# A preliminary revision of the Sino-Himalayan whitebeams

## (*Sorbus* section *Thibeticae* : Rosaceae)

KEITH RUSHFORTH reviews the species in *Sorbus* section *Thibeticae* Aldsasoro *et al* and names a new section, *Sorbus* section *Dunnii* Rushforth and nine new species, viz *Sorbus burtonsmithii* Rushforth, *Sorbus guanii* Rushforth, *Sorbus heseltinei* Rushforth, *Sorbus hudsonii* Rushforth, *Sorbus karchungii* Rushforth, *Sorbus neehamii* Rushforth, *Sorbus sharmae* M. Watson, V. Manandhar & Rushforth, *Sorbus spongbergii* Rushforth and *Sorbus yondeensis* Rushforth.

**Introduction**

From the note in the 2008 Yearbook (McAllister & Rushforth, 2009) it was clear that I thought there were a couple of new species needing to be described in the whitebeams in the Sino-Himalaya. So, I started to check the application of names, which included looking at all possible types. As part of this the Curator of the Herbarium at Edinburgh kindly borrowed holo-type or iso-type specimens from Harvard, Paris and New York to supplement the material at Edinburgh. Harvard responded to the request generously by sending over all their material from Yunnan and adjacent areas. Initially I intended to concentrate on the eastern Himalaya, leaving the western end of the range to the Flora of Nepal project. Dr Mark Watson and Vidya Manandhar (2008) had resolved the whitebeams in Nepal to comprise four species, viz *Sorbus lanata, Sorbus vestita, Sorbus hedlundii* and one which on the basis of literature (Long 1987, Aldasoro *et al* 2004) they were identifying as *Sorbus thibetica*. When I showed Mark the holotype of *Sorbus thibetica* he concurred that this last species did not equate (on the basis of characters they had found useful with the other three species) to *Sorbus thibetica* and thus a new name is needed for this entity (*Sorbus sharmae*). I am grateful to Mark for giving me access to their draft treatment, allowing me to deal with the group from the western end of the Himalaya to China.



The purpose of taxonomy is to help ***us*** understand the relationships between plants (or animals or fungi...) and the ways in which plants respond to their environment – ***they*** just get on with it (or become extinct). There is little profit in making one's concept of a species so wide that variation along the range is not recognisably the same taxon nor so narrow that every population is a different 'species'.

I have found the species concept used in the Edinburgh classification of *Rhododendron*, viz "species should differ from each other in at least two independent but correlated varying characters, and have geographical or ecological distributions different from those of their closest allies" (Cullen 1980, p. 3) very helpful as it requires both morphological and either geographic or ecological characters. In a group where, as far as we know, the species are all

sexual diploids, I find this species concept helpful in understanding the variation.

The result has been more taxa than I was expecting. I have not made any of these subspecies, primarily because the entities fit the above criteria. However, there is also the practical consideration of which earlier name to use with such a wide ranging group and there is a risk of obfuscating relationships rather than elucidating them–the purpose of the section is to show the reticulate nature of relationships. Also Linnaeus had this wonderful idea of a binomial system.

I am presenting the account in the genus *Sorbus* L. (Sp. pl. 2: 477. 1753). I consider *Sorbus sensu lato* as currently circumscribed to be an artificial entity, as demonstrated by Robertson *et al* (1991) but I am not convinced that their treatment satisfactorily resolves matters. In particular there is the matter of the numerous, primarily agamospermous apomictic taxa, involving *Sorbus sensu stricto*, *Aria* (Pers.) Host (Fl. Austiac. 2: 7 (1831) and *Torminaria* Medic. (Philos. Bot. 1: 134, 155. 1789) in their genome. Whilst this is a European problem, the types of these three genera are European species and it is a matter which needs resolving. Therefore, pending further investigation I think it is more pragmatic to use *Sorbus*, rather than *Aria* (as used by Robertson *et al* (1991) and Obashi & Iketani (1993).

Aldasoro et al (2004) treated the group as *Sorbus* section *Thibeticae* (T. T. Yü) Aldasoro, Aedo & C. Navarro (Syst. Bot. Mono. 69: 81. 2004). However, I do not agree with their placement of *Sorbus dunnii* within section *Thibeticae*. The Flora Reipublicae Popularis Sinicae (36: xiii 1974) treats it in series *Folgnerianae* T. T. Yü. I consider that it fits neither section *Thibeticae* nor section *Alnifoliae* (T. T. Yü) Aldasoro, Aedo & C. Navarro (Aldasoro et al, 2004, page 72, which includes *Sorbus folgneri* (C. K. Schneider) Rehder)) but showing some affinity to both groups. Accordingly I propose to treat it in its own monotypic section:



***Sorbus* Section *Dunnii* Rushforth Sect. nov.**

Type: *Sorbus dunnii* Rehder Plantae Wilsonianae 2: 273 (1915).

Fructus maturitatem rubri, haud vel pauci lenticellati, globosi, 5-7mm, calyice deciduo; styli duo, fere ad apicem connati.

The mature fruits are red, without or with few lenticels, globose, 5-7mm, with a deciduous calyx; styles 2, joined to near the apex.

This section only contains *Sorbus dunnii*. The fruit shows an affinity to section *Alnifoliae* but in this group the fruit is much longer than broad and larger. From section *Thibeticae*, it differs in the broad fruit clusters, the styles joined in the basal half and the deciduous calyx.

**Taxonomic treatment of Section *Thibeticae* and Section *Dunnii***

In the following discussion I divide section *Thibeticae* into three informal groups. Group A comprises the species with generally stout shoots, usually over 5mm in diameter. These are discussed sequentially from the western end of the Himalaya to southeast China. Group B comprises the group of species

related to *Sorbus pallescens*, which have one-year shoots generally in the range 2.5-4mm. Group C is the species pair of *Sorbus hemsleyi* and *Sorbus henryi*.

**Key to species in sections *Thibeticae* and *Dunnii***

1A Fruit 5-7mm in diameter, without lenticels or a few at the base, ripening from green to bright red, calyx deciduous, styles joined in basal half ***Sorbus dunnii***

1B Fruits larger than 7mm with calyx persistent, if less than 7mm then not ripening to bright red and styles close, free or only joined at the base 2

2A Leaves on fertile spurs 3-5 by 1.5-3cm; fruit 5-7mm in fruiting clusters less 2.5cm in length and breadth ***Sorbus pallescens***

2B Leaves on fertile spurs longer than 5cm; if fruit only 5-7mm then peduncle, pedicel and fruit in fruiting cluster together greater than 2.5cm 3

3A On mature trees leaves with rufous* (see footnote page 102) hairs on the veins below 4

3B On mature trees leaf veins below white, ginger or yellow haired or glabrous, not rufous haired 9

4A Leaves on fertile spurs 4-8.5cm, veins densely rufous haired ***Sorbus spongbergii***

4B Leaves on fertile spurs mainly greater than 8.5cm in length, veins usually less densely haired than lamina 5

5A Leaf margins lobulate or distinctly doubly serrate, leaves 18-30 by (4-)10-20cm ***Sorbus hedlundii***



5B Leaf margins simply serrate or weakly doubly serrate, less than 19cm 6

6A Leaves 5.5cm or less in width 7

6B Leaves, or most of them, more than 5cm in width 8

7A Leaves elliptic, 6.5-10 by 3.5-5cm, apex acute, cuspidate, veins impressed above, prominent below, parallel ***Sorbus hudsonii***

7B Leaves lanceolate to narrow elliptic, 5-15 by 2.5-4cm, apex acute but not cuspidate, veins not impressed above and not strongly prominent below ***Sorbus ambrozyana***

8A Leaf broad elliptic to sub-orbicular, 8-11 by 5-9cm, fruit lenticels large, erupting ***Sorbus guanii***

8B Leaf elliptic to oblong, (11-)14-19 by (2.5-)5-10cm, broadest above the middle, fruit lenticels small ***Sorbus yondeensis***

9A Fruit maturing to yellow or orange with or without a red flush 10

9B Fruit maturing to russet or red 12

10A Fruit obovoid or pear-shaped, with a few small round lenticels; leaves elliptic to lanceolate, 8-13 by 3-6cm, petiole 0.7-1.5cm ***Sorbus heseltinei***

10B Fruit globose, rarely obovoid; leaves oblong to broad elliptic to obovate to sub-orbicular, apex cuspidate, petioles generally less 1cm 11

11A Leaves oblong-obovate to sub-orbicular, margin sharply doubly toothed in upper half, teeth triangular with an aristate apex and tip 1-3mm, leaves 9-17 by 7-12cm with 11-18(-22) pairs veins; fruit moderately lenticellate; bud pointed ***Sorbus karchungii***

11B Leaves oblong to broad elliptic, margin more evenly toothed with aristate tips 0.5mm on fertile shoots (to 1.5mm on extension shoots), leaves 6-10 by 3.5-6.5cm with 9-11 (-13) pairs veins; buds rounded or abruptly pointed ***Sorbus wardii***

12A Fruit without prominent lenticels visible to the naked eye 13

12B Fruit with prominent lenticels visible to the naked eye 14

13A Leaves lobulate, teeth on lobes ***Sorbus lanata***

13B Leaves serrate but not lobulate ***Sorbus thibetica***

14A Leaves 2.5-4(-5)cm in width, shoot on lateral extension branches 2.5-4mm in diameter 15

14B Leaves 5cm plus in width, shoots on lateral extension branches 4mm+ in diameter 17

15A Leaf underside in fertile spurs and on first flush of extension shoots glabrous ***Sorbus needhamii***

15B Leaf underside hairy below, at least on the lamina 16

16A Fruit globose, 1.2-1.5cm in diameter, fleshy (soft) when ripe (usually squashed in herbarium specimens) ***Sorbus ambrozyana***

16B Fruit obovoid/globose 0.7-0.9(-1.1) by 0.6-0.8cm, remaining firm when ripe (retaining shape in herbarium specimens) ***Sorbus coronata***

17A Leaf veins 6-11 pairs ***Sorbus vestita***

17B Leaf veins 11-16 pairs 18

18A Leaves on fertile spurs nearly orbicular (less than twice as long as wide), veins curved forwards towards apex ***Sorbus burtonsmithii***

18B Leaves on fertile spurs not nearly orbicular (at least twice as long as wide), veins towards apex of leaf parallel 19

19A Leaves broad elliptic, to 22 by 11cm, teeth rounded with a forward beaked tip, fruit ovoid, 1-2cm, red-brown with dense lenticels ***Sorbus sharmae***

19B Leaves elliptic to obovate, to 15 by 8cm, teeth triangular, fruit less than 1.3cm, lenticels moderate 20

20A Petiole less than 1cm, hairy, underside of leaf lamina sparse to densely off-white lanate, veins with ginger or white hairs, fruit ripening red or red-brown ***Sorbus atrosanguinea***

20B Petiole generally more than 1cm, nearly glabrous, lamina loosely hairy below, veins sparsely hairy with white hairs or glabrous, fruit ripening russet 21

21A Bud long pointed, 0.6-1.1cm, terminal half of leaves finely to coarsely serrate, rarely doubly serrate, fruit to 0.9cm ***Sorbus hemsleyi***

21B Bud pointed, less than 0.7cm, leaves doubly toothed or lobulate in upper half, fruit globose, to 1.3cm ***Sorbus henryi***

## *Group A*–Thick twigged group

***Sorbus lanata* (D. Don) Schaur**
Schaur, Uebers. Arbeiten Veränd. Schles. Ges. Vaterl. Cult. 1847: 292 (1848).
*Pyrus lanata* D. Don, Prodr. fl. nepal. 237. 1825
*Aria lanata* (D. Don) Decaisne Nouv. Arch. Mus. Hist. Nat. 10: 163 (1874).

