

Five new species of *Cotoneaster* Medik. (Rosaceae) naturalized in Britain

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ABSTRACT

Of the 69 species of *Cotoneaster* so far found to be naturalized in the British Isles, the following five are here described by us as new species: *C. hsingshangensis*, *C. tengyuehensis*, *C. hummelii*, *C. pseudoambiguus* and *C. induratus*.

KEYWORDS: China, Denmark, Sweden, agamospecies, garden plants.

INTRODUCTION

The abundance of naturalized *Cotoneaster* species in the flora of Britain and Ireland is a remarkable and recent phenomenon, resulting from the increased popularity of this genus in gardens, the attractiveness of their fruit to birds, and the availability of suitable wild habitats. Although most of the naturalized plants occur in waste, derelict and marginal ground, many have invaded semi-natural habitats. It must be brought to notice though that many of these records are for single specimens only.

The increased incidence of this genus in the British Isles is illustrated by the fact that Dandy (1958) listed only five species, whilst Kent (1992) listed 45, in both cases including the single native *C. cambricus* J. Fryer & B. Hylmö (*C. integerrimus* Medik. var. *anglicus* Hrabětova). By September 1996 this total had risen to 69 (Stace 1997). It is likely that in the not too distant future more cultivated taxa will have been deposited by birds somewhere in the wild; currently more than 100 taxa are grown in gardens and this total is still rising. 69 taxa are keyed and the leaves of them illustrated by Stace (1997).

In common with related genera such as *Crataegus* and *Sorbus*, many taxa of *Cotoneaster* are apomictic. As a rule in *Cotoneaster* the diploids ($2n = 34$) are sexual and the polyploids ($2n = 51, 68, 85, \text{ or } 102$) are apomictic. The sexual species are variable, often markedly so, whereas the apomictic species are almost invariable.

Of the 69 taxa now recognized as naturalized in the British Isles, five are hitherto un-named species. One species, *C. induratus*, has only recently been confirmed as being naturalized. We provide descriptions of all five here; in all cases we have been able to link the taxa with wild collections from China.

NEW SPECIES

***Cotoneaster hsingshangensis* J. Fryer & B. Hylmö, sp. nov.**

Affinis *C. foveolato* Rehder & E. H. Wilson sed foliis atrovirentibus elliptico-ovatis, hypanthiis tubiformibus, pyrenis 2–3 (non 4–5) differt.

HOLOTYPE: Cultivated in the botanic garden of Dr K. E. Flinck, Bjuv, Sweden. Plant no. 1027 ex Arnold Arboretum as "*C. foveolatus* 13431–D SD China, Wilson 1907", 5 July 1964, B. Hylmö (E).

PARATYPE: Cultivated in the botanic garden of Dr K. E. Flinck, Bjuv, Sweden, no. 9029, 26 April 1957 & 26 June 1958, *B. Hylmö* (BM). Cultivated in the Botanic Garden of the University of Lund, Sweden, no. 9012, 25 June 1958, *B. Hylmö* (LD). Cultivated in the garden of B. Hylmö, Bjuv, Sweden, no. 9142, 19 October 1960, *B. Hylmö* (LD).

Erect and spreading, arching, multi-stemmed, deciduous shrub, 2–3 m; young growth spiralled or divaricate; young bark maroon-purple, pilose-tomentose; 1-year old bark blackish-maroon, becoming glabrous. Leaf blades on sterile shoots 75 × 40 to 105 × 50 mm, chartaceous or subcoriaceous, elliptic-ovate, with acuminate to acute apex and obtuse base; upper surface of newly emerged leaves intensely shiny maroon-purple to green, sparsely pilose, becoming dark green, persistently pilose, very bullate with 5–6 pairs of veins deeply impressed; lower surface light green, sparsely pilose becoming glabrous or nearly so; petiole 2–3 mm, pilose. Flowering shoots 25–40 mm, with 3–4 leaves; inflorescences erect with (3–)4–7(–9) flowers; peduncle 5–15 mm, pilose; pedicels 2–10 mm, pilose. Flowers 6–8 mm; hypanthium tubular, pilose-tomentose; calyx lobes obtuse, acute or cuspidate, glabrous or with a few hairs, with densely tomentose fringe; petals erect but incurved, leaving no opening at apex, pandurate, with red bases, maroon stripes and a few central red spots on outer side, margins irregularly toothed, white, inner sides of petals glabrous; stamens 16–20, incurved; filaments pale rose and white; anthers white; styles 2 or 3. Fruit globose, 10–11 mm, shiny plum-purple to black, pilose; calyx lobes depressed, glabrous, with tomentose margin forming star-shaped opening at apex; flesh yellowish; pyrenes 2 or 3, c. 6 mm long; styles attached 3/4 from base, reaching c. 1 mm above the pyrene.

