 cm by 10–20 cm with 12–15 pairs of veins. The fruit (flowers) has three to five styles, ripening to 1.0–1.3 cm, yellowish russet and lenticellate. Two or three styles are common in the group but having five styles is unusual. It is recorded from eastern Nepal to central Bhutan. The Nepali collections have much stronger toothing on the leaf margins than the Sikkim and Bhutan collections.
Sorbus guanii Rushforth has leaves broad elliptic to sub-orbicular, 8–11 cm × 5–9 cm and the fruit, which ripens to 0.6–1.1 cm × 0.6–1.1 cm to russet/brownish red with numerous large pale lenticels. It is recorded from the Cangshan, Yunnan, but may also occur further north.

Sorbus hudsonii Rushforth has elliptic leaves 6.5–10 cm × 3.5–5 cm with 10–15 pairs of close parallel veins and a fruit which is globose, 0.9–1.1 cm, ripening pale russet yellow, with scattered round lenticels. It is from southwest Yunnan.

Sorbus yondeensis Rushforth has leaves elliptic to oblong, 14–19 cm × 5–10 cm. The 10–14 pairs of veins are spaced with the tertiary veins forming a ladder effect between the secondary veins, as seen in S. burtonsmithiorum. The buds are conspicuously rounded, whereas the normal state in the group is to have ovoid-conic buds. The fruits are globose, 0.8–1.1cm. It is only known from the Yongde shan – omitting the g from Yongde in the original description was my typographical error!

Sorbus spongbergii Rushforth is closer to S. pallescens. It differs from S. heseltinei in the ovate-elliptic to ovate-oblong leaves 5–8.5 cm × 2.7–4.5 cm which are densely yellow-white lanate on the lamina beneath and densely rufous or dark rufous hairy on the usually 12–13 pairs veins beneath; the ovoid fruit is 0.6–0.7 cm long and wide, with 2 styles.

Cultivation. Sorbus heseltinei has proved hardy and easy to grow in good, well-drained soil in east Devon (Fig. 1). It is fast-growing reaching 5 m in ten years. Where several plants are grown away from other Sorbus species, it is likely to come true from seed, but where several species are grown together, hybrids are likely.

Sorbus heseltinei Rushforth, International Dendrology Society Yearbook 2009: 83(-84; fig.) (2010). Type: (China: Xizang), Tongkyuk, Rong Chu valley, 3 km south of Chunyima, 29°49′57.8N, 94°46′33.5E, 3100 m, tree 10 m, leaves oval to elliptic, 10–15 cm, fruit obovate, orange, 1.5 cm Rushforth (KR) 3770 DS80, from a tree grown from seeds collected at Tibet cultivated in Devon, September 18, 2009, (holotype, E).

Description. Tree to 12 m. Shoot sparsely hairy at first, then glabrous by autumn with a few oval lenticels, brown, 2.5 mm in diameter on spur shoots, to 6 mm on extension shoots. Bud ovoid, pointed, red-brown, glabrous, to 1.1 cm. Leaf lamina 8–13 cm × 3–6 cm, to 16 cm × 7.5 cm on strong extension shoots,
Fig. 1. Flowers of *Sorbus heseltinei*, KR 3770, growing at Ashill in Devon in early May. Photograph: Martyn Rix.
elliptic to lanceolate, apex acute to acuminate, base cuneate to narrow cuneate, decurrent on petiole, margin serrate or slightly doubly serrate, teeth to 3 mm with 1–2 mm tip on extension shoots, 3–5 teeth per cm on spur shoots, only 2–3 on extension shoots; upper surface initially sparsely pilose, later glabrous, some red-brown or blackish colleters on the main vein, 10–14 pairs of veins which are slightly impressed above with veinlets impressed and somewhat reticulate; underside veins raised, loosely lanate at first then largely glabrous, lamina persistently grey-white lanate with the surface rugose beneath; petiole initially off-white lanate, later glabrous, 0.7–1.5 cm; stipules linear, caducous, to 7 × 1 mm. Flowers on spur shoots with 3–5 leaves, corymbs 5 cm × 4 cm with circa 15–20 flowers, branched at base with 2–5 flowers on long peduncles, pedicels pilose; petals white, obovate, 4 mm × 3.5 mm wide, white pilose in centre on inside, glabrous without; ovary white pilose; styles 2, close or connate and hairy at base; pollen yellow. Fruit 6–10 in a cluster on glabrous pedicels 7–9 × 1 mm with linear lenticels, obovoid, yellow or orange with a few small round lenticels, 1.1–1.6 cm × 0.8–1.1 cm; calyx not forming a crown, sepal tips reflexed.

**Distribution.** China, Xizang, Namche Barwa near Gyala, from the lower Rong Chu and Tongkyuk valleys and from the Showa La in the Po Tsangpo valley.

**Habitat.** Montane scrub and forests, 2800–3400 m.

**Flowering Time.** May in cultivation.

Other locations: Bago, up the Tongkyuk river, 29°59′38.6N, 94°38′17.0E, 3400 m (KR 6373); Bagu, to the Qomzo La, at 29°57′48.9N, 94°40′38.7E, 3400 m (KR 7239); Gyala, circa 29°42′14.5N, 94°54′25.4E, 3200 m (KR 5162); Pome, Showa La, ca 29°53′57.2N, 95°23′56.5E, 2800–3200 m (KR 6247).

**REFERENCES**


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