



Article

The application of scientific names to plants in cultivation: *Salix vitellina* L. and related taxa (Salicaceae)Irina V. Belyaeva,^{1,2} Olga V. Epantchintseva,² Rafaël H.A. Govaerts,¹ Kevin McGinn,¹
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Abstract

The nomenclature and taxonomy of the taxa related to *S. vitellina* L. are clarified. Two new combinations, *Salix* × *fragilis* L. f. *vitellina* (L.) I.V.Belyaeva and *S.* × *pendulina* f. *salamonii* (Carrière) I.V.Belyaeva, are made and one new form, *S.* × *pendulina* f. *erythroflexuosa* I.V.Belyaeva, is described. Twenty-seven names are synonymised to the three accepted names including seven as new synonyms. Eleven new typifications are made. Fifty-one existing cultivars are assigned to the three taxa accepted by the authors and brief descriptions of them are provided.

Keywords: botanical nomenclature, cultivars, hybrid willows, Salicaceae, *Salix vitellina*, taxonomy, typification.

Introduction

As previously reported (Kovtonyuk and Belyaeva, 2015; Kuzovkina *et al.*, 2016a; Kuzovkina *et al.*, 2016b), the scientific names of plants are frequently misapplied to plants in cultivation. Although the application of scientific names is determined by the use of nomenclatural types, as stated in Art. 7.1 of the International Code of Nomenclature for Algae, Fungi, and Plants (ICN) (Turland *et al.*, 2018), the requirement to indicate a type when publishing a new taxon applies only to names published on or after January 1st, 1958. Consequently, many names published before then were not typified, thereby creating confusion for botanists and horticulturists in the identification and verification of taxa. Nevertheless, many herbarium specimens and other historical collections associated with plant names published before 1958 are now available via virtual herbaria, such as JSTOR, assisting research on these taxa.

Salix vitellina L. was described by Linnaeus (1753). Its species epithet translates from Latin as ‘egg-yolk-coloured,’ describing the colour of this willow’s one-year old branchlets.

Although the epithet indicates that the unusual colour caught the eye of Linnaeus, he did not mention this characteristic in his description of the taxon and listed features found in many other willows.

This species was typified by Belyaeva in Jarvis (2007) and is a basionym for other names. The currently accepted name for this taxon is *Salix alba* var. *vitellina* (L.) Stokes, and this name was used for a parent taxon of some ornamental willows, including weeping willows.

Examination of the lectotype, “Herb. Linn. No. 1158.13, female specimen (LINN)” showed that the plant on this herbarium sheet had characteristics not only of *S. alba* L. but also of *S. euxina* I.V.Belyaeva and is in fact a hybrid between these two species.

Skvortsov (1973) compared the characteristics of *S. alba* and *S. fragilis* auct. non L. (= *S. euxina*) and made the following observations of *S. alba*: “older branches becoming rather bright reddish or brownish, pigmentation more pronounced on the lighted side... Buds during the fall and winter coloured same as branches or brighter, not blackening”; and of *S. fragilis*: “branches within old crown uniformly yellowish grey or nearly ivory...buds during late fall and winter coloured same as branches; apices blackening due to bud scale dieback.” Because the type of *S. vitellina* has intermediate characteristics of *S. alba* and *S. euxina* (Table 1) we are led to conclude that *S. vitellina* is a hybrid between the two, for which the name is *S. × fragilis* L. (Belyaeva, 2009).

Although Linnaeus had the opportunity to observe *Salix vitellina* in cultivation in Sweden (Skvortsov, 1968; Skvortsov, 1999), he did not recognise the hybrid nature of either this taxon or *S. fragilis*, which he also described (Belyaeva, 2009). Thus, clarification of the nomenclature and taxonomy of the taxa related to *S. vitellina* is needed. This is of particular relevance to the authors’ current projects: ‘World Checklist of Salicaceae s. str.’ (I.V.Belyaeva and R.H.A.Govaerts); a compilation for the ‘Checklist for Cultivars of *Salix* L. (willow)’ (Y.A.Kuzovkina); research on the cultivation of willows in the Middle Urals (O.V.Epantchintseva and I.V.Belyaeva) and verification of the taxonomic identities of cultivated *Salix* growing at the Royal Botanic Gardens Kew (K.McGinn and I.V.Belyaeva). Here, we verify the taxonomic identities of cultivated plants associated with *S. vitellina* in order to apply the correct scientific names. We do so by studying original herbarium material and, where possible, making typifications.