Flowering in June, often re-flowering August–September. Fruiting September–October. Leaf-fall late October–November, with a green-yellow-red or intense red autumn colour.

Chromosome number 2n = 68 (Zeilinga 1964) as *C. moupinensis*, no. 1481 Botanic Garden Wageningen, 15 September 1964, *B. Hylmö* (LD).

This species has a tendency to burst into life in mild spells during January–February causing leaf bud damage which shows as whitish discoloured areas remaining throughout the season. This species has been widely cultivated in central and northern Europe. It can be seen in most botanic gardens and large private collections and has been distributed by nurseries under the name *C. foveolatus*, and more recently *C. foveolatus* 'Alnarps'. In the Arnold Arboretum, Massachusetts, USA, in 1958 a bush of the same taxon was named "*C. foveolatus* Wilson China 1907–13431D". This was Wilson no. 187 collected in W. Hupeh (Hubei), Hsing-Shan, thickets, alt. 1300–2000 m, 1907, bush 2–3 m, seed only, as *C. foveolatus* (Rehder & Wilson 1912, p. 430).

Naturalized in S. Hampshire (v.c. 11), and Westmorland (v.c. 69).

***Cotoneaster hummelii* J. Fryer & B. Hylmö, sp. nov.**

Affinis *C. villosulo* (Rehder & E. H. Wilson) Flinck & B. Hylmö sed foliis obovatis acuminatis, supra bullatis mox glabrescentibus, inflorescentiis 7–15 floribus differt.

HOLOTYPE: Cultivated in Göteborg Botanic Garden, no. 9182, Hummel, 1931 II, 461, 8 June 1960, *B. Hylmö* (E).

PARATYPE: Cultivated in Göteborg Botanic Garden, no. 9182, Hummel, 1931 II, 461, 21 October 1958, *B. Hylmö* (E). Cultivated in the garden of B. Hylmö, Bjuv, Sweden, seed from Göteborg, no. 9182, 13 June 1964, *B. Hylmö* (LD).

Stiffly erect, multi-stemmed, deciduous shrub, 3–4 m; young growth spiralled; young bark greenish-yellow or light brown, pilose-tomentose, becoming glabrous. Leaf blades on sterile shoots 80 × 30 to 110 × 45 mm, chartaceous, somewhat wavy on margin, obovate, elliptic or ovate, with drawn out acuminate apex and cuneate base; upper surface of leaf on emergence shiny reddish-brown, densely pilose, becoming dark green, matt or somewhat glossy and glabrous, bullate, with 5–6 pairs of impressed veins; lower surface greyish-green to yellowish-brown, villous-tomentose becoming glabrous or nearly so; petiole 4–6 mm, villous. Flowering shoots 40–60 mm, with 4 leaves; inflorescence erect, with 7–15 flowers; peduncles 10–30 mm, sparsely pilose; pedicels 3–10 mm, sparsely pilose. Flowers 4–5 mm; hypanthium cupulate, sparsely villous with long yellowish hairs; calyx lobes triangular, acute, sparsely pilose with long hairs, fringed with dense yellowish villous hairs; petals erect but incurved leaving only small opening at apex, pandurate, reddish-brown with small black spots on outer side, margins toothed, white, petals glabrous within; stamens 16–20, incurved; filaments white with rose base, becoming red with age; anthers white; styles 2–3. Fruit obovoid, 11 × 10 to 13 × 12 mm, shiny plum-purple to black, glabrous, villous at apex; calyx lobes

depressed, sparsely villous, densely fringed with yellowish hair forming star-shaped opening at apex; flesh brownish, plum-purple when over-ripe; pyrenes 2 or 3 (3 in 80% of fruit), 5–6 mm long; styles attached c. 2/3 from base, not reaching above apex of pyrene.

Flowering in June, often re-flowering in August. Fruiting September–October. Leaf-fall late October–November after an intense maroon-purple autumn colour.

Chromosome number not known, but apparently apomictic.

Seed of this species was collected in the Min-Shan mountains of the province of Kansu (Gansu), China, in 1930 by the Swedish traveller Dr David Hummel. In the Botanic Garden of Göteborg in the autumn of 1958 the species was a striking 4 m high, many branched shrub weighed down with large clusters of shiny black fruit, and leaves with magnificent maroon-purple autumn colour. The shrub was said to be "*Cotoneaster moupinensis* vel sp. nov. Hummel 31 II 461". The seed was collected in Kansu, Min-Shan, Ngan-Dre-Liang on 31 October 1930. Later, the same taxon was observed in several gardens in Europe raised from seed distributed by the Göteborg Botanic Garden.

We name this species as a tribute to Dr David Hummel, 1893–1984, the medical doctor and naturalist of the Swedish Sven Hedin Expedition to Central China and the Gobi Desert, 1927–1931.

Naturalized in S. Hampshire (v.c. 11).

***Cotoneaster pseudoambiguus* J. Fryer & B. Hylmö, sp. nov.**

Affinis *C. ambiguus* Rehder & E. H. Wilson sed ramis effusis arcuatis, foliis chartaceis late ellipticis vel rhombicis, supra bullatis persistenter pilosis, calycibus dentibus obtusis vel acutis differt.

HOLOTYPE: Expedition to China 1907–09, Western Sichuan, west of Tachien-lu, alt. 3300 m, bush 6–8 ft [2–2.75 m], October 1908, *E. H. Wilson*, no. 1270 (A).

PARATYPE: China, W. Szechuan (Sichuan), Tachien-lu, thickets, 8–9000 ft [2400–2700 m], June 1908, coll. *E. H. Wilson* no. 2178 (A). Cultivated Hort. Uppsala no. 9327 as *C. ambiguus*, ex Vilmorin, 20–23 October 1958, *B. Hylmö* (BM). Cultivated in the botanic garden of Alnarp, Sweden, no. 9279, as *C. ambiguus*, 14 October 1958, *B. Hylmö* (LD).

Erect, multi-stemmed, spreading, arching, deciduous, 3–4 m shrub; young growth spiralled or divaricate; young bark brownish-red or light brown, pilose-tomentose; 1-year old bark brown, pilose. Leaf blades on sterile shoots 34 × 24 to 55 × 34 mm, chartaceous, broadly elliptic, broadly ovate or rhomboid, with acuminate (seldom acute) apex and cuneate base; upper surface of leaf on emergence reddish-green, densely villous, soon dark green, becoming sparsely hairy, matt, bullate; veins 4–5 pairs, impressed; lower surface pale green, at first densely villous, becoming sparsely so; petiole 3–4 mm, yellowish-villous. Flowering shoots 25–35 mm, with 4 leaves; inflorescences erect, with 4–7 flowers; peduncles 10–20 mm, yellowish-villous; pedicels 2–12 mm, yellowish-villous. Flowers 5 mm; hypanthium cupulate, yellowish-villous strigose; calyx lobes triangular, obtuse or acute, with few villous hairs, fringed yellowish-tomentose; petals erect but incurved leaving no opening at apex, pandurate, pale pink with red base on outer side, off-white and toothed at margin, petals glabrous within; stamens 15–20, incurved; filaments white and pale pink; anthers white; styles 2 or 3. Fruit globose or obovoid, 8 × 8 to 9 × 8 mm, shiny plum-purple to black, with few villous hairs; calyx lobes depressed, glabrous, leaving large opening at apex; flesh yellowish; pyrenes 2 or 3 (mostly 3), 5–6 mm long; styles attached c. 4/5 from base, exceeding the pyrene by c. 1 mm.

Flowering in June, sometimes re-flowering in September. Fruiting September–October. Leaf-fall October, with yellow autumn colour.

Chromosome number 2n = 68 (Zeilinga 1964), as *Cotoneaster ambiguus* Rehder & E. H. Wilson no. 1458, cultivated Arboretum Wageningen, 22 May and 27 October 1964, *A. E. Zeilinga* (LD).

The holotype of *Cotoneaster ambiguus* Rehder & E. H. Wilson was collected in flower in June and therefore no seed was available. What is grown in nurseries and gardens today as *C. ambiguus* originated from another collection, namely *Wilson 1270*, an October collection with fruit. When describing *C. ambiguus*, Rehder & Wilson (1912) stated that "Numbers 1270 and 2178 differ from the type in their thicker, broader leaves. Number 2178 has a more numerous flowered corymb, broader sepals, showing some approach to *Cotoneaster moupinensis* Franchet". *Wilson 1270* and *2178* were both collected in the same area of the province of Sichuan around Tachien-lu (Kangting), and we now separate them as this new species *C. pseudoambiguus*. The type of *C. ambiguus* was collected in another area of the province of Sichuan, West of Kuan Hsein in Pan-lanshan.

Naturalized in Westmorland (v.c. 69).

When Rehder & Wilson (1912) described the extensive Wilson *Cotoneaster* collections from China, apomixis within the genus was not yet recognized. After studying earlier paratypes in cultivation the differences were evident, and it is preferred to separate those obligately apomictic taxa coming true from seed as distinct species.

C. hsingshangensis J. Fryer & B. Hylmö, *C. hummelii* J. Fryer & B. Hylmö and *C. pseudoambiguus* J. Fryer & B. Hylmö belong to Section *Cotoneaster*, Series *Lucidi* Pojark. which also includes three other species found naturalized in the British Isles: *C. laetevirens* (Rehder & E. H. Wilson) G. Klotz, *C. lucidus* Schldl. and *C. villosulus* (Rehder & E. H. Wilson) Flinck & B. Hylmö. We provide here a key to all six species:

1. Inflorescence 5–15 flowered 2
1. Inflorescence 3–7(–9) flowered 3
2. Leaves with apex acute or acuminate; upper surface flat, intensely shiny; veins 3–4 pairs, only slightly impressed; shrub 1.5–2.5 m *C. lucidus*
2. Leaves with apex elongated acuminate; upper surface bullate, dull; veins 5–6 pairs, impressed; shrub 3–4 m *C. hummelii*
3. Leaves thin, membranous to chartaceous, light-green; upper surface flat *C. laetevirens*
3. Leaves subcoriaceous or chartaceous, dark-green; upper surface bullate 4
4. Leaves rhomboid or broadly elliptic *C. pseudoambiguus*
4. Leaves elliptic-ovate 5
5. Leaves very bullate; lower surface clear-green, shiny; calyx lobes glabrous or nearly so *C. hsingshangensis*
5. Leaves only slightly bullate; lower surface pale-green, dull; calyx lobes villous-tomentose *C. villosulus*

***Cotoneaster tengyuehensis* J. Fryer & B. Hylmö, sp. nov.**

Affinis *C. glomerulato* W. W. Sm. sed foliis acuminatis, inflorescentiis 3–7 floribus, pyrenis 3–4 plerumque 4 differt.

HOLOTYPE: Cultivated in the garden of B. Hylmö, Bjuv, Sweden, raised from seed ex Glasnevin Botanic Garden, Dublin, Ireland, as plant no. 9876 *Cotoneaster* 'Tengyueh', 1 July 1974, B. Hylmö (E).

PARATYPE: Glasnevin Botanic Garden, Dublin, Ireland, as plant no. 9876 *Cotoneaster* 'Tengyueh', 10 September 1965, B. Hylmö (BM).

Recent collections: *C. tengyuehensis* has recently been re-found north of the city of Tengyueh by K. Rushforth, no. 2647 China, Yunnan, Nu Shan range, Ziben Shan, 12 km N. of Caojian, Mekong drainage, in cut-over forest in valley floor area, 2500 m, shrub 2 m, open habit, 1 November 1993. Also: J. Fryer, no. FJWY 011 China, Yunnan, Mekong-Salween divide, Feng Shui Ling, 2500 m, 2 November 1996.

Stiffly erect, evergreen or semi-evergreen shrub, 2–2.5 m; branches arching; young growth distichous, persistently densely strigose; 1-year old branches greyish-dark-maroon, strigose. Leaf blades on sterile shoots 35 × 17 to 46 × 24 mm, chartaceous, ovate, with acuminate, mucronulate apex and obtuse base; upper surface somewhat shiny dark green, persistently pilose-strigose, veins 3–5 pairs, impressed; lower surface greyish-green, persistently villous; petiole 1–3 mm, strigose. Flowering shoots erect, 25–40 mm, with (3–)4 leaves; inflorescence a compact (3–)5–7(–9) flowered cyme; peduncle 1–4 mm, strigose; pedicels 1–3 mm, densely strigose. Flowers 5–6 mm; hypanthium cupulate, strigose; calyx lobes spreading, triangular, acuminate or cuspidate, strigose, with tomentose margin; petals erect, obovate, glabrous, dark maroon-red with somewhat frayed white margin; stamens c. 20, erect; filaments pale-pink; anthers white, becoming yellowish; styles 3–4 (–5). Fruit depressed-globose or obovoid, 7–9 mm, blood-red (when ripening green, yellow, orange to finally blood-red in the same cluster); calyx lobes erect; flesh yellowish; pyrenes 3–4 (mostly 4), seldom 5, 4–5 mm long; styles attached 2/3 from base.

Flowering late July. Fruiting October–November.

Chromosome number 2n = 68 (Krügel 1992) as *C.* 'New York', originating from B. Hylmö in 1967 number 79.

During the past 40 years we have studied *C. tengyuehensis* in gardens in Europe and the U.S.A. In most gardens the shrubs were without names or were named *C. franchetii* Bois, *C. wardii* W.W. Sm., *C. dielsianus* E. Pritz., *C. elegans* (Rehder & E. H. Wilson) Flinck & B. Hylmö or *C. cinerascens* (Rehder) Flinck & B. Hylmö. This taxon is easy to recognize and after some research we discovered its origin. The first clue was on a label in Glasnevin Botanic Garden, Dublin, Ireland, which simply read 'Tengyueh'. Tengyueh (or modern spelling Tenchong) is in the province of Yunnan, China. In the herbarium of cultivated plants of the Arnold Arboretum, U.S.A. (AAH), are a large number of sheets from Cotoneasters grown at Kew in 1923. Amongst those shrubs was our taxon, sown in the years 1914 and 1915. On one of the sheets was the number 12497. We found that George Forrest used numbers of this series during his expedition to China in 1912–1914.

Naturalized in W. Kent (v.c. 16).

Cotoneaster tengyuehensis J. Fryer & B. Hylmö belongs to Section *Cotoneaster*, Series *Glomerulati* Flinck & B. Hylmö.

***Cotoneaster induratus* J. Fryer & B. Hylmö, sp. nov.**

Affinis *C. franchetii* Bois sed inflorescentiis foliosis 15–30 mm, 3–4 floribus, antheris albis (non lilacinis) differt.

HOLOTYPE: China, N. W. Yunnan, on the N. W. flank of the Lichiang range, Lat. 27°20'N, Long. 100°10'E, 1200 ft [360 m], September 1922, *Forrest* 22352 (E).

PARATYPE: Cultivated in the Royal Botanic Gardens, Kew, as *Cotoneaster* 2235F: 422–22 Edinburgh, 24 September 1928 (AAH). Cultivated Hort. Bot. Berol. Dahlem Abteilung China no. 116, *Forrest* 23, 11 November 1948 (E). Cultivated in the garden of B. Hylmö, Bjuv, Sweden, no. 9424, seed from Kew 1956 as 493–22 Edinburgh sp. 2235F, 26 July 1962 (BM), (LD).

Stiffly erect, deciduous or semi-evergreen shrub to 3 m; branches erect; young growth distichous or spiralled, covered with dense tomentose hairs; 1-year old branches grey-tomentose. Leaf blades 19 × 10 to 27 × 14 mm, coriaceous, reticulate veined, ovate or ovate-elliptic, with acute or acuminate, mucronulate apex and cuneate base; upper surface shiny dark green, pilose-strigose; veins impressed, 3–4 pairs; lower surface with persistent, densely tomentose greyish-white hairs; petioles 2–3 mm, tomentose. Flowering shoots erect, 15–30 mm, with 4 leaves; inflorescence 3–5(–7) flowered, with an extended flowering period; peduncle 8–15 mm, silky tomentose; pedicels 1–4 mm, densely silky tomentose. Flowers c. 5 mm; hypanthium with dense silky hairs; calyx lobes erect, triangular, the outer ones with apex cuspidate, the inner ones acute or obtuse, with silky hairs, margins tomentose; petals obovate, glabrous, erect, leaving small opening at apex, reddish-maroon, pink and off-white at margin, irregularly toothed; stamens 20, erect; filaments subulate, broad-based, dark red or pink; anthers white; styles (2–)3(–4). Fruit obovoid or globose, 9 × 8 to 10 × 9 mm, shiny orange-red, pilose at apex; calyx lobes semi-erect, fringed tomentose; flesh yellowish; pyrenes 2–4 (mostly 3), 5–6 mm long; styles attached 3/4 from base.

Flowering late in season – June and July. Fruiting November.

Chromosome number 2n = 68 (Zeilinga 1964), as *C. franchetii* cv. 'Gloire de Versailles', no. 935, Proefstation, Boskoop, 27 October 1964, A. E. Zeilinga (LD).

Tracing the origin of *C. induratus* (as with many other species) involved a certain amount of detective work. In the Danish garden and nursery of Braendkjaerhoej of Kolding, South Jutland, a large number of new introductions, which included some of George Forrest's and Joseph Rock's Chinese *Cotoneaster* collections, was amassed before 1939. The extremely cold winters around that time killed a large number of the new introductions. However, some Cotoneasters withstood the very severe weather. The owner of the nursery, Mr Axel Olsen, realized that *C. induratus* would be of great value for Scandinavian gardens. He named it *Cotoneaster* cv. 'Hardy', and in several gardens it is to be found under this name. We have found this taxon wrongly named as *C. wardii*. In the Berlin Botanic Garden in 1948 a shrub labelled *C. wardii* was believed to be the Forrest collection no. 23. At Kew in 1956 there was a *Cotoneaster* labelled "493–22 Edinburgh sp. 2235 F". We believed this to be Forrest but the number 2235 was confusing as the Forrest collection 2235 proved not to be a *Cotoneaster*. Recently we discovered in the herbarium of the Arnold Arboretum, Harvard University, the solution to the puzzle. On 24 September 1928 a herbarium sheet was prepared of a shrub in Kew Gardens labelled "*Cotoneaster* 433–22 Edinburgh 22352F". Thus over the years one number had been lost in Kew and three in Berlin. In the herbarium of Edinburgh we were able to confirm that our *C. induratus* is the Forrest collection no. 22352.

Found semi-wild in two localities: S. W. Yorks. (v.c. 63), and Midlothian (v.c. 83).

C. induratus J. Fryer & B. Hylmö belongs to Section *Cotoneaster*, Series *Dielsiani* Klotz which also includes four other species found naturalized in the British Isles: *C. dielsianus* E. Pritz., *C. sternianus* (Turrill) Boom, *C. insculptus* Diels, and *C. mairei* A. Lev. We provide here a key to all five species:

1. Fruit blood-red *C. dielsianus*
1. Fruit orange-red 2
2. Flowering shoots 30–70 mm; inflorescence 7–15 flowered; leaves to 50 mm *C. sternianus*
2. Flowering shoots 15–35 mm; inflorescence 1–7(–11) flowered; leaves to 40 mm 3
3. Leaves to 25 mm, broadly ovate or broadly elliptic, width/length ratio 0.7–0.8; inflorescences mostly 2–3 flowered *C. insculptus*
3. Leaves ovate or elliptic, width/length ratio 0.4–0.6; inflorescences mostly 3–7 flowered 4
4. Leaves to 40 mm *C. mairei*
4. Leaves mostly less than 25 mm *C. induratus*

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