



The genus *Betula* L.

(Betulaceae)

**Identification key for the species of the genus,
based on vegetative features, from specimens in West-European collections.**

Jan De Langhe

(10 September 2008)

This key is based on characteristics, visible during the longest possible period of the year. Species in general represented in collections are assembled. Below some taxa are referred to synonymy or relatives, as I think I can conclude from the recent views of several specialists in the genus.

To improve practice:

- **Examine only the two mature leaves at base of long shoot and/or de leaves of short shoots unless otherwise mentioned.** Depending the taxon, all other leaves can differ enormously in size and lateral vein number!!!
- Beware of hybridisation, especially with plants raised from seed gathered in collections.

Features based on:

- JDL herbarium specimens.
- living specimens, in various arboreta, botanic gardens and collections, especially these from wild origin.
- literature:

- Ashburner, K.B. (1980), *Betula* – A Survey in The Plantsman 2(1) p.31-53.
Ashburner, K.B. & McAllister, H. (2008), approach, summary and simplified key of the forthcoming book "The Genus Betula".
Ashburner, K.B. & Schilling, T. (1985), *Betula utilis* in The Plantsman VOL.7 (2), p. 116-125
Ashburner, K.B. & Walters, S.M. (1989), *Betula* in The European Garden Flora VOL. 2, p. 49-55.
Bean, W.J. (1981) Trees and Shrubs hardy in the British Isles I, p.414-434.
Bean, W.J. (1988) Trees and Shrubs hardy in the British Isles Supplement, p.36-62.
de Jong, P.C. (1986) *Betula*, Problematiek van de systematiek en de benaming in Dendroflora n°23, p. 3-28.
Fontaine, F.J. (1970) Het geslacht *Betula* (bijdrage tot een monografie) in Belmontiana 6, p. 99-180.
Fontaine, F.J. (1994) Het geslacht *Betula* in Boomspiegel, 124p.
Furlow, J.J. (1997) *Betula* in Flora of North America VOL. 3., 507-538
Govaerts, R. & Frodin, D.G. (1998) World Checklist of Fagales, 407 p.
Grimshaw, J. (2005) *Betula* draft for the forthcoming book 'New Trees', 17p.
Grootendorst, H.J. (1973) *Betula*, keuringsrapport keuringscommissie sierbomen N.A.K.-B in Dendroflora n°10, p. 15-25.
Hillier, J. & Coombes, A. (2002) The Hillier Manual of Trees & Shrubs, p.11-20.
Hunt, D. (1993) *Betula*, Proceedings of the IDS Betula Symposium 2-4 October 1992, 111p.
Krüssmann, G. (1976) Handbuch der Laubgehölze I, p.235-249.
Kurata. (1964) Illustrated Important Forest Trees Of Japan, VOL. 1, p.68-74.
Kurata. (1968) Illustrated Important Forest Trees Of Japan, VOL. 2, p.20-28.
Kuzeneva, O.I. (1936, vertaling 1970) *Betula* in Flora of USSR VOL. 5, p.213-241
Lee, S. (1963) Forest Botany of China Supplement, p.64-68.
More, D. & White, J. (2003) Trees of Britain & Northern Europe, p.303-315.
Peiqiong, Li (Pei-chun Li) & Skvortsov, A.K. (1999) Flora of China VOL. 4, p. 304-313
Stace, C. (1997) New Flora of the British Isles, p.123-126
Ohba, H. (2006) Flora of Japan VOL. 2, p. 31-37.
Ohwi. (1965) Flora of Japan, p.372-374.
Rehder A. (1940) Manual of cultivated trees and shrubs hardy in North America, p.124-133.
Sargent, C.S. (1915) *Betula* in Plantae Wilsonianae VOL. 2, p. 455-488.
Sargent, C.S. (1921) Manual of the trees of North America, p.205-220.
Schneider, C.K. (1912) Illustriertes Handbuch der Laubholzkunde II, p. 97-119.
Skvortsov, A.K. (2002) A new system of the genus *Betula* in Salicicola, 8p.
Stace, C. (1997) New Flora of the British Isles, p.123-125.
Walters, S.M. (1993) *Betula* in Flora Europaea VOL. 1, p. 68-69.