Tree 5-15m. Shoot shiny brown, initially white woolly, lenticels ellipsoid. Bud ovoid, obtuse or acute, brown, glabrous except for hairs at the apex. Leaves broad oblong, 6-13 by 3-9cm, apex acute, base cuneate, margin lobulate with lobes serrulate, upper surface glabrescent, underside white woolly, veins 9-15 pairs, nearly parallel. Petiole 1.5-2.0cm, white tomentose. Flowers densely white woolly; sepals ovate; petals obovate, clawed, obtuse, glabrous, 3.5-4.5mm; styles 3, connate at base, woolly. Fruit globose, red or dark brown, 1.3-3cm.

**India, Northwest**: Lace 1470, Chamba state, Donai to Bindraban, 9500 feet, (E); Lace 1596, Chamba state, above Chachul, 8-10000 feet, (E); Stainton 7566, Himachal Pradesh, Kilar, Chamba, 8500 feet, (E); Watt 8610, Bagi to Sunghi, 9000 feet, (E); Thomson s.n., Banahal, 8000 feet, (E); Nand 87, Deobaw range, 10000 feet, (E); Duthie 12507, Kamri valley, near Ratta, 9000 feet, (E); Hart s.n., Kangra district, 10000 feet, (E); Howick & McNamara 1908, Kashmir, Great Himalaya National Park, 2730m, fruit to 3cm by 2.5cm, (E); Polunin 56/480, Kashmir, Pahlgam & Aru, 7500 feet, fruit carmine, (E); Watt 2929, Kilar, below Dunny, (E); Claghorn s.n., Lahalle (?), (E); Bor 12626, Lahul, Manali, 10000 feet, (E); Fleming 248, Moockpoosa Sumal, 10000 feet, (E); sine collector, Murphul, (E); Lace 0059, Narkunda, (E); Reid s.n., near Drulita, (E); Stewart s.n., Northwest, (E); Watt 0815, Pangi, 8000 feet, (E); Parkinson 4082, Punjab, above Swajni, Parbatti valley, Kulu, (E); Drummond 24388, Punjab, Kunawar, (E); Drummond 24392, Punjab, Mussoarie, Kidar Kautha, (E); Watt 8046, Simla, (E); Madden s.n., upper Himalaya, (E); **Nepal**: Polunin, Sykes & Williams 1940, Bhartha Lagna, 9000 feet, (E); Polunin, Sykes & Williams 4127, Chaukhedi Lagna, 11000 feet, anthers pale cream, (E); Polunin, Sykes & Williams 4820, Gargiankuta & Munigaon, southeast of Jumla, 10500 feet, (E); Polunin, Sykes & Williams 0791, Punga Lekh, Pulonto Dara, 10000 feet, (E)



*Sorbus lanata* is very distinct in the lobulate leaf margin, recalling Swedish whitebeam (*Sorbus intermedia*) in this respect, and in the lack of lenticels in the fruit. It is mainly in cultivation from a Kashmir collection by Chris Chadwell and colleagues, either as Chadwell & Ramsey 92 or KBE (Kashmir Botanical Expedition) 92, with trees from this source at Ness and at the University of British Colombia Botanic Garden. Aldasoro *et al* record *Sorbus lanata* from

northeast India, including Bor 12626. This appears to be a mis-reading of the place names, although the plotting of locations on their map is a little fanciful.

***Sorbus vestita* (Wall. ex G. Don) Loddiges**
Cat. pl., ed. 16. 1836
*Pyrus vestita* Wallich ex G. Don, Gen. hist. 2: 647 (1832)
*Aria vestita* (Wall. ex G. Don) M. Roem. Fam. Nat. Syn. Mongr. 3 (Rosifl.):125 (1847).
*Sorbus cuspidata* (Spach) Hedlund, Kongl. Svenska Vet–Acad.Handl. 35:89 (1901)

Tree 6-10m. Shoot brown, 5mm, initially white tomentose, lenticels ellipsoid. Bud ovoid, brown, glabrous, 0.7-1.4cm. Leaves broad elliptic or lanceolate ovate, 12-20 by 7-11cm, apex acute or obtuse, base rounded or broad cuneate, margin serrate or crenate, upper surface initially hairy, underside dense white tomentose, veins 6-11 pairs. Petiole 1-2.5cm, white hairy. Flowers in corymbs 4-7cm across; sepals triangular, acute; petals 5.5-7.5 by 4-5mm, oblong obovate, woolly on the inner face; anthers pale purple; styles 3-4, woolly and connate at base. Fruit globose, dark red, lenticels sparse, 1.5-2cm.

Specimens: **Nepal**: Polunin, Sykes & Williams 2125, Bangthari, near Jirikot, 10200 feet (E, BM); Polunin, Sykes & Williams 3082, west of Jumla, Padmora, 10500 feet (E, BM); Stainton, Sykes & Williams 225, Tara Khola, west of Beni, 9500 feet (E); Stainton, Sykes & Williams 8619, Annapurna Himal, Modi Khola (E); Tokyo 9460111, Gandaki zone, Gorkha, Dumje Thumje, 2300m (E); **India (Northwest)**: Wallich 679B, Kamoan (E, BM); Wallich 679C, Kamoan (E).



*Sorbus vestita* is recorded from central Nepal to northwest India. Material from Sagarmatha region is often assigned to *Sorbus vestita* but I think it better fits within the circumscription of *Sorbus sharmae*. Literature reports have *Sorbus vestita* extending much further east, but the specimens I have examined represent different taxa which always have 11+ leaf veins.

True *Sorbus vestita* is not common in cultivation, but several collections by Chris Chadwell belong here.

***Sorbus sharmae* M. Watson, V. Manandhar & Rushforth sp. nov.**
Species nova, affinis *Sorbi vestitae* sed foliis latioribus, venis 11-16 paribus, petalis intus sparse pubescentibus, fructibus dense lenticellatis e *Sorbo thibetica* fructibus dense lenticellatis differt.

*Sorbus sharmae* differs from *Sorbus vestita* in the broader leaves (width greater than 0.58 times length (cf less than 0.57 times) with 11-16 pairs veins (cf 6-11 pairs), petals sparsely hairy within (cf woolly within) and fruit with dense lenticels (cf sparse lenticels) and from *Sorbus thibetica* in the fruits with dense lenticels (cf non-lenticellate).

Type: **Nepal**: ENEP 487, Bagmati zone, Langtang, 28°12′32″N, 85°28′46″E, 3170m, 15 October 2001, (E-holotype, KATH-isotype).

Tree 10-20m. Shoot grey brown, initially white tomentose, lenticels elliptic to round. Bud ovoid, acute, red-brown, glabrous with hairs at apex, 5-8mm. Leaves 8-22 by 3.5-11cm, broad elliptic, apex acute or shortly acuminate, base cuneate to rounded, margin serrate, teeth rounded with small forward hooked tip less than 0.5mm, upper surface dark green, glabrous when mature, underside white tomentose; veins 11-16 pairs, impressed above, raised on lower surface, rather slender and widely spaced; petiole 0.5-2.5cm, grooved, white tomentose; stipules ovate, caducous. Flowers in corymbs to 6cm across, white tomentose, flowers 1.0-1.2cm diameter, petals 5-7 by 3-5mm, obtuse, sparsely hairy towards the apex; styles 2-5, connate and densely hairy at base. Fruit ovoid, 1-2cm, red-brown with dense lenticels.

Other specimens: **Nepal**: Long & McDermot 21942, Rasuwe, Langtang Khola, 28°09′N, 85°26′E, 2480m, (E); Proud 111, Kathmandu valley, 8-10000 feet, (E, BM); Stainton 7080, Sangkua Khola, 10000 feet, (E); DNEP1 042, Sagarmatha, Solu Khumbu, Jorsale, 27°46′ 44″, 86°43′ 21″E, 2830m, (E, KATH); DNEP1 266, Nepal, Sagarmatha, Solu Khumbu, Namche Bazar to Lukla, 27°47′ 26″, 86°43′ 04″E, 2990m, 24/05/2004, (E); DNEP3 BY2, Nepal, Sagarmatha, Solu Khumbu, Phakding, 27°44′ 40″, 86°42′ 45″E, 2560m, fruit red, darkening as it ripens, (E, KATH); Geneva 1818, Sagarmatha, Thyangboche towards Namche Bazar, 3200m, (E); Stonor 63, Sagarmatha, Thyangboche, 12-13000 feet, (E); Ohba et al (83) 40124, Dhaulagiri zone, (BM).



*Sorbus sharmae* is recorded from the Langtang valley of central Nepal eastwards and replaces *Sorbus vestita*. It has been confused with *Sorbus thibetica* but differs in leaf characters as well as in the abundant lenticels on the fruit. It differs from *Sorbus karchungii* in the red-brown fruits (cf yellow/orange) and more rounded teeth on the leaf margins (cf. sharply doubly toothed). I am not sure whether it extends into Sikkim, or whether there is a further entity there; I have a tree from AGSES 347 from Sikkim, above Bakhim. The foliage suggests a closer relationship with *Sorbus sharmae* but the description of the fruit "fruit yellow, tinged orange" indicates a closer relationship with *Sorbus karchungii*.

*Sorbus sharmae* is in cultivation, usually as *Sorbus vestita*, from the Langtang and Sagarmatha regions. It is with great pleasure that we name this species in honour of Dr Uday R. Sharma for his contribution to the study and conservation of plants in Nepal.