Table 1. Comparative characteristics of *Salix vitellina* L., *S. alba* L. and *S. euxina*
I.V.Belyaeva (based on herbarium and living material)

Taxa	<i>Salix alba</i>	<i>Salix vitellina</i>	<i>Salix euxina</i>
Characteristics			
Crown type	Elongate	Elongate to nearly spherical	Mostly spherical
Branches	1–3-year-old branches often pendulous, growing at angle less than 60°, not brittle at base	1–3-year-old branches sometimes pendulous, mostly not pendulous, often brittle at base	1–3-year-old branches never pendulous, brittle at base
Colour of 1–3-year-old branches	Dark brown reddish or brownish	Egg-yolk colour, yellowish orange with reddish spots or bright reddish	Yellowish grey or nearly ivory
Pubescence	Current-year branchlets always pubescent; older branches mostly pubescent	Current-year branchlets puberulent or pubescent; older branches mostly glabrous	Current-year branchlets may be puberulent; older branches always glabrous
Buds	Buds during autumn and winter coloured same as branches, not blackening at apices	Some buds during autumn and winter coloured same as branches, with some blackening at apices due to bud scale dieback	Buds during autumn and winter coloured same as branches, blackening at apices due to bud scale dieback
Leaves	Mature leaves pale green above, glaucous below, sericeous, more or less silvery pubescent	Mature leaves dark green above, glaucous below, quite glabrous	Mature leaves dark green above, pale green below, not glaucous, glabrous
Catkins	Proximal flowers in staminate catkins open earlier than distal	Anthesis may vary: 'alba' or/and 'euxina' type	All flowers open simultaneously in male catkins
Flower bracts	With short, twisted white hairs	Trichomes variable: 'alba' or/and 'euxina' type	With long white straight hairs

Materials and methods

The protologues of *Salix vitellina* and related taxa, authentic herbarium specimens held in **A, ALTB, BAS, BASBG, BOCH, CAN, DR, E, FI, FR, G, GH, H, HBA, K, LE, LINN, LIV, MHA, MO, MW, NHM, NS, NSK, NY, P, PTH, S, SVER, UPS, W, WU, Z** and **ZT** and information stored in the international databases ‘Virtual Herbaria’ (<http://herbarium.univie.ac.at/>) and JSTOR (<https://www.jstor.org/>) were used for this study. Herbarium codes are cited according to Thiers (2013). Accepted scientific names are given in bold. Typifications were made according to the ICN (Turland *et al.*, 2018) and recommendations provided by McNeill (2014; 2015). Cultivated plants were studied in many botanical gardens across Europe, Asia, and North America corresponding to the herbarium codes listed above, in the private collections of R.D.Meikle (UK), T.Uronen (Finland) and M.Dodge (USA) and were grown and observed at the Botanic Garden of the Ural Branch of the Russian Academy of Sciences, Yekaterinburg and the Royal Botanic Gardens Kew. The nomenclatural status of the names is given as in IPNI (<http://www.ipni.org/index.html>).