Thanks to Dirk De Meyere, Philippe de Spoelberch, Koen Camelbeke, Paul Goetghebeur, Andrew Marsh, Paul Reader, Allen Coombes, Hugh McAllister, Maurice Foster, Piet de Jong, for the constructive comments and help with collecting material. Also thanks to the responsible persons of various arboreta, botanic gardens and collections where I could collect herbarium specimens, John Grimshaw for the 'New Trees' Betula account.

Copyright © 2008-2009 Jan De Langhe

Non-commercial use of material with correctly referencing my name and the web address is allowed.

- 1 a Shrub AND lamina with ≤ 6 pair, +/- shallowly lateral veins (rarely some leaves with up to 8 pair of veins). 2
- b Tree or shrub. IF shrub, then lamina with ≥ 8 pair lateral veins, often obvious deeply ribbed. 7
- 2 a Margin crenate. Lamina obovate, +/- round or kidney shaped, at least as broad as long, often broader than long. *B. nana* (*Betula/Apterocaryon*)
- b Margin not crenate, OR variable coarsely serrate to crenate. Lamina sometimes equally broad as long but usually obvious longer than broad. 3
- 3 a Apex sharp AND margin sharp-pointed toothed. 4
- b Apex obtuse to rounded AND margin +/- obtuse-pointed toothed (attend: juvenile or strong shoots can differ in sharper toothed margin and sharper apex). 5
- 4 a Young shoot brownish glandular (especially on end of shoot, visible with LENS), often sticky to the touch. *B. occidentalis* (*Betula/Betulae*)
- b Young shoot if glandular then transparent or white (LENS), often densely and short hairy and poorly or not glandular. *B. pubescens* (*Betula/Betulae*)
- 5 a Lamina broad, sometimes almost as broad as long AND margin coarsely toothed or +/- crenate and coarsely toothed. *B. pumila* (*Betula/Apterocaryon*)
- b Lamina always obvious longer than broad. Margin more regular and finely toothed. .. 6
- 6 a Lamina adaxially dark green, ovate to rhombic. Primary teeth +/- broad at their base. *B. ovalifolia* (*Betula/Apterocaryon*)
- Different: hybrid of *B. ermanii* and *B. ovalifolia*, with characters between both parents: +/- deeply ribbed to 8 pairs, base wedge shaped, rounded to cordate, apex sharp to obtuse. *B. apoiensis* (*Betula*)
- b Lamina adaxially green, ovate to obovate. Primary teeth +/- narrow at their base. *B. fruticosa* (*Betula/Apterocaryon*)
- 7 a Lamina at base remarkably cordate (>1 cm deep) AND primary teeth ending in fine linear points (3-4 mm long) AND petiole 2-6 cm. *B. maximowicziana* (*Acuminatae/Acuminatae*)
- b Lamina at base rounded to cuneate or truncate, IF cordate than never >1 cm deep and with such outrunning primary teeth nor petiole 2-6 cm long. 8
- 8 a Smell and/or taste of wintergreen oil obvious when damaging young shoot (wetting damaged shoots increases this). 9
- b No smell nor taste of wintergreen oil perceptible. 17
- 9 a Petiole and lamina abaxially on lateral veins +/- felty hairy with short hairs (decreasing in Autumn), primary teeth +/- ending in fine linear points. Fruiting catkin long and pendulous. *B. alnoides* (*Acuminatae/Acuminatae*)
- Lamina $\leq 2 \times$ longer than broad. Fruiting catkin solitary. *B. alnoides* subsp. *luminifera*
 - Lamina $\geq 2 \times$ longer than broad. Fruiting catkin 2-5. *B. alnoides* subsp. *alnoides*
- b Petiole and lamina abaxially on lateral veins +/- silky to stiffly hairy with long hairs (decreasing in Autumn), primary teeth not ending in fine linear points. Fruiting catkin short and erect. 10

- 10 a Margin obvious coarsely to doubly toothed: teeth +/- triangular, often ≥5 mm high and broad. Lamina abaxially +/- blue-green. *B. corylifolia* (*Nipponobetula/Nipponobetula*)
- b Margin different: teeth <5 mm high and broad. Lamina abaxially green. 11
- 11 a Lateral veins <6 pair. Apex obtuse. *B. lenta* f. *uber* (*Asperae/Lentae*)
- b Lateral veins ≥7 pair. Apex acute to acuminate. 12
- 12 a 1 year old long shoots mainly directed upwards, firm. Multistemmed shrub/small tree. *B. medwediewii* (*Asperae/Lentae*)
- b 1 year old long shoots in lesser way directed upwards, horizontal to pendent, thinner. Tree. 13
- 13 a Lamina ovate to broadly ovate, to 8 cm long, lateral veins usually ≤10 pair. Leaf base round to broadly cuneate. *B. globispica* (*Asperae/Lentae*)
- b Lamina ovate to oblong ovate, to 12 cm long (sometimes more), lateral veins usually 12-18 pair. Leaf base +/- cordate to round, rarely somewhat truncate to cuneate. 14
- 14 a Bark at least partly peeling of with little curly/curled up strips. *B. alleghaniensis* (*Asperae/Lentae*)
- b Bark sombre, initially smooth or +/- granular, often vertically torn and bursting open in tick plates later. 15
- 15 a Margin finely toothed, mainly 3-5 (9) teeth between 2 lateral veins. *B. lenta* (*Asperae/Lentae*)
- b Margin coarsely toothed, mostly 1-3 (4) teeth between 2 lateral veins. 16
- 16 a Lamina between lateral veins adaxially obvious bullate. Fruiting catkin 2-4 x 1,5 cm, bract to 8 mm long, central lobe obvious longer than lateral lobes. *B. grossa* (*Asperae/Lentae*)
- b Lamina between lateral veins adaxially not so obvious bullate. Fruiting catkin 2,5-6 x 1,2-2,5 cm, bract 8 - 13 mm long, central lobe 2 x longer than lateral lobes. *B. insignis* (*Asperae/Lentae*)
- 17 a Lateral veins mainly ≥10 pair AND bark peeling in long papery thin strips or ribbons/strings (or at least so detachable by hand). 18
- b Lateral veins <10 pair, at least so partly on the short shoots. OR bark different (+/- rough, or tearing loose with curly flakes, or stiff/breakable strips). 24
- 18 a Lamina +/- triangular ovate, largest breadth obvious under the middle AND margin sharply (doubly) toothed AND base truncate to weakly cordate. *B. ermanii* (*Betula/Costatae*)
- b Lamina ovate to oblong ovate or elliptic. IF lamina +/- triangular ovate then margin not sharply (doubly) toothed. 19
- 19 a Bark with orange or pink-red to brownish tints. 20
- b Bark with whitish crème to honey or grey tints. 21
- 20 a Lamina abaxially glossy. Bark with brown tints. *B. utilis* var. *utilis* (*Betula/Betulae*)
- b Lamina abaxially dull. Bark pink, coppery coloured to orange. *B. utilis* var. *albosinensis* (*Betula/Betulae*)

- 21 a Lamina at base +/- cuneate AND largest breadth about the middle of lamina
B. utilis var. *jacquemontii* hybrids (+ cultivars) (*Betula/Betulae*)
- b Lamina at base +/- truncate to rounded or weakly cordate, largest breadth sometimes at, but usually below the middle of lamina. 22
- 22 a Lamina broad: ovate to broadly ovate. Margin with broad and coarse primary teeth and coarse incisions. *B. utilis* var. *jacquemontii* (*Betula/Betulae*)
- b Lamina relative narrow: ovate to oblong ovate. Margin with sharp primary teeth and fin)sharp incisions. 23
- 23 a Lamina $\geq 2 \times$ longer than broad. Lateral veins mainly strictly rectilinear.
B. costata (*Betula/Costatae*)
- b Lamina $\leq 2 \times$ longer than broad. Lateral veins slightly curved upwards.
B. utilis var. *utilis* (*Betula/Betulae*)
- 24 a Young shoot with short pubescence. One year old shoot often short pubescent. *B. pubescens* (*Betula/Betulae*)
- different: similar taxa with short and dense pubescence on shoot, glandular or not:
- Shoots densely whitish glandular. Fruiting catkins pendulous, bract with central lobe not obvious enlarged. *B. microphylla* (*Betula/Betulae*)
 - Shoots not or poorly glandular. Fruiting catkins +/- erect, bract prominent, with obvious enlarged central lobe. *B. raddeana* (*Betula/Dahuricae*)
- b Young shoot and annual shoot glabrous, +/- glandular to warty. OR IF hairy than with long, pointing forwards or scattered hairs. 25
- 25 a Young shoot +/- sticky and brownish glandular (especially visible near the end with a LENS). Lamina with ≤ 6 pair of lateral veins. *B. occidentalis* (*Betula/Betulae*)
- b Young shoot not as sticky and brownish glandular. Lamina mostly with ≥ 6 pair of lateral veins. 26
- 26 a Bark at least partly peeling in several layers of large stiff scales/plates. Big specimens exhibit this on the branches while the trunk itself is very roughly ridged. 27
- b Bark different: OR peeling with long papery thin strips, OR not peeling, OR rough. 28
- 27 a Hairiness of shoot, petiole, lamina abaxially woolly, +/- lasting so, young shoot less obvious glandular. Lamina on short shoot with doubly serrated margin, 5-12 pair of lateral veins, ending in larger sharp teeth. *B. nigra* (*Betula/Dahuricae*)
- b Hairiness less obvious, thin to fading, and young shoot obvious glandular. Lamina on short shoot with +/- irregular serrate margin, 5-8 (9) pair of lateral veins, not so obvious ending in larger teeth. *B. dahurica* (*Betula/Dahuricae*)
- 28 a Bark peeling in long papery thin strips of ribbons/strings (or at least so detachable by hand). 29
- b Bark different: not peeling or if so, then at base very rough (and not at all, or at base not detachable by hand in ribbons or strings). 34
- 29 a Lamina adaxially with lateral veins close together and obvious deeply impressed, AND lamina abaxially obvious ribbed (with lateral veins well perceptible), AND margin sharply (often doubly) toothed. *B. ermanii* (*Betula/Costatae*)

Different: hybrid of *B. ermanii* and *B. ovalifolia*, with features between both parents: +/- deeply impressed veins to 8 pairs, base cuneate, rounded to cordate, apex sharp to obtuse. *B. apoiensis* (*Betula*)

- b Lamina adaxially with lateral veins distantly and impressed or not, AND/OR lamina abaxially +/- flat, with lateral veins not quite perceptible, AND/OR margin bluntly to +/- crenate toothed. 30
- 30 a Lamina adaxially glossy, lateral veins often impressed and lamina between the lateral veins +/- bullate, sometimes bulged. 31
- b Lamina adaxially +/- mat, lateral veins not so impressed, lamina flat between de lateral veins, sometimes +/- wavy. 32
- 31 a Shoot and bud not of weakly glandular.
B. utilis var. *jacquemontii* (+ cultivars en hybrids) (*Betula/Betulae*)
- b Shoot obvious glandular, bud +/- resinous. *B. utilis* var. *occidentalis* (*Betula/Betulae*)
- 32 a Lamina variable: oblong ovate to ovate, or ovate to rhombic. Bark often heavily marked with striking lenticels (zebra-effect, especially on white specimens).
B. papyrifera (*Betula/Betulae*)
- different: Similar species, lamina more gradual narrowing into slender point, always with cordate base. Bark pink tot red-brown (not white or dark brown).... *B. cordifolia* (*Betula/Betulae*)
- b Lamina variable: triangular to broad ovate, or broad ovate to rhombic. Bark with less striking lenticels. 33
- 33 a Lamina adaxially dark green with blue-green shine, abaxially contrasting paler grey- to blue-green and completely glabrous (margin ciliate!). Lamina cuneate to truncate at base. *B. pendula* subsp. *szechuanica* (*Betula/Betulae*)
- b Lamina adaxially dark green, abaxially paler green, glabrous to variable hairy. Lamina cuneate to weakly cordate. *B. pendula* subsp. *platyphylla* (*Betula/Betulae*)
- 34 a Lamina with \leq 7 pair lateral veins. Bark white or partly white. 35
- b Lamina with \geq 8 pair lateral veins. Bark dark, often with contrasting pale lenticels. 36
- 35 a Apex acuminate to long acuminate, gradually narrowing from the middle of the lamina. Bark white, +/- peeling, at base dark and coarsely ridged with dark rhombic markings. *B. pendula* subsp. *pendula* (*Betula/Betulae*)
- b Apex caudate. Lamina often striking constricted/narrowing from the middle towards the apex. Bark not peeling, white and speckled to orange brown.
B. populifolia (*Betula/Betulae*)
- 36 a Lamina with \leq 12 pair lateral veins. 37
- b Lamina with \geq 12 pair lateral veins or at least in part of the leaves. 40
- 37 a Lamina mature short shoot leaf mostly <4 cm long, abaxially +/- glaucous AND lateral veins obvious deeply impressed (de lamina is strikingly ribbed).
B. bomiensis (*Asperae/Asperae*)
- b Lamina mature short shoot leaf >4 cm long, abaxially green, AND/OR lateral veins not so or less impressed. 38
- 38 a Lamina average 6-9 cm long. Mid- and lateral veins abaxially with scattered tiny brown glands (aromatic at drying). *B. schmidtii* (*Asperae/Asperae*)
- b Lamina average \leq 6 cm long. Lamina abaxially not so glandulous nor aromatic. 39
- 39 a Lamina rhombic to ovate, base cuneate to rounded. Margin often with \geq 2 teeth between two lateral veins. *B. chinensis* (*Asperae/Asperae*)

- b** Lamina ovate to oblong ovate, base rounded. Margin with ≤2 teeth between two lateral veins. *B. fargesii* (Asperae/Asperae)
- 40 a Shoot, very densely honey coloured hairy (later greyish and thinner), shoot colour is not visible. Lamina abaxially without glands. *B. calcicola* (Asperae/Asperae)
- b Shoot less hairy, or with lesser pubescence, shoot colour is visible. 41
- 41 a Lamina on short shoot with strong texture AND <2,5 cm broad AND primary teeth linear at apex. *B. potaninii* (Asperae/Asperae)
- b Lamina on short shoot with thin texture OR >3 cm broad AND primary teeth not linear at apex. 42
- 42 a Lamina with >16 pair lateral veins, abaxially without glands. *B. chichibuensis* (Asperae/Asperae)
- b Lamina with <16 pair lateral veins, abaxially +/- glandulous. *B. delavayi* (Asperae/Asperae)

In this determination table, following taxa are referred to close relative (~) or synonym (=):

Betula aetnensis = *Betula pendula*
Betula austrosinensis = *Betula insignis*
Betula celtiberica ~ *Betula pubescens* (subsp. *celtiberica*)
Betula divaricata ~ *Betula ovalifolia*
Betula glandulifera ~ *Betula pumila* (western form)
Betula humilis = *Betula fruticosa*
Betula kirghisorum ~ *Betula pendula*
Betula litwinowii = *Betula pubescens* (McAllister and Ashburner)
Betula middendorffii ~ *Betula pumila*
Betula oycoviensis ~ *Betula pendula*
Betula pamirica ~ *Betula pubescens*
Betula procura = *Betula pubescens* (McAllister and Ashburner)
Betula saposhnikovii = *Betula pubescens* (McAllister and Ashburner)
Betula schugnanica ~ *Betula pubescens*
Betula tatewakiana ~ *Betula ovalifolia*