***Sorbus hedlundii* C. K. Schneider**
Ill. Handb. Laubh. 1: 685 (1906). Type: India, Sikkim, 9-10000 feet (K-lectotype)
*Pyrus hedlundii* (C. K. Schneider) Lacaita. J. Linn. Soc. Bot. 43: 468 (1916).

Tree 10-20m. Shoot dark brown, initially white lanate, lenticels small, ovoid. Bud ovoid, 5-6mm. Leaves broad elliptic, 18-30 by (4-)10-20cm, apex acute or rounded, base cuneate, margin doubly serrate or lobulate, upper surface initially white woolly, underside lamina white lanate, veins, 12-15 pairs, prominently rufous hairy. Inflorescence a corymb 5-8cm across, rachis brown hairy; sepals linear triangular, reflexed; petals white, obovate, clawed, glabrous; styles 3-5, connate and white woolly at base, later glabrescent. Fruit globose, yellowish russet, lenticellate, 1.0-1.3cm.

Specimens: **Bhutan**: Ludlow, Sherriff & Hicks 20236, Tobrang (Trashi-Yangse chu), 8500 feet, anthers maroon, (E, BM); **India, Sikkim/West Bengal**: Ball 10225, Yak La, (E); Ribu & Rhomoo 7323, Lagnep, 11000 feet, (E); Hooker f. s.n., 9-10000 feet, (E, isotype); Cave s.n., Gyreeban, 9000 feet, (E); King, Kalaphokri, (E); Lace 2241, Tonglu, 10000 feet, (E); Cowan s.n., Tonglu, 9000 feet, (E); Gamble 8477, 9000 feet, (E); Rhomoo 1218, 9000 feet, 12/08/1913, (E). Haines 975, Rechi La, 9000 feet, (E); **Nepal**: Tokyo 9755180, Koshi zone, Sankhuwasabha district, 2810m, fruit oblate, (E).

*Sorbus hedlundii* is very distinct in the dense rufous hairs on the underside of the leaves. However, these are not found in physiologically juvenile plants or in suckers growths from older plants. It occurs on the outer ranges of the Himalaya, and is replaced to the north in Nepal by *Sorbus sharmae*; in Bhutan I have only seen it around Sengor in the east of the country. It may also be present on the Tongri ridge leading to the Poshing La in West Kameng, Arunachal Pradesh, India, *circa* 27°27′06.5′N, 92°22′53.2′E, 3157m.



The species was first introduced to Mount Usher in the nineteenth century and the plants in general cultivation are believed to derive from this introduction (suggesting they probably came from the Tonglu region). It is also recorded from BLM 020 from East Nepal but I have only seen juvenile material. The Bhutanese Sengor population is in cultivation in both the UK and New Zealand.

***Sorbus karchungii* Rushforth sp. nov**.
Species nova, *Sorbi wardii* affinis sed foliis oblonge ovatis ad suborbiculatis, duplicato-serratis partem superiorem versus, venis 11-18(-22) paribus; e *Sorbo thibetica* fructibus moderate lenticellatis, luteo-aurantiacis differt.

*Sorbus karchungii* is close to *Sorbus wardii* but differs in its oblong-obovate to sub-orbicular leaves which are sharply doubly toothed in the upper half and the more numerous (11-18(-22) pairs) leaf veins; from *Sorbus thibetica* in its moderately lenticellate, yellow-orange fruit.

Type: cultivated specimen from Rushforth 1776, grown from seed collected in Bhutan, Tashigang, from Radi Gompa on the way to Merak, crest of the Mindu la, 11,150 feet (E, holotype, collected October 2009).

Tree to 20m. Shoot initially white lanate, becoming glabrous, brown to red-brown with small round lenticels, 5-7mm in diameter. Bud ovoid or conical, pointed, to 1.2cm, scales green and brown. Leaf 9-17 by 4-12cm, lamina elliptic, ovate-oblong, obovate-oblong to sub-orbicular, apex rounded, cuspidate with cusp 0.5-1.0cm, with acumen 2-3mm, base sub-rounded to cuneate, margin sharply doubly toothed in apical half, teeth triangular, with aristate tip 1-3mm, *circa* 3 teeth per cm, basal half serrate or entire in basal ¼, upper surface initially woolly, 11-18(-22) pairs veins, not markedly impressed with some colleters on the midrib, lower surface veins raised, glabrous or sparsely haired, lamina with a thin plastered indumentum with a velvety feel; petiole 0.5-1.2cm, slightly hairy; stipules linear, pilose, caducous, 20 by 1mm. Flowers in corymbs 6 cm across by 3 cm, on spur shoots with 3 or 4 leaves; pedicels 0.2-1.5cm, white lanate; ovary white lanate; sepals spreading, obtuse, 2-3 by 1.5-2mm; petals obovate, spreading, creamy white, 7 by 4mm, pilose on inside; styles 2 or 3, joined at base, 4mm; stamens filaments 4-7mm. Fruit ovoid to obovoid, 1.4-2.0 by 1.1-1.4cm, base tapers into pedicel, lenticels moderate, round or oval; calyx persistent, incurved; ripening to yellow or orange often with a pink flush, fleshy (soft).

Other specimens, all **Bhutan**: Bowes Lyon 10108, Bumthang, Dhur chu, 3000m, (E); Ludlow, Sherriff & Hicks 18933, Bumthang, Shimitang, 10000 feet, (E); Sargent 244, Chele La, 27°23'N, 89°20'E, styles 4, (E); Grierson & Long 1049, Dochu La, 27°29'N, 89°45'E, 2925m, (E); Bartholomew & Tse 1689, ibid, 3100m, (E); Ludlow, Sherriff & Hicks 16173, Drukyel Dzong, 9000 feet, (E); Cooper 2041, Pele La, (E); Ludlow & Sherriff 3118, Phobsikha, anthers dull red, 10000 feet, (E); Grierson & Long 1908, Sengor, 27°23'N, 91°01'E, 3500m, anthers bright crimson, (E); Sinclair & Long 5567, Thimpu, Barshong & Dolam Kencho, 27°41'N, 89°38'E, fruit yellow, (E); Sargent 255, Bhutan, Thimpu, Phodjuding, (E); Cooper 2923, ibid, 10000 feet, (E); Sinclair & Long 5070, Upper Mo Chu district, Chamsa to Kohina, 28°00'N, 89°47'E, 3340m, (E); Kingdon-Ward 13696, Orka La, border of Bhutan with West Kameng, Arunachal Pradesh.



*Sorbus karchungii* is the common whitebeam across Bhutan, from just under 3000m to about 3500m. It is likely to extend into West Kameng and Tawang districts of Arunachal Pradesh but is not known from Sikkim. In Rushforth (1992) I questioned whether there were consistent differences between higher and lower elevation populations. Having examined the herbarium material cited above and studying trees in cultivation grown from both forms, I have concluded that the differences are largely environmentally induced. Leaf shape and size do not appear to be useful characters in this species, which is best defined by the toothing of the leaf margin, the silvery cast to pressed specimens and the fruit characters.

*Sorbus karchungii* is cultivated in Britain under a number of different

collections spanning most of it range, and is also grown at the University of British Columbia Botanic Garden.

*Sorbus karchungii* is named after Karchung Wangchuk in appreciation of the assistance he gave the party I was with in October 1985 when a cyclone deposited copious snow when we were at Lingshi, Northwest Bhutan.

***Sorbus heseltinei* Rushforth sp. nov.**

Species nova, *Sorbi wardii* et *Sorbi karchungii* affinis sed fructibus ovoideis, paucilenticellatis, ramis fertilibus tenuibus (2.5-3mm diametro), foliis ellipticis ad lanceolatis, e *Sorbo ambrozyana* fructibus ovoideis differt.

*Sorbus heseltinei* differs from *Sorbus wardii* and *Sorbus karchungii* in the fruit being obovoid with few lenticels, in the more slender shoots (2.5-3mm in diameter on flowering shoots) and the elliptic to lanceolate leaves and from *Sorbus ambrozyana* by its ovoid fruits.

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

Tree to 12m. Shoot sparsely hairy at first, then glabrous by autumn with a few oval lenticels, brown, 2.5mm in diameter on spur shoots, to 6mm on extension shoots. Bud ovoid, pointed, red-brown, glabrous, to 1.1cm. Leaf lamina 8-13cm by 3-6cm, to 16cm by 7.5cm on strong extension shoots, elliptic to lanceolate, apex acute to acuminate, base cuneate to narrow cuneate, decurrent on petiole, margin serrate or slightly doubly serrate, teeth to 3mm with 1-2mm 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 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, 0.7-1.5cm; stipules linear, caducous, to 7 by 1mm. Flowers on spur shoots with 3-5 leaves, corymbs 5cm by 4cm with *circa* 15-20 flowers, branched at base with 2-5 flowers per long peduncle, pedicels pilose; petals white, obovate, 4mm by 3.5mm 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 pendent cluster on glabrous pedicels 7-9 by 1mm with linear lenticels; fruit obovoid, yellow or orange with a few small round lenticels, 1.1-1.6cm by 0.8-1.1cm; calyx not coronati, sepals tips reflexed.

Other locations: Bago, up the Tongkyuk river, 29°59'38.6'N, 94°38'17.0'E, 3400m), (KR 6373); Bagu, to the Qomzo La, at 29°57'48.9'N, 94°40'38.7'E,

3400m (KR 7239); Gyala, *circa* 29°42'14.5' N, 94°54'25.4' E, 3200m (KR 5162); Pome, Showa La, *circa* 29°53'57.2'N, 95°23'56.5'E, 2800-3200m (KR 6247).

This species shows affinities to both the *Sorbus thibetica* alliance and the *Sorbus pallescens* group (such as in the generally smaller leaves and more slender shoots). It is in cultivation from Chunyima and Showa. *Sorbus coronata* var. *glabrescen*s T. T. Yü & L. T. Lu from Medog xian (Acta Phytotax. Sin. 18: 494. 1980) may belong here. Medog is on the southern side of the range adjacent to India and the species may occur in India. It is named for Michael Heseltine in appreciation of his support for trips over the past two decades.

***Sorbus wardii* Merrill**
Brittonia 4: 75 (1941), Kingdon-Ward 9623, Adung Valley, North Burma (HUH-holotype, BM).

Tree to 10m. Shoot loosely lanate with few lenticels. Bud ovoid conic, to 0.8cm, scales red-brown. Leaves 6-12 by 3.5-6.5cm, elliptic to obovate, apex cuspidate, margin serrate, teeth aristate, on fertile spurs teeth to 0.5mm but up to 1.5mm on extension shoots, base broad cuneate; upper surface loosely woolly, reticulate with veins slightly impressed; underside loosely woolly with white or pale yellow hairs, veins slightly raised; veins in 10-12 pairs which are parallel but curve forwards. Petiole 4-7mm. Stipules linear, caducous, 5mm. Inflorescense on spur shoots with 2-4 leaves in corymbs of *circa* a dozen flowers; sepals reflexed, oblong-lanceolate; petals obovate, lanate on outside, finely pubescent on inside, 4-4.5 by 3-3.5mm; styles 2 or 3, free; stamens 20, filaments 1.5-2.5mm. Fruit globose or ovoid, 0.8-1.2 by 0.7-1.0cm, lenticellate ripening yellow often with a red flush, sepals reflexed (KW 13124, BM) or closed over apex (KW21127 in cultivation).



**Burma**: Kingdon-Ward 13124, Nam Tamai valley, 28°00'N, 97°40'E, (BM); Kingdon-Ward 21127, Kachin state, Tama Bum, 9500ft, (BM); Forrest 25968, Hpimaw pass, west flank, 26°40'N, 98°40'E, 10-11000 feet, (E); **China**, Yunnan: Forrest 08924, Shweli-Salween divide, 25°20'N, 10000 ft, (E); Yü 20301, Salween-Kiukiang divide, east of Tehahtu, 2850m, pome reddish green, nearly mature, (E); Yü 20899, Yunnan, Taron-Taru divide, Ahtehmai, 2400m, pome yellow, fleshy, 2 or 3 celled, (E).

A distinctive feature of *Sorbus wardii* is the parallel side veins on the leaves; these curve forwards towards the apex of the leaf. This feature is also found on another principally Burmese species, *Sorbus burtonsmithii*, but this has much larger sub-orbicular leaves. The type is described from a flowering specimen, and thus not known in fruit. However, the higher elevation specimens from northern Burma and the Dulong of Yunnan fit the foliage on the type. I am

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*Sorbus heseltinei* KR 3770

*Sorbus wardii* KW 21127

tentatively including here a collection from the Delei valley in India (KR 8452), which is some 30 miles or so west of the Adung valley.

Aldasoro et al (2004, page 81) propose a specimen at Kew under Kingdon-Ward 9623 as lectotype. However, Merrill is quite clear in the protologue to his article in Brittonia (4, page 23) that except where he cited a specimen at New York Botanic Garden all the types of the species he named in the article were at the Arnold. This specimen exists, making it the holotype.

*Sorbus wardii* is in cultivation from Kingdon-Ward 21127. This forms an upright tree whose fruits ripen to yellow.



***Sorbus burtonsmithii* Rushforth sp. nov.**

Species nova, *Sorbi atrosanguineae* affinis sed foliis ramorum fertilium suborbicularibus, venis ad apicem curvis, e *Sorbo yondeense* venis pilis albis pubescentibus, e *Sorbo vestita* venis 12-15 paribus differt.

*Sorbus burtonsmithii* differs from *Sorbus atrosanguinea* in the leaves on fruiting shoots being sub-orbicular with the veins curving forwards, from *Sorbus yondeensis* in the white hairs on the leaf veins and from *Sorbus vestita* in the 12-15 pairs of veins.

Type: Yü 19986, Yunnan, Tangrehwang, Tarun-Taru divide, 1850m, 27 August 1938 (holotype E)

Tree 10m. Shoot brown with few lenticels, initially white loosely woolly, 5-6mm in diameter. Bud ovoid, rounded or pointed at apex. Leaves on fertile spurs 2-4, lamina sub-orbicular to broad elliptic, apex acute, shortly cuspidate, base shortly decurrent onto petiole, margin with rounded forward teeth; upper surface becoming glabrous with slightly impressed veins, under surface with dense white wool on lamina and less so on veins; veins in 12-15 pairs which curve forwards towards the tip, tertiary veins slightly raised and

forming a ladder effect between the main veins. Petiole 1.5-2cm, grooved, initially white lanate. Flowers in corymbs 5cm across, white lanate, sepals triangular. Fruit globose, 1.3-1.5cm, lenticellate, calyx persistent.

Specimens: **Burma**: Kingdon-Ward 20834, North Triangle, Uhring Bum, above Ahkail, 8-9,000 feet, 14 May 1953 (E); Kingdon-Ward 12985, Mungku Hkyet, 27°45'N, 97°50'E, 8-9000ft, (BM).

*Sorbus burtonsmithii* is a relatively low elevation taxon from the Irrawaddy drainage of northern Burma, which includes the Dulong valley of Yunnan (also known as the Taron and Kiukiang). I have chosen the Yü collection from Yunnan as the type because it is in fruit, but all three specimens have identical foliage. The species is characterised by the sub-orbicular leaves on the fertile spurs, on extension shoots these are more elliptic and more heavily toothed. It shares the ladder-like effect of the tertiary veins between the lateral veins with several other species. The leaf shape is also shared with the clone 'John Mitchell'. However, 'John Mitchell' does not belong here (or in the *Thibeticae*) on account of the styles being separate (not very close or joined at the base) and also differs in the green buds and in the toothing of the leaves. *Sorbus burtonsmithii* is in cultivation from Kingdon-Ward 20834, with trees at Wakehurst, Benmore and the Hillier Arboretum. I have named it after Peta and Vinh Burton Smith in appreciation of their company on treks.



***Sorbus atrosanguinea* T. T. Yü & Tsai**
Bull. Fan Mem. Inst. Biol. (Bot.) 7:119 (1936), type H. T. Tsai 58454, China, Yunnan, Chih-tse-lo, 3200m, 9 September 1934 (PE, non vide, HUH isotype)

Tree 8m. Shoot shiny, red-brown (maroon) becoming glabrous, 5mm; lenticels elliptic or rarely rounded, few. Bud ovoid, pointed, maroon, to 7mm; scales with hairs at tip and on margin. Leaf lamina 11-14cm by 5.5-7cm, ovate, obovate to elliptic, apex acute to short acuminate, base cuneate to narrow cuneate, margins sharply and somewhat irregularly serrate to doubly serrate with acute sinuses to 3mm, tip to 1mm, veins 14-17 pairs, impressed above, raised below and somewhat hairy; upper surface glabrous with a few brown colleters in the veins, underside white with a sparse to dense covering of off-white or ginger lanate hairs, lamina rugose. Petiole loosely lanate hairy, not dense, less 7mm. Stipules caducous. Inflorescence corymbs 4cm wide by 3cm, *circa* 12-15 flowers; peduncle & pedicels white lanate; sepals triangular, hairy on margins; petals obovate, 4mm by 3mm, densely hairy on inside, glabrous on outside; styles 2. Fruit in much branched corymbs 6-8cm across, lax from base, peduncles loosely hairy; pedicels to 7mm; fruit ovoid to subglobose, with some lenticels; calyx persistent; sepals triangular, acute, reflexed, lightly hairy; styles 2, close or joined at base; ovary hairy at apex; fruit red in field notes.

Specimens: **China, Yunnan**: Forrest 23486, Chienchuan-Mekong divide, 26°20'N, 99°20'E, 9000 feet, (E, BM); Forrest 23540, Chienchuan-Mekong divide, 26°20'N, 99°20'E, 10000 ft, (E, BM); KR 2661, Caojian, Yunlong Co, Nushan, Zibenshan, 25°45'N, 99°03'E, 3170m, (E); KR 2656, ibid, (E).

*Sorbus atrosanguinea* is closely related to *Sorbus thibetica*. In the autumn it is easily separated by the presence of lenticels on the fruit. Sterile or flowering specimens can be more problematic, but the narrower base to the leaf, less dense hairs on the leaf underside and the coarser toothing assist. The treatment of *Sorbus atrosanguinea* as a synonym of *Sorbus hemsleyi* by Aldasoro *et al* (2004) is rejected here for the characters given in the key.

*Sorbus atrosanguinea* is in cultivation from Caojian. Trees raised from KR 2656 and TH 532 have some ginger hairs on the veins on fertile shoots. If these are treated in the key as rufous hairs, these plants key out with *Sorbus yondeensis* at 8B but can be distinguished by the leaves 11-14 × 5.5-7cm (cf 14-19 × 5-10cm) and other characters. Yü 08423, from Dequen (Atuntze), Mt Kaakerpu, 3200m (E, BM) is in cultivation and is close to *Sorbus atrosanguinea*. Specimens from Li-ti-ping, such as Forrest 19461 (E), may also belong here or to an undescribed taxon.

***Sorbus thibetica* (Cardot) Handel-Mazzetti**
Symb. sin. 7: 467. 1933
*Pyrus thibetica* Cardot, Lecomte, Not. Syst. 3: 349 (1918).
*Aria thibetica* (Cardot) H. Obashi & Iketani J. Japan Bot. 68: 360 (1993).



Tree 10-15m. Shoot brown, shiny, glabrous, lenticels oval. Bud ovoid, or ovoid-conic, red-brown, *circa* 7mm. Leaves 8-14 by 4-9.5cm, ovate to broad ovate, apex acute to shortly acuminate, base rounded to broad cuneate and slightly decurrent on the petiole, margin serrate, teeth 1-2mm with a tip of *circa* 0.5mm; veins 12-15 pairs; upper surface glabrous, veins slightly impressed with some colleters, underside densely white lanate with raised veins. Petiole white lanate, grooved, *circa* 1 cm. Stipules caducous. Flowers not known. Fruiting clusters to 9cm across, fruit ovoid, 0.6-1.4 by 0.5-1.2cm, without lenticels; calyx persistent, sepals triangular, reflexed, densely hairy at tip and margin; styles 2, free or joined at base; pedicels white lanate, 2-3mm. Ripe fruit red-orange, drying to a bluish colour.

**China, Yunnan:** Soulie 1237, Tsekou, Thra-na, (P); Forrest 13399 Mekong-Salween divide 28°10'N 10,500 feet (E); Forrest 15087, ibid, 8-10,000 feet (E).

The fruit of the two Forrest collections cited has a very distinct bluish cast in the herbarium, a feature also shared with the better preserved specimens of *Sorbus lanata* (but not the somewhat musty ones!). These specimens were collected from not far from Tsekou, and agree with Cardot's description of the fruit as "haud lenticellati" – without lenticels. This is a feature shared only with *Sorbus lanata*

photograph © Keith Rushforth

*Sorbus atrosanguinea*
KR 2656

from the western Himalaya, although *Sorbus heseltinei* has few lenticels. All the other Chinese specimens with mature fruit which I have examined have had moderate to dense often erupting lenticels. Accordingly, I consider it helpful to treat *Sorbus thibetica* as a local endemic to the area around Tsekou.

As far as I am aware, *Sorbus thibetica* is not in cultivation.

***Sorbus guanii* Rushforth sp. nov.**

Species nova *Sorbi thibeticae* affinis sed fructibus magnis lenticellis erumpentibus, venis rufis pubescentibus, e *Sorbo hedlundii* foliis parvioribus, late ellipticis vel suborbicularibus, serratis differt.



*Sorbus guanii* differs from *Sorbus thibetica* in the fruits with many large erupting lenticels and the rufous hairy veins; from *Sorbus hedlundii* it differs in the smaller, broadly elliptic to sub-orbicular serrate leaves.

Type: CLD 1501, Yunnan, Cang shan, Huadianba, 3270m, 18 October 1990, (E, holotype).

Tree to 10m. Shoot glabrous, lenticellate, 5mm in diameter. Bud ovoid conic, pointed, reddish-brown, *circa* 1.0cm. Leaves broad elliptic to sub-orbicular, 8-11 by 5-9cm, apex rounded with a short acute point or somewhat acuminate, base cuneate to sub-rounded, margin serrate with small triangular teeth, tip less 1mm, 4-5 teeth per cm; upper surface glabrous with impressed veins, underside silvery hairy with very fine rufous hairs in veins; veins 11-17 pairs, prominent beneath; petiole 1-1.5cm; stipules caducous. Flowers in corymbs 4-6cm across, white lanate, petals obovate, 6mm. Fruit in large clusters 7cm across; fruit globose to turbinate, 0.6-1.1 by 0.6-1.1cm, ripening to russet/brownish red with numerous large pale lenticels.

**China**: Yunnan, Cang Shan: SBEC 0088, Dapingxi above Yangbi, 3000m, (E); 1984 SABE 1100, Huadianba, 2900-3300m, (HUH), (E); 1984 SABE 0181,

photograph © Keith Rushforth

*Sorbus hudsonii*
KR 7480

Xueshanbe to Dapingzi, 25°43'N, 100°02'E, 2600-3000m, (E); SBEC 0420, Yunnan, Cang shan, Shangchang, Yangbi, 2700m, (E, HUH).

This species is only recorded from the northern end of the Cang shan west of Dali (with no specimens matching it from Forrest's collection). Although only collected in the past 30 years, *Sorbus guanii* has managed to be given a miscellany of names–*pallescens* and *coronata* on herbarium sheets and, by Aldasoro et all (2004) *hedlundii* for SBEC 0420 and *dunnii* for 1984 SABE 181 & 1100, the later designation is inexplicable as the fruits are so different from those of *dunnii*! It is in cultivation from the type collection and looks set to make a neat upright tree. I take pleasure in naming this species after Guan Kaiyun in recognition of his involvement with many plant hunting trips from the 1980 SABE expedition into the twenty-first century.



***Sorbus hudsonii* Rushforth sp. nov.**
Species nova, *Sorbi atrosanguineae* affinis sed foliis nitentibus, ellipticis, acutis, venis approximate parallelis, sub angulo circa 30-45°, pilis rufis pubescentibus, fructibus globosis, ad maturatitatem pallidis ochraceis, et e *Sorbo hedlundii* foliis multis parvis differt.

*Sorbus hudsonii* differs from *Sorbus atrosanguinea*, in the shiny acute elliptic leaves with close parallel veins at 30-45 degrees, in the veins on the underside being rufous hairy and the fruit globose ripening pale yellow-brown and from *Sorbus hedlundii* in the much smaller leaves.

Type: cultivated specimen from Rushforth (KR) 7480 growing at Ashill, Devon, UK, from CHINA, Yunnan, Bang Dang & Lincang Daxue shan, at 23°56'18.5'N, 100°17'07.7'E, 3050m, shrub with *circa* 11 pairs of veins in the leaves, (E, holotype collected in fruit October 2009; flowering specimen 15 May 2009, E).

Small tree or shrub. Shoot initially white lanate, becoming glabrous, brown with few oval lenticels. Bud ovoid-conic to rounded, shiny brown, to

0.8cm. Leaves (3.5-)6.5-10 by (2-)3.5-5cm, elliptic, apex acute to rounded, cuspidate, cusp to 0.6cm, base cuneate, margin doubly serrate, larger teeth terminating secondary veins, teeth 1-2mm with tip to 1mm, finely revolute with 4-7 teeth per cm; upper surface initially white woolly, becoming glabrous and shiny with a few small colleters along main veins, surface finely impressed reticulate; lower surface grey-white woolly on lamina, rufous brown hairs on primary, secondary and some tertiary veins, with pilose tufts in vein axils; veins 10-15 pairs, pointing forwards at 30-45 degrees; petiole white hairy, glabrescent, 0.5-1.5cm, grooved; stipules caducous, linear, white hairy, to 6mm. Flowers in corymbs 4-5cm on spur shoots with 4-5 leaves; peduncles and pedicels white/yellow/rufous lanate; flowers 1.5cm across; sepals triangular, rufous hairy; petals reflexed, obovate, toothed with an apical fringe of hairs, 5 by 3mm, with pale hairs drying rufous on inside face, glabrous on outer face; stamens 20, filaments 4mm, glabrous, anthers pale purple; ovary rufous hairy; styles 2 or 3, joined at base, glabrous, 3mm, hairs at the top of the ovary; hawthorn scented. Fruit globose, 0.9-1.1cm with scattered round lenticels, hairy at base and apex, ripening pale russet yellow, pedicels 0.6cm, loosely white lanate, sepals spreading in fruit.

Other specimen: Forrest 24333, Yunnan, Shweli-Salween divide just west of 25º45'N, 98°45'E, 10-11000 feet (E, BM).



At 23°56' N *Sorbus hudsonii* is the most southerly known true whitebeam. The Forrest collection, which is not in cultivation, is more densely rufous hairy than the Lincang plant but appears to match the type in other respects.

***Sorbus yondeensis* Rushforth sp. nov.**
Species nova, *Sorbi hedlundii* affinis sed foliis parvis 14-19 × 5-10cm (vs 18-30 × 10-20cm) serratis, e *Sorbo atrosanguinea* et *Sorbo wardii* foliis 14-19cm et venis infra rufis pubescentibus differt.

*Sorbus yondeensis* differs from *Sorbus hedlundii* in the smaller (14-19 by 5-10cm leaves (cf 18-30 by 10-20cm) with serrate (cf lobulate or doubly serrate) margins. From *Sorbus atrosanguinea* and *Sorbus wardii* it differs in the leaf dimensions and the veins being rufous hairy beneath.

Type: cultivated specimen collected 16 October 2009 from Rushforth (KR) 7533 growing at Tregrehan, Cornwall, UK, from CHINA, Yunnan, Wu Mu Long township, Yonde Shan, 24°07'17.3'N, 99°39'19.0'E, 3350m: tree 6m, 24/10/2002 (E, holotype).

Small tree 4-6m. Shoot initially white woolly, nearly glabrous by autumn, 5mm, lenticels oval. Bud rounded, hemispherical, to 8mm, red-brown, scales cuspidate, margins hairy. Leaves (11-)14-19 by (2.5-)5-10cm, elliptic to

oblong, broadest above the middle, apex rounded to acute, shortly cuspidate, cusp 0.5cm, base narrow cuneate to cuneate, margin serrate, teeth forward, terminating veins, apex *circa* 1mm, slightly recurved on drying; upper surface finely rugose & reticulate; veins in 10-14 pairs, veins and veinlets impressed, loosely white woolly when young, nearly glabrous by autumn, small dark colleters in veins on midrib and secondary veins; underside lamina white hairy, loose brown hairs on primary, secondary, tertiary and even some 4th order veins, tertiary veins link between secondary veins, forming a ladder effect. Petiole 1.2-2cm, white woolly with a few rounded to oval lenticels. Stipules lanceolate or acute, 2-3mm. Flowers not known. Fruit globose, 0.8-1.1cm, white woolly at base and apex, yellow-russet with small lenticels denser towards the apex; pedicels white woolly, 8mm, peduncle with linear lenticels; calyx persistent, sepals triangular, erect; styles 3, close or joined at base, 3mm, hairy at base.

*Sorbus yondeensis* is only known from the Yonde shan in southwest Yunnan, China.

## Group B – Slender twigged species

***Sorbus pallescens* Rehder**
Plantae wilsonianae 2: 266 (1915).
*Aria pallescens* (Rehder) H. Obashi & Iketani J. Jap. Bot. 68: 360 (1993).



Thin tree 6m. Shoot lightly hairy in first year, some hairs persistent, shiny red-brown, 2.5-3mm in diameter, lenticels occasional, oval to rounded. Bud conical or ovoid, pointed, 8mm by 4mm, pale reddish brown, lightly pilose on margins & near tip, variably hairy on back of bud scales. Leaf lamina on fertile spurs 3-5cm by 1.5-3cm but on extension shoot to 10cm by 5cm, ovate to ovate-oblong, acute or slightly acuminate, base rounded to cuneate, margin finely serrate, vein-ending teeth triangular, to 2mm, slightly larger than the 1-3 inter-venal teeth which are less than 1mm; veins 10-14 pairs, slightly impressed above, raised below, light brown; lamina lightly lanate above with branched hairs, becoming more or less glabrous, with small brown colleters on some veins, lanate below with grey-white or off-white hairs, less hairy on yellow-brown veins where there are some pilose and/or some rufous hairs. Petiole slightly white pilose, caniculate, 0.5-1.0(-1.3)cm; stipule narrow triangular or linear, soon lost. Flowers on spurs shoots with 2 or 3 leaves, inflorescence branched at base, 2.5 by 2.5cm or less with *circa* 15 flowers; pedicels 2-3mm, densely lanate, ovary pilose; sepals triangular, rounded at apex, pilose; petals obovate, 3-4mm by 3-4mm, pilose at base on inside; stamens *circa* 20, anthers attached in middle; styles 2; bracts linear, soon deciduous, 5-6mm, pilose. Fruit in small clusters, on a short lenticellate peduncle on spur shoots; pedicels 4-5mm, white pilose; calyx

*Sorbus yondeensis* KR 7533 (see page 90)

*Sorbus ambrozyana* KR 4225 (see page 94)

persistent, crown-like (coronati), sepals acute, reflexed; styles 2, joined at base, base of style and top of ovary pilose; fruit globose or ovoid, 5-7mm by 5-7mm, slightly hairy, abrupt to tapered at base.

**China, Sichuan**: Wilson 1255, West of Tachien-lu (Kangding), 10,000 feet, 10 October 1908 (HUH-lectotype, E, BM); Cheng 910, South West of Tachien-lu (Kangting), (HUH, BM).

*Sorbus pallescens* is very distinct for the smallness of the leaves on fertile spur shoots, although on the type at Harvard there are larger leaves on the separate extension shoot. The reduced size of the inflorescence also distinguishes it from the other members of the group, as does the small size of the fruit except from *Sorbus spongbergii*.

*Sorbus pallescens* is the oldest species in a cluster of taxa from west and south Sichuan to Yunnan and into Guizhou, viz *Sorbus pallescens*, *Sorbus ambrozyana*, *Sorbus coronata*, *Sorbus needhamii* and *Sorbus spongbergii*. These species are distinguished by the slender shoots, generally 2.5-3mm in diameter on lateral twigs. Another unifying feature of the group is the way the calyx is held as a crown over the fruit–a character used by Rehder, Schneider and Cardot when they described the first three species.

As defined here, *Sorbus pallescens* has a restricted distribution in western Sichuan. I have not found any record of Wilson introducing the species in 1908 to Britain. SICH 0718 from Kangding Xian, Niquio river, North of the Jiehou pass, 3040m should belong here.

***Sorbus needhamii* Rushforth sp. nov.**

Species nova, *Sorbi ambrozyanae* affinis sed foliis ramorum fertilium et primis surculorum crescentium glabratis, obovate-oblongis vel elliptice-obovatis, venis condensatis parallelis 13-20 paribus differt.

*Sorbus needhamii* is close to *Sorbus ambrozyana* but differs in the leaves on

photograph © Keith Rushforth

*Sorbus needhamii*
TH 2842

fertile spurs and the first flush on extension shoots being nearly glabrous with 13-20 pairs of close parallel veins and obovate-oblong or elliptic-obovate.

Type: Cultivated 16 October 2009 from a tree grown under Hudson (TH) 2842 at Tregrehan, Cornwall, UK, from seed collected with Edward Needham on the Leigong shan, Guizhou, China at 1900m.



Tree. Shoot glabrous, red brown in first year and 2.5-4mm in diameter, dull brown in second, with small oval lenticels. Bud ovoid, acute to acuminate, brown, to 8mm. Leaves 6-10 by 2.5-4cm, elliptic to obovate-oblong, broadest at or above middle, apex acuminate, base cuneate to sub-rounded, shortly decurrent on the petiole, margin slightly revolute and finely doubly serrate with teeth on main veins larger than intermediate teeth terminating spur veins, 5-7 teeth per cm, upper surface shiny, finely reticulate with impressed veins, initially glabrous or loosely lanate with some hairs and black colleters persisting at junctions of midrib and side veins; under surface on fertile spurs and first flush on extension shoots in spring virtually glabrous but later leaves (which are elliptic to elliptic-obovate) grey-white lanate; veins 13-20 pairs, parallel but often branching near leaf margin; petiole grooved, 5-7mm on flowering shoots, to 1.5cm on extension shoots, glabrous or hairy as for the leaf; stipules linear or triangular, caducous, 3 by 1mm. Flowers in small corymbs on spur shoots with 3 or 4 leaves. Fruit globose to somewhat oblate, 0.8-1.2cm, hairy at apex and base, with small round lenticels 3-6 times apart; pedicels slender, 4-5 by 1mm, white lanate; calyx persistent, coronate, sepals reflexed, short triangular; styles 2; ovary hairy; fruit orange or pinkish-orange, soft and fleshy when ripe.

*Sorbus needhamii* is only known from the Leigong shan in Guizhou. In the soft ripe fruit, slender shoots and leaves on extension growths it shows an affinity with *Sorbus ambrozyana* but is very distinct in the foliage on the flowering/

fruiting spurs. In the absence of fruits it would logically be identified as close to *Sorbus alnifolia* (Sieb. & Zucc.) Decne but the globose to oblate fruit with persistent calyx shows it has no close relationship with this northern species.

Rehder (in **Plantae wilsonianae**, 2:273, 1916) refers to a plant described by Léveillé as *Sorbus aria* var. *Mairei* as having subsessile leaves green beneath. I have not traced a specimen in the RBG Edinburgh herbarium (Edinburgh purchased the herbarium of Hector Léveillé) but it could be related.

The species is named for the late Edward Needham.

***Sorbus ambrozyana* C. K. Schneider**
Bot. Gaz. 63:401 (1917). Type: Schneider 3913, China, Yunnan, in reg. Lijiang, October 1916 (HUH).

Tree to 10m. Shoot shiny red-brown (maroon-brown), glabrous, lenticels pointed, elliptic to oval. Bud conical on long shoots, ovoid on short ones, 5-9mm, shiny brown, slightly pilose at tips. Leaves variable. On fertile spurs leaves 5-10 by 2.5-4cm, oblong-ovate to oblong, but on extension shoots they are more lanceolate to narrow elliptic, 10-15 by 2.5-4cm; apex rounded to acute, base cuneate to truncate, margins finely serrate or smoothly crenate, teeth terminating veins or spur veins, tip less 0.5mm, veins 8-15 pairs; upper surface with veins impressed, glabrous and somewhat rugose; underside with main and other veins raised, yellow or white lanate beneath on lamina, veins less hairy, yellow-brown or sometimes thinly rufous. Petiole initially pilose, 0.5-1.5cm. Flowers in small lanate corymbs 4cm across on spur shoots with 1-3 leaves; petals white, sepals triangular; styles 2, close or joined at the base. Fruit generally squashed on herbarium specimens, 1.2-1.5 by 1.5cm, globose, few lenticels; calyx persistent, coronate, top of ovary yellow-white hairy.



Specimens: **China, Yunnan, Lijiang**: Forrest 02112, (E); Rock 03853, (HUH); Rock 06441, (HUH); Rock 06759, (HUH); Rock 06759, (HUH); Forrest 10232, 27°40'N, 10-11000 feet, (E, HUH, BM); Ching 20514, 2800m, (HUH); Rock 17230, Yunnan, Lijiang to Youngning, (E, HUH). **Yunnan, Dali & Cang shan**: SBEC 0268, Cang shan, Shangchang, Yangbi, 2400m, (E); SBEC 0795, Cang shan, XiaoHuadianba, 3000m, (E, HUH); Rock 06761, Dali to Youngchang, (HUH); Rock 06763, Dali to Youngchang, (HUH); Rock 06766, Dali to Youngchang, (HUH); Forrest 10050, Yunnan, Laughans (?) to Hoching pass, 26°25'N, (E). **Yunnan**: Forrest 26006, Mekong-Salween divide, north of Pien-tien-go, 27°26'N, 99°30'E, 10000 feet, (E); Forrest 25438, Yunnan, Mekong-Salween divide, north of Pien-tien-go, 27°26'N, 99°30'E, 10000 feet, (E); Forrest 23019, Chienchuan-Mekong divide, 26°40'N, 99°40'E, 12000 feet, (E); Rock 08807, Tsekou & Tsehchung, Mekong-Salween, (HUH); Yü 14919, Zhongdian, Paitih, 3000m, (E); Yü 07825, Atuntse (Deqen), Dokerla, 2900m, (E); Yü 10498, Atuntze (Deqen), Mt Kaakerpu, 3200m, (E, HUH, BM). **Sichuan**: Yü 14427, Muli, (E, HUH, BM).

*Sorbus ambrozyana* is the second oldest species in this group and thus has priority over *Sorbus coronata* if the two are merged. Leaf and fruit size well distinguish it from *Sorbus pallescens* and *Sorbus spongbergii*. Distinguishing *Sorbus ambrozyana* and *Sorbus coronata* is less certain, especially in flowering specimens although *Sorbus ambrozyana* seems to have a more lax inflorescence. The characters I am using here are fruit characters, which is why my identification of flowering specimens is provisional. In *Sorbus ambrozyana*, the mature fruit, or at least the better formed fruits[1], are globose or even slightly oblate and in the range 1.2-1.5 by *circa* 1.5cm, thus similar to *Sorbus needhamii*. The fruits soften on ripening, resulting in them being squashed on drying. In *Sorbus coronata*, the fruits seem to remain firm on ripening, and thus retain their shape on drying, and are usually 0.7-0.9(-1.1) by 0.6-0.7cm.

Plotting the distribution of the majority of the specimens assigned to either *Sorbus ambrozyana, Sorbus coronata* or *Sorbus spongbergii* has *Sorbus ambrozyana* in an arc running south from Muli to Lijiang to Dali and thence southwest, *Sorbus coronata* extending from Muli to Lijiang and then west, and *Sorbus spongbergii* from Lijiang north to southern Sichuan. Outliers to this may indicate erroneous identifications on my part, or simply that the picture is a little more complicated! It is likely that there is some ecological factor separating the taxa.

The only plant in cultivation which I am confident to assign to *Sorbus ambrozyana* rather than *Sorbus coronata* is KR 4225 from Lijiang to Dali, Tie Jia Shan, 26°45′27″ N, 100°40′57 E, from 2700m down to 2600m, which was a coppiced shrub 2.5m.



***Sorbus coronata*** **(Cardot) T. T. Yü & Tsai**
Bull. Fan Mem. Inst. Biol. 7: 120 (1936).
*Pirus coronata* Cardot, Lecomte Not. Syst. 3: 348 (1918).
*Aria coronata* (Cardot) H. Obashi & Iketani, J. Japon Bot. 68: 357 (1993)

Small tree to 10m. Shoot slender, becoming glabrous with few oval lenticels. Bud conical, 6mm, scales white hairy on margins but otherwise glabrous. Leaves 5.5-10.5 by 2.5-4cm, lanceolate to oblanceolate, apex acuminate, base cuneate, margin finely double serrate, teeth less 1mm, up to 3 small teeth between vein terminating tooth; veins in *circa* 12-14 pairs, on upper surface main veins impressed with colleters, glabrous, on underside lamina short white lanate with veins raised and nearly glabrous. Petiole 1.3-1.5cm, deeply grooved, glabrous. Flowers white, in corymbs *circa* 4cm across, styles 2 or 3. Fruit *circa* 20 in a corymb 10cm wide by 5cm deep, pome 7-9(-11) by 6-8mm, obovoid with few lenticels and some white hairs by the

[1] In whitebeams, fruits which don't contain fertile seeds often appear to mature but remain small. It is important that fruit measurements are from ripe fertile fruits, and they often shrink on drying!

persistent coronate calyx; sepals reflexed, linear, *circa* 2mm, styles 2 or 3.

Specimens: **China, Yunnan, Lijiang**: Delavay s. n., along the route in the plain of La Che Pa near Likiang, 29 August 1887 (P, type); Rock 06185, (HUH); Rock 06757, (HUH); Rock 06758, (HUH); Rock 25365, 9500-10000 feet, (HUH); Feng 2995, 2700m, (HUH); Feng 3048, 2800m, (HUH); Tanichung, (HUH); **Yunnan, without details**: Tsai 57211, (HUH); Tsai 57358, (HUH); Tsai 57421, (HUH); Tsai 57621, (HUH); Tsai 57811, (HUH); Forrest 29044, (E); **Yunnan, Wei Xi**: Rock 17157, (HUH); Wang 63614, 2300m, (HUH); Tsai 59509, 2800m, (HUH); Tsai 59586, 2800m, (HUH); Tsai 59770, 2900m, (HUH); Tsai 59906, 2800m, (HUH); Rock 17170, Mt Shang-Mu-Kou, (HUH); **Yunnan, elsewhere**: Tsai 50914, Chaotung xian, (HUH); Tsai 58402, Che tse lo, 3200m, (HUH); McLaren C286, Chi Tso Shan, (E, BM); Forrest 22349, Chienchuan-Mekong divide, 26°40'N, 99°40'E, 11000 feet, (HUH); Forrest 23459, Chienchuan-Mekong divide, 26°30'N, 99°20'E, (E, BM); Maire 124, Lao Kiou, (HUH); Forrest 15060, Mekong-Salween divide, 28°12'N, 10-11000 feet, (E, BM); Forrest 25437, Mekong-Salween divide, north of Pien-tien-go, 27°26'N, 99°30'E, 11000 feet, (E, BM); Forrest 25994, Mekong-Salween divide, north of Pien-tien-go, 27°26'N, 99°30'E, 11000 feet, (E); Cox & Hutchison 7117, Northeast, Qujing, Yiliang, 2600m, (E); Tsai 52975, Pin chuan xian, 2800m, (HUH); Tsai 54463, Shangpa xian, (HUH); Tsai 59030, Shangpa, 2000m, (HUH). **Sichuan**: Yü 14718, Muli, Wacin, Jungchi, 3200m, (E, BM).



*Sorbus coronata* is doubtfully distinct from *Sorbus ambrozyana*, which was described a year earlier. For this reason, the combination making *Sorbus ambrozyana* a variety of *Sorbus coronata* is invalid. For the present time I am distinguishing *Sorbus coronata* from *Sorbus ambrozyana* on the basis of fruit size and texture, as discussed above.

***Sorbus spongbergii* Rushforth sp. nov.**

Species nova, *Sorbi pallescentis* affinis sed foliis ramorum fertilium 4-8.5 × 2.7-4.5cm (vs 3-5 × 1.5-3cm), venis infra dense rufis pubescentibus et inflorescentia maiore 3-4.5cm differt.

*Sorbus spongbergii* differs from *Sorbus pallescens* in the leaves on fertile spurs being 4-8.5 by 2.7-4.5cm (vs. 3-5 by 1.5-3cm), in the veins on the leaf underside being densely rufous hairy (cf. white haired with few or no rufous hairs) and in the larger inflorescence 3-4.5cm across (cf less 2.5cm).

Type: Schneider 3530, China, Sichuan, YenYuan Xian, towards Hungba, 2500m, 12 June 1914, (HUH-holotype, E-iso-type).

Tree to 10m by 0.8m. Shoot maroon or dark maroon, with few rounded oval lenticels, shiny, initially hairy. Bud ovoid to long conic, 6-7 by 3-4mm. Leaves 5-8.5 by 2.7-4.5cm, ovate, elliptic or ovate-oblong, apex acute, base cuneate to

photograph © Keith Rushforth

*Sorbus henryi*
KR 161

broad cuneate, margin finely serrate with a small mucro, upper surface lightly hairy, becoming glabrous, veins lightly impressed with some colleters along the main vein; underside densely yellow-white lanate on the lamina with the raised veins densely rufous or dark rufous hairy; veins in (10-) 12-13 pairs (to 15-17 veins on extension growths). Petiole hairy, 0.7-1.0cm. Stipules linear, caducous. Flowers on spur shoots with 2-4 leaves, corymbs 3-4.5cm across by 2.5cm, with *circa* 15-20 flowers; pedicels 3mm, densely white or rufous lanate; ovary rufous lanate; sepals broad triangular, bluntly pointed, white or rufous hairy; petals obovate, rounded to acute, 3-4 by 2-4mm, white lanate on inside, glabrous on outside; styles 2, joined or close at the base. Fruit ovoid, cuneate at base, 6-7 by 6-7mm, ripening to purple and remaining firm; calyx persistent, hairy, sepals reflexed, rufous.



Specimens: **China, Sichuan**: Schneider 1193, between Tukungpu and Yen Yuan xian, 3200m (E, HUH); Schneider 4155, in mountains above Kuapie [Kwapie], 3200m (HUH); Handel-Mazzetti 01627, Daliang shan, (E); Handel-Mazzetti 07438, Muli to Yungning, 3425m, (HUH); Rock 17982, Muli-Kulu, (HUH, BM); **Yunnan**: Yü 05144, s. d. (HUH); Yü 05996, s.d., (HUH); Yü 06767, s. d. (HUH); Yü 06977, s. d. (HUH); Rock 03289, Yunnan, Dali to Lijiang, (HUH); McLaren C185, Dali, Pe Yün shan, (E); Maire 479, Lao Kiou, (HUH); Ching 21486, Lijiang, (HUH); Feng 2491, Lijiang, (HUH); Feng 2882, Lijiang, (HUH); Forrest 10050, Lijiang, (HUH); Forrest 21310, Lijiang, (E); Rock 03280, Lijiang, (HUH); Rock 03495, Lijiang, (HUH, BM); Rock 07791, Lijiang, (HUH); Rock 08511, Lijiang, (HUH); Forrest 05547, Lijiang range, 27°10'N, 9-10000 feet, (E, BM); Forrest 10104, Lijiang range, 27°15'N, 9-10000 feet, (E, HUH, BM); Yü 15022, Lijiang shan, (E, HUH); Yü 15090, Lijiang, 3400m, (E, HUH, BM); Rock 17360, Lijiang to Youngning, (E, HUH); Rock 24262, Mt Wuaha, west of Yawabee, (E, HUH,

BM); KW 05071, Yungning, 10000 feet, (E); Yü 14919, Zhongdian, Paitih, 3000m, (HUH, BM); Ducloux 1205, Lou pou, near Tong chuan, (E).

*Sorbus spongbergii* has a distribution from southern Sichuan to just south of Lijiang. It is similar to *Sorbus pallescens* but easily distinguished by the larger leaves which are densely hairy, usually somewhat felted, and the dense rufous hairs on the underside of the leaf veins. From *Sorbus ambrozyana* the leaf shape, smaller hard fruits and dense covering of rufous hairs on the veins distinguish it.

Despite the large number of specimens cited above, I have found no record of it being in cultivation.

The species is named for Stephen Spongberg, whose post-note annotations of the Harvard specimens greatly assisted my understanding of the group.

There are a number of specimens in this grouping which I cannot currently assign between either *Sorbus ambrozyana*, *Sorbus coronata* or *Sorbus spongbergii*, viz. Rock 04034, Lijiang, Hochin to Chluho, (HUH); Feng 1357, Haba snow mountain, (HUH); Rock 11480, Lijiang, (HUH); Rock 05140, Lijiang to Muli, (HUH); Ten 551, Pe Yen Tsin, Kou Ty, (E, HUH); Wang 67728, Wei Xi, 2500m and Rock 24706, Zhongdian, 3000m, (E, BM); Rushforth 2834, Tong Jiang He gorge, 2750m (E) and KEG 1519, Chung Jiang He valley, 27°55′22″N, 99°56′28″E, 3000m (E).



ACE 2180 (Zhongdian & San-ba, 27°33′58″N, 100°01′51′E, 3140m, 15 October 1994, E) and ACE 0236 (road to Haba shan, 27°33′59″N, 100°01′54″E, 3206m, 14 June 1994, E) are recollections of the same tree. The herbarium specimens at E suggest *Sorbus coronata* but young plants in cultivation of ACE 2180 look different. Finally, Tsai 54038, Yunnan, Lanping xian, 2600m, 23/8/1933, (HUH) does not fit either *Sorbus pallescens* nor *Sorbus coronata*; it has elliptic leaves to 7 by 3cm and fruits 6-7mm; it probably represents a new species.

## Group C–*Sorbus hemsleyi* & *Sorbus henryi* group

***Sorbus hemsleyi* (C. K. Schneider) Rehder**
Plantae wilsonianae 2: 276 (1915).
*Aria hemsleyi* (C. K. Schneider) H. Obashi & Iketani, J. Jap. Bot. 6: 359
*Micromeles hemsleyii* C. K. Schneider, Ill. Handb. Laubholzk. 1: 704, fig 388a, 705 fig. 389c. 1906, *Sorbus xanthoneura* Rehder, Plantae wilsonianae 2: 276. 1915

Tree to 15m by 0.5m; bark smooth with scaly ridges, grey, inner bark light brown. Shoot with few oval lenticels. Bud pointed, 0.6-1.1cm by 0.5cm; scales with colleters or long white hairs. Leaf 11-17cm by 3.5-10cm, elliptic to obovate, apex acuminate to acute, base rounded to broad cuneate, margin finely serrate with some coarsely serrate teeth (Henry 6830) to more strongly/coarsely toothed or doubly toothed (SABE 719, W Y Chun 3889),

recurved at the very edge; teeth with aristate tip usually curved down at apex, tip to less than 1mm in length; veins 12-16 pairs which are impressed with some colleters on the upper surface, raised on the underside; upper surface glabrous; underside main veins glabrous but lamina and tertiary veins lanate, sometimes with some longer hairs. Petiole caniculate on upper surface, nearly glabrous, 1.0-1.5cm, some hairs at base where clasping bud. Stipules linear, caducous. Inflorescence squat with some lenticels and white hairs, pedicels 0.6-0.8cm. Fruit 0.9cm, shiny with white hairs mainly at base and apex, yellow-green (possibly dried to red in Henry 6830), lenticels round or oval 1-6 times their diameter apart; calyx persistent; sepals reflexed but mainly dropped off; styles 2 or 3, close together but free at the base.

Specimens: **China, Hubei**: Henry 6830 (isosyntype of *Micromeles hemsleyi* and type of *Sorbus xanthoneura*, 2 sheets, (HUH, BM); W Y Chun 3889, Wan Tsao Shan; 1980 SABE 719, Shennongjia Forest District, 31°30'N, 110°30'E, near MuYuping Forest Brigade on southeast side of Chang jiang (Yangtse) & Han jiang near 73 km from Xing Shan Xian, 1450-1600m in cut-over *Fagus-Quercus-Betula* forest on steep slopes, (HUH); 1980 SABE 1739, Shennongjia Forest District, along Xigou canyon *circa* 20km N of Jiuhuping forest farm, on slopes above river in open, 1700m, (HUH); 1980 SABE 1776, Shennogjia Forest District, Hong He, 2100 m, 31°30'N, 110°30'E, (HUH). **Sichuan**: Fang 10396, Chengkou, 31°58'N, 108°50'E, (HUH).



*Sorbus hemsleyi* is restricted to western Hubei and adjacent northeast Sichuan (now north Chongqing) provinces (and probably Shaanxi). Aldasoro *et al* (2004) give it a much wider distribtion, including *Sorbus henryi* [which is a vicariant], *Sorbus atrosanguinea* [on the basis that the leaves are "glabrous abaxially"] and Ohba *et al* (83) 40124 from central Nepal which is here cited as *Sorbus sharmae* (see page 79).

*Sorbus hemsleyi* is in cultivation from 1980 SABE 0719 and 1317.

***Sorbus henryi* Rehder**
Plantae wilsonianae 2: 276 (1915)
Basionym: *Micromeles schwerinii* C. K. Schneider Ill. Hanb. Laubholzk. 1: 702, fig. 388b, 389a-c. 1906 Lectotype Henry 8957 (HUH).

Tree to 15m. Shoot slightly hairy, with a few scattered or with no lenticels. Bud pointed, glossy, to 0.7cm. Leaves 7-15 by 3.5-8cm, obovate, less often elliptic, broadest just above the middle to near apex, apex acuminate usually with a long toothed acumen, base cuneate, margin doubly toothed to lobulate in upper half, simply toothed in basal half, margin finely recurved, upper surface with slightly raised dark brown, somewhat hairy veins in 12-15 pairs, lower surface rugose when young, covered in loose long white hairs when new. Petiole slightly hairy,

caniculate, 0.7-0.8cm, to 2cm in mature leaves. Stipules caducous. Inflorescense a corymb of 15-20 flowers; peduncle less then 1cm, pedicels lanate; ovary off-white woolly; sepals spreading, slightly hairy; petals densely hairy on outside, 4-5mm; styles (2-)3, close at base. Fruit in lax clusters, 1.2-1.3cm long & broad, globose, calyx persistent or partly late deciduous, lenticels 3-5 times apart, top of ovary with some persistent hairs.

Specimens: **Sichuan, Emei shan**: Henry 8957, isosyntype, (HUH); Fang Wen-Pei 2722, 5500-6000 feet (E, HUH); Fang Wen-Pei 6120, (E, HUH); Chow H-C 12459, 1800m, (HUH); ibid Tai L-Y 18, Jiu Lau Dong, 1800m, (HUH); Lee T. C. 3293, tree 6-7m; Lee T. C. 3903, tree 6-7m, (HUH); Lee T. C. 3913, tree 5-6m, (HUH), Rushforth 161 (E). **Opien xian, S of Emei**: Liu Yü-Shih 2088, 1500-1800m, (HUH); Liu Y-S 2215, 1300-1600m (HUH).

*Micromelese schwerinii* was described with a flowering (Henry 8957 from the Emei shan) and a fruiting type (Giraldi 986 from Shaanxi). Rehder when he transferred the species to *Sorbus de facto* lectotypified it to the Henry collection, although this was only formally done in Aldasoro *et al* (2004, page 87). As there was a pre-existing *Sorbus schwerinii* C. K. Schneider 1906, Rehder was required to make a new name, when he made the combination in *Sorbus*). I have not seen Giraldi 986 but suspect it may not belong here but on distribution to *Sorbus hemsleyi*.



*Sorbus henryi* is a vicariant of *Sorbus hemsleyi*, being restricted to the Emei shan and to the country to the southwest. It differs in the larger fruit, smaller buds and often lobulate or at least doubly serrate leaf margin. It is in cultivation under KR 161, Lancaster 765 and from seeds sent out in 1992 by the Shanghai Botanic Garden as seed list number 267 (as *Sorbus folgneri*), all from *circa* 2050-2200m on the Emei shan. In the 2008 Yearbook I suggested these did not belong here on the basis of two specimens at Edinburgh which Stephen Spongberg had annotated as *Sorbus henryi*. However, since borrowing the lectotype and examining plants of KR 161 from first flush to mature fruit, I conclude that these two specimens were mis-identified and are not *Sorbus henryi*. SICH 1622 from the Wawu shan may belong here.

***Sorbus dunnii* Rehder**
Plantae wilsonianae 2: 273 (1915).
*Aria dunnii* (Rehder) H. Obashi & Iketani J. Jap. Bot. 68: 358 (1993)
*Pirus koehnei* Léveillé 1912, non C. K. Schneider 1906

Tree to 10m; bark grey, smooth. Shoot in 2nd year slightly hairy, glossy, red-brown/maroon, with oval lenticels. Bud pointed, 4-5mm, shiny, scales with light brown hairs on the inside. Leaf lanceolate, ovate-oblong, elliptic, narrow obovate to obovate, apex acute or abruptly acute or abruptly acuminate,

base rounded or cuneate, decurrent, 6-9(-11)cm by 2.0-4.5(-5.5)cm; margin finely serrate, occasionally irregularly or doubly serrate, teeth forward; 10-16 pairs veins, impressed above with black/dark brown colleters and sparsely hairy, tertiary veins finely reticulate above; underside lamina grey/off white hairy, main veins variably rufous hairy but mainly densely hairy in Fujian & Anhui, less densely hairy in Zhejiang collections; petiole rufous & white hairy, 1.0-1.2(-2)cm. Inflorescence in tight clusters of *circa* 30-40 flowers; pedicels rufous to pale fawn hairy; ovary densely fawn/light brown hairy; sepals triangular; petals hairy on inside, obovate, 5mm by 3mm wide; styles 2, mainly joined but free towards the tip, glabrous. Fruit globose, 6-7mm, red/maroon, lenticels absent or a few at base; calyx deciduous before fruit fully ripe.

**Specimens**: **China: Fujian**: Dunn 939 (Hong Kong herbarium 2597), central Fujian, Yanping, 5000ft, June 1905, holotype & isotype (HUH); **Anhui**: M P Deng & K Yao 79173, Li Ma Quao, Hunag shan, 1100 m, (HUH); K Ling 7738, Wang shan, (HUH). **Zhejiang**: Zou Hui-Yü 085, Feng Yang shan, 870m, tree 3m, (HUH); Zou Hui-Yü 668, ibid, 940m, tree 8m in valley woods, (HUH); Y L Keng 351, ChingYüan, (HUH); Y L Keng 381, Ching-Ning, (HUH); Ching Ren-chang 2358, south Zhejiang, in open thickets (HUH). **Guizhou**: Pin-fa, Cavalerie 2376 (E, isotype of *Pirus koehnei*); Pin-fa, Esquirol 385 (E, isotype of *Pirus koehnei*).

This species is very distinct in the small sub-globose fruit which is without or with only a few lenticels and is two-celled. It is represented in cultivation by a tree at Westonbirt, raised from seeds distributed by the Shanghai Botanic Garden in 1982 from southern Zhejiang, *circa* 27°39′ N, 119°05-119°14 E, 1300m. The rufous hairy veins have caused confusion, leading to the species being compared with *Sorbus hedlundii*. However, Léveillé was closer to the mark when relating his new species to *Sorbus folgneri*. However, my opinion is that the small globose fruit places it in its own section separate from both the *Thibeticae* and the *Alnifoliae*. There are black or dark brown colleters on the main veins above which seem to be a distinguishing feature of *Sorbus dunnii*.



**Where next?**

There are a number of areas where more research is needed. First, there are gaps in the distributions. The largest gap is on the south side of the Himalaya east of Bhutan. I have tentatively placed a whitebeam from the Delei valley in eastern Arunachal Pradesh with *Sorbus wardii*, but this needs confirming. If *Sorbus wardii* extends from the Tongri ridge east of Dirang to northern Burma it would be a wide distribution, but would be consistent with the similar distribution of *Magnolia rostrata* W. W. Smith. The current distribution of *Sorbus karchungii* equates with that of *Rhododendron kesangiae* Long & Rushforth, but what happens in Sikkim? That said, it has surprised me that no one has reported *Rhodendron kesangiae* from Sikkim. I have, however, jumped

genera; the selection pressure on a whitebeam will be different to that on a *Magnolia* or a *Rhododendron*, so there could be more, or less variation in one compared to the other. There is also a large area in northern Yunnan, such as the Beima shan and 99 Dragons where plants in group A occur but I haven't been able to determine their status.

Secondly, the relationship of the species in group B both with each other and also with group A needs sorting. I anticipate that group B occurs in generally lower or drier habitats–this hypothesis needs testing. Also the variation in group B–is it real? There is no reason why three whitebeams shouldn't be found on the Lijiang range–it is a large area, but if so we need to discover the ecological reason which allows them to exist near one another.

Thirdly, what is the role of rufous hairs? They seem to occur in taxa from wetter or more humid localities, e.g. rufous haired *Sorbus hedlundii* occurs on the southern ranges of the Himalaya in Bhutan with white haired *Sorbus karchungii* in the more "inland" areas. Is this the case and what is it telling us? Rufous[2] as opposed to white hairs are a useful key character but in the species delimited here the hair colour is only part of the correlation.

Finally, is there apomixis present? All counts to date (McAllister, pers. com.) have proved to be diploid, but I do wonder, particularly about some of the forms of *Sorbus lanata* from the western Himalaya.



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[2] Rufous hairs are very obvious on fertile trees but may not be present on immature trees or sucker or epicormic shoots on older trees. Also, they can be more pronounced on a dried or older leaf; this is a common phenomenon in many groups of colour changes as material dries, e.g. in *Pyrus nivalis* Jacques the snow-white character of the inflorescences is only obvious on dried specimens.