Nomenclatural and taxonomic notes

There are numerous willow cultivars with vitellinous (egg-yolk yellow) branches, used in horticulture and basketry, which exist under a variety of different names, causing great confusion in their application. Indeed, it is common to find multiple names used for the same willow taxon in botanic gardens and plant nurseries due to the misapplication of names or misidentification. The authors of some publications interpret the names related to *Salix alba*, *S. euxina*, *S. × fragilis* and *S. vitellina* differently (Rehder, 1949; Snarskis, 1954; Rechinger, 1964, 1981; Jalas and Suominen, 1976; Chmelař and Meusel, 1976; Neumann, 1981; Skvortsov and Edmondson, 1982; Chmelař, 1983; Krüssman, 1984; Meikle, 1984; Meikle, 1985; Clarke, 1988; Santamour and McArdle, 1988; Newsholm, 1992; Blanco, 1993; Rechinger and Akeroyd, 1993; Lautenschlager-Fleury and Lautenschlager, 1994; Skvortsov, 1999; Belyaeva *et al.*, 1999; Berg and Christensen, 2000; Hörandl *et al.*, 2002; Fischer *et al.*, 2005; Belyaeva, 2009; Stace, 2010; Mabbett, 2012; Hillier and Lancaster, 2014; Stace *et al.*, 2015; Marchenko, 2017; Schulz, 2018; Sell, 2018). However, there are only three accepted scientific names recognised by the authors of the current paper that apply to willows with twigs whose bark is both vitellinous (egg-yolk coloured) and sanguineous (blood red coloured) and which are related to *S. vitellina*. One is *Salix × fragilis* f. *vitellina* (L.) I.V.Belyaeva, a form of crack willow (*S. × fragilis* = *S. alba* × *S. euxina*); the second is a hybrid weeping willow, *S. × pendulina* f. *salamonii* (Carrière) I.V.Belyaeva (= *S. babylonica* L. × *S. × fragilis* f. *vitellina*)

and the third is *S. × pendulina* f. *erythroflexuosa* I.V.Belyaeva (= *S. babylonica* f. *tortuosa* Y.L.Chou × *S. pendulina* f. *salamonii*).



Figure 1. *Salix × fragilis* L. f. *vitellina* (L.) I.V.Belyaeva (right) and *Salix × pendulina* f. *salamonii* (Carrière) I.V.Belyaeva (left) on the bank of River Tees in Yarm, North Yorkshire, UK. Photo by K.Chamberlain



Figure 2. *Salix × fragilis* L. f. *vitellina* (L.) I.V.Belyaeva outside Kew Palace at royal Botanic Gardens, Kew (accession 2009-98). Photo by K.McGinn

All cultivars attributable to these three names are easily propagated vegetatively. Under these trees, one can usually find many fallen branchlets and branches broken by the wind that may root and propagate in this way. These willows are also able to reproduce by seed, creating morphologically variable seedlings similar to one parent or different from both parents. Identification of these taxa is consequently challenging, as mentioned in publications reporting molecular research by Beismann *et al.* (1997), Triest *et al.* (1999), Triest (2001), Baccardia *et al.* (2003), De Cock *et al.* (2003), Kell *et al.* (2008), Trung *et al.* (2008) and van Puyvelde (2013). However, narrowing the taxonomy of this group of willows to the three accepted names, as described below, will simplify the process of identification. These willows are very ornamental and widely cultivated around the world (Fig. 1–4).



Figure 3. *Salix × pendulina* f. *salamonii* (Carrière) I.V.Belyaeva near Palm House pond at Royal Botanic Gardens, Kew (accession 2008-653). Photo by K.McGinn

Salix × *fragilis* L. (= *S. alba* L. × *S. euxina* I.V.Belyaeva), [Sp. Pl. 2: 1017](#). 1753

=*S. decipiens* Hoffm., [Hist. Salic. III. 2\(1\): 9](#), t. 31. 1791, **nom. illeg. superfl.** ≡ *S. fragilis* var. *decipiens* W.D.J.Koch, [Syn. Fl. Germ. Helv.: 643](#). 1837.

Type: Herb. Celsius 5: 659 (lectotype, **UPS!**, designated by Belyaeva 2009). Sweden, Uppsala, on the banks of the Fyrisån at the girls school, 5.v.1950, *O.Hedberg* (epitype, K000335238, **K!**, designated by I.V.Belyaeva, 2009).

= *S. × rubens* Schrank, [Baier. Fl. 1: 226](#). 1789.

Type: [Germany, Bayern, Regensburg], Kiesgrube unterh. Alt-St. Niklas, May 1896, *A.Mayer s.n.* (neotype, **M** – left hand specimen bearing catkins and unfolding leaves, n.v., designated by Christensen & Jonsell, 2005).



Figure 4. Hermaphrodite catkins of *Salix* × *pendulina* f. *salamonii* (Carrière) I.V.Belyaeva at Royal Botanic Gardens, Kew. Photo by K.McGinn

Salix × *fragilis* f. *fragilis* (= *S. alba* × *S. euxina*)

Tree, 15–30 m tall; bark on young (1–3-year-old) branches pubescent, later glabrescent or glabrous, dull or slightly lustrous, brownish or olive brown; leaves lanceolate or linear-lanceolate, long acuminate at tips, appressed sericeous or glabrous and glaucous beneath, finely irregularly serrate at margins; stipules large caducous. Catkins coetaneous (leaves and catkins appear at the same time), 4–7 cm long, lax-flowered; bracts pilose at margin, ovaries subsessile, flask shaped, glabrous; styles longer than stigmas; female flowers with one adaxial nectary; male flowers with two nectaries and two stamens; filaments free, hairy at base, anthers pale yellow.

Salix × *fragilis* f. *vitellina* (L.) I.V.Belyaeva, **comb. & stat. nov.**

(urn:lsid:ipni.org:names: 77187455-1).

Basionym: *Salix vitellina* L., [Sp. Pl. 2: 1016](#). 1753 ≡ *S. alba* var. *vitellina* (L.) Stokes, [Bot. Mat. Med. 506](#). 1812, ≡ *S. alba* subsp. *vitellina* (L.) Schübl. & G.Martens, [Fl. Württemberg: 630](#). 1834, ≡ *S. alba* f. *vitellina* (L.) Wimm., [Salic. Eur.: 18](#) (1866).

Type: Herb. Linn. No. 1158.13, female specimen (lectotype, **LINN!**, designated by I.V.Belyaeva in Jarvis 2007). The picture of the type specimen is available [online](http://linnean-online.org/) (<http://linnean-online.org/>) (Fig. 5).

= *S. alba* var. *chermesina* Hartig, [Vollst. Naturgesch. Culturpfl. Deutschl. 421](#). 1851, **syn. nov.** ≡ *S. alba* f. *chermesina* (Hartig) Rehder, [Bibliogr. Cult. Trees 75](#). 1949.

Type: Arboretum, Royal Botanic Gardens Kew, 17.04.1936, *R.Meikle 56* (neotype, K000335347, **K!**, **designated here** by I.V.Belyaeva).

= *S. basfordiana* Scaling ex J.Salter, [Gard. Chron. 17: 298](#) (fig. 41-42). 1882, **syn. nov.** ≡ *S. × fragilis* var. *basfordiana* (Scaling ex J.Salter) Bean, [Trees & Shrubs Brit. Isles 2: 481](#).

1914, ≡ *S. × rubens* var. *basfordiana* (Scaling ex J.Salter)

Meikle, *Watsonia* 15(3): 273, 1985, ≡ *S. × rubens* f. *basfordiana* (Scaling ex J.Salter) Meikle, *Watsonia* 15(3): 273. 1985.

Type: [icon] 'Fig. 41. *Salix basfordiana* in [Gard. Chron. 17: 298](#). 1882. (lectotype, **designated here** by I.V.Belyaeva); Kew [Gardens], West side of Lake, 29.04.1892, fragment with pistillate catkins on the left (epitype, K000335345, **K!**, **designated here** by I.V.Belyaeva).

= *S. vitellina* L. [infrasp.unranked] *britzensis* Späth, *Baumschule* 3. 1883, **syn. nov.** ≡ *S. alba* f. *britzensis* (Späth) C.K.Schneid., [Ill. Handb. Laubholz. \[C.K.Schneider\] 1: 36](#). 1904.

Type: Branderburg, May 1921, *Görz 19*, fragment with pistillate flowers on the right (neotype, **K!**, K000335348, **designated here** by I.V.Belyaeva).

Salix alba L. f. *britzensis* (Späth ex C.K.Schneid.) P.D.Sell, *Fl. Gr. Brit. Ireland* 1: 692. 2018, **nom. inval.**

= *S. × chrysostela* Dode, [Bull. Soc. Dendrol. France 76: 93](#). 1930.

Type: Russia, Yekaterinburg, Botanical Garden UB RAS, cultivated near the lake, 15.05.1997, *I.V.Belyaeva & A.A.Dyachenko 960*, fragment with staminate flowers (neotype, **MHA!**, **designated here** by I.V.Belyaeva; isoneotype – **SVER!**)

S. sanguinea Scaling ex J. Salter, [Gard. Chron. 17: 298](#). 1882, **nom. inval.**

S. × rubens f. *sanguinea* Meikle, *Watsonia* 15(3): 274. 1985, **nom. inval.**

S. vitellina var. *aurea* Lunell, [Amer. Midl. Naturalist 4: 298](#). 1916, **nom. inval.**



Figure 5. Lectotype of *Salix vitellina* L. (LINN)

Female and male plants are known in cultivation. According to Salter (1882), the bark in female plant is darker than in male, especially on terminal branchlets, which are very smooth and glossy and therefore conspicuous in the autumn and winter, yellowish, yellowish orange with red or reddish orange spots. Young branchlets and leaves are more or less hairy. Leaves and catkins appear at the same time, usually at the end of April in the UK. Leaves glabrous, lanceolate, acuminate at tips, finely serrate at margins. Stipules are large and vigorous, caducous. Female and male catkins are long, pendulous when developed, and fragrant. Flower bracts ciliate at margin, ovaries in female flowers are subsessile, lanceolate, glabrous, styles are longer than stigmas, female flowers have only one adaxial nectary; male flowers have two stamens and two nectaries. Filaments are free, hairy at the base, anthers are pale yellow.

Salix × *pendulina* Wender. [Schriften Ges. Beförd. Gesamten Naturwiss. Marburg 2](#): 235. 1831

Type: Saint Helena, January 1836, *P.F.Siebold 16*, (neotype, **W!**, W0023200 fragment on the left with developed leaves and buds), **designated here** by I.V.Belyaeva.

Salix × *pendulina* f. *pendulina* (= *S. alba* × *S. babylonica* × *S. euxina*.)

= *S. × blanda* Andersson, [Kongl. Svenska Vetensk.-Akad. Handl. 6\(1\)](#): 50. 1867.

Type: Germany, Hanau, 1862, *Clemenson s.n.*, (lectotype, **G-DC!**, fragment on the left with female flowers), **designated here** by I.V.Belyaeva; isolectotype (**S!**, S-13-11269, fragment on the left with female flowers; syntypes, **G-DC!**, S-13-11269, fragments on the right with developed leaves).

= *S. elegantissima* K.Koch, [Wochenschr. Vereines Beförd. Gartenbaues Königl. Preuss. Staaten 14](#): 381. 1871, **syn. nov.** ≡ *S. pendulina* var. *elegantissima* (K. Koch) Meikle, *Watsonia* 15: 274. 1985.

Type: France, Le Colombier, Paizay-le-Tort, 3 Avril 1959, *Deux-Sevres s.n.* (neotype, **P!**, P04791245, fragment on the left with female flowers, **designated here** by I.V.Belyaeva).

S. sieboldii K.Koch, [Dendrologie 2\(2\)](#): 505. 1872, **nom. inval.**

Tree with broad crown and spreading, weeping branches. Twigs are slender, green to brownish, glabrous, more or less brittle at the base. Buds small (0.3–0.5 cm long) acuminate, appressed, glabrous. Leaves long, lanceolate, long-acuminate, cuneate and with 2–3 glands at base, glabrous, dull green above, pale green and glaucous beneath, with serrulate margins and caducous stipules. Only trees of this taxon that develop catkins with female flowers are known

to the authors. Ovaries are pedunculate, glabrous, styles short, to 0.8 mm, stigmas bifid, female flowers have one adaxial nectary.

Salix × *pendulina* f. *salamonii* (Carrière) I.V. Belyaeva, **comb. & stat. nov.**

(= *S. babylonica* L. × *S. × fragilis* f. *vitellina*)

(urn:lsid:ipni.org:names: 77187810-1).

Basionym: *S. babylonica* [infrasp. unranked] *salamonii* Carrière, [Hort. Franc. 339](#). 1864.

≡ *S. × salamonii* (Carrière) Carrière, Rev. Hort. [Paris]. 49: 444. 1869.

Type: France, 93 Seine-Saint-Denis, Aulnay-sous-Bois, April 1974, *G.Sag 849* (neotype, **P!**, P05598756, **designated here** by I.V. Belyaeva).

= *S. chrysocoma* Dode, [Bull. Soc. Bot. France 55: 655](#). 1909, **syn. nov.** ≡ *Salix* × *sepulcralis* var. *chrysocoma* (Dode) Meikle, *Watsonia* 15(3): 274. 1985. ≡ *S. alba* f. *pendula* C.K. Schneid., [Ill. Handb. Laubholz. \[C.K. Schneider\] 1: 36](#). 1904.

Type: ‘Hortus Späth, 25 April 1906, *E.G. Camus & A. Camus*’ (neotype, **P!**, P05514596, **designated here** by I.V. Belyaeva).

= *S. alba* var. *vitellina-tristis* Ser., [Essai Saules Suisse 83](#). 1815, **syn. nov.** ≡ *S. alba* [unranked] *tristis* Gaudin, Fl. [Helv. 6: 206](#). 1833, **nom. illeg. superfl.** ≡ *S. alba* var. *tristis* Trautv., [Fl. Altaic. \(C.F. Ledebour\) 4: 256](#). 1833, **nom. illeg. superfl.** ≡ *S. × sepulcralis* Simonk., [Természetráji Fü. 12: 157](#). 1890.

Type: ‘Herbarium Helveticum, *N.C. Seringe 1498*’ (lectotype, **GH!**, GH00277403, **designated here** by I.V. Belyaeva).

= *S. alba* var. *vitellina* f. *pendula* Rehder, [Möller's Deutsche Gärt.-Zeitung 11: 98](#). 1896, **syn. nov.**

Type: “Park zu Wilhelmshöhe bei Kassel”, **not designated.**

= *S. alba* var. *vitellina* f. *pendula* C.K.Schneid., [Ill. Handb. Laubholz. 1: 36](#). 1904, **nom. illeg. non** Rehder, 1896, **syn. nov.**

S. alba var. *vitellina* f. *pendula* Kuphaldt, [Mitt. Deutsch. Dendrol. Ges. 24: 233](#) (& 373). 1916, **nom. inval.**

This weeping willow is very ornamental and hence popular in cultivation. Twigs are slender, golden or yellowish orange with reddish spots, sometimes sanguineous and easily breakable at the base. Buds ovoid, acuminate, of same colour as twigs or darker, hairy at the apex. Leaves are lanceolate, acuminate with 2–3 glands at the base, glabrous, green above, pale green and glaucous beneath, with serrulate margins and caducous stipules. Trees often develop

female, male and androgynous catkins at the same time as the leaves. Bracts pale yellow, ciliate at margin. Ovaries subsessile, flask-shaped, glabrous, styles short (to 0.8 mm) stigmas bifid, nectary one, adaxial in female flowers; male flowers with two stamens and two nectaries, abaxial nectary narrowly oblong, adaxial broader. Filaments are free, hairy at the base, anthers are pale yellow.

S. × pendulina f. *erythroflexuosa* I.V.Belyaeva, f. nov.

(= *S. babylonica* f. *tortuosa* × *S. × pendulina* f. *salamonii*)

(urn:lsid:ipni.org:names: 77187815-1).

Description: *S. × erythroflexuosa* Ragonese & Alberti (as '*S. × erithro-flexuosa*'), Revista Invest. Agríc. 15(1): 101. 1961, **nom. inval.**

Type: Russia, Yekaterinburg, Botanical Garden UB RAS, cultivated near the lake, 02.07.1997, I.V.Belyaeva & A.A.Dyachenko 176, (holotype, **MHA!**, isotype – **SVER!**).

Cultivars

Bright stem coloration constitutes an important ornamental characteristic for basketry and for landscape specimens and, because of this, numerous upright and weeping cultivars have been named during the last 150 years. They were listed in prominent horticultural references, such as Bailey (1924), Rehder (1927, 1940, 1949), Späth (1930), Bailey and Bailey (1976), Krüssman (1978, 1984) and Bean (1980), in most cases without detailed information regarding their origin. Many yellow, orange and red basket selections were developed by K.G.Stott from Long Ashton Research Station, Bristol, U.K., and described as cultivars of *S. × basfordiana* and *S. × sanguinea* and listed as hybrids of *S. alba vitellina* and *S. × fragilis* (Stott, 2001). Many yellow-barked upright and weeping ornamental hybrids were developed by V. Shaburov from the Botanic Gardens in Yekaterinburg, Russia (Shaburov, 1986; Belyaeva *et al.*, 1999; Marchenko, 2017).

The majority of cultivars of *S. × fragilis* f. *vitellina* are upright plants. However, when *S. × fragilis* f. *vitellina* is crossed with some clones of *S. alba* which have pendulous branches, their progeny exhibit a weeping habit which becomes obvious by the age of about nine years. The cultivars 'Lyubimets,' 'Strela Kupidona,' 'Oranzhevaya Tonkostvol'naya' and 'Oranzhevaya Tolstostvol'naya' exhibit this type of weeping habit. Their weeping habit along with the extreme cold-hardiness is inherited from the male parent – *S. alba* from the Urals, Russia (Shaburov, 1986; Marchenko, 2017). Interestingly, *S. alba* observed in the wild develops a weeping habit much later – after 25–30 years (Shaburov, 1965). In contrast, all

cultivars of *S. × pendulina* f. *salamonii* exhibit a weeping habit almost immediately. This early development of the weeping habit is inherited from weeping clones of *S. babylonica*. Another interesting characteristic of the cultivars described below is that hybrids of *S. × fragilis* f. *vitellina* are either strictly male or female, while the hybrids of *S. × pendulina* f. *salamonii* with *S. babylonica* as a parent, exhibit androgynous flowers and catkins (Marchenko, 2017).

The cultivars of *S. × pendulina* f. *salamonii* are formed by various combinations of *S. babylonica* and *S. × fragilis* f. *vitellina* (*S. alba* × *S. euxina*). For example, ‘Salamonii,’ ‘Vitellina-tristis’ and ‘Tristis Resistentia’ are characterised by shorter weeping branches and are possibly crosses of *S. babylonica* L. × *S. × fragilis* f. *vitellina*, while ‘Chrysocoma’ and ‘Sepulcralis,’ both cultivars with long pendulous branches, are likely crosses of *S. babylonica* × (*S. babylonica* × *S. × fragilis* f. *vitellina*) with higher involvement of *S. babylonica*. ‘Ural’skaya Krasavitsa’ and ‘Pamyati Shaburova’ represent crosses of *S. alba* × (*S. babylonica* × (*S. babylonica* × *S. fragilis* f. *vitellina*)), which are characterized by cold hardiness traits, that are likely inherited from involvement of *S. alba* from the Urals.

The cultivars of *S. × pendulina* f. *erythroflexuosa* (*S. babylonica* f. *tortuosa* × *S. pendulina* f. *salamonii*) have yellow, yellowish orange and orange-reddish contorted branches and contorted leaves (one of the parents *S. babylonica* ‘Tortuosa’ has green or green-brown upright contorted branches). In this hybrid combination there are cultivars with either upright (‘Caradoc’) or pendulous/widely arching (‘Erythroflexuosa,’ ‘Golden Curls,’ ‘Golden Spiral,’ ‘Scarcuzam’) habits.

The following list of cultivars was compiled in the Checklist for Cultivars of *Salix* L. (willow) (Kuzovkina, 2015) where some cultivars were under different combinations, so it should now be corrected in light of the taxonomic changes outlined earlier in this paper. Below, the new placement of cultivar names is provided.

***Salix × fragilis* (*S. alba* × *S. euxina*)**

S. × fragilis* f. *vitellina

The following cultivars belong under this name.

‘**Aurea.**’ This cultivar name possibly corresponds to the epithet *S. vitellina* var. *aurea* – an invalidly published name, without a description. This selection is less vigorous than other *S. × fragilis* cultivars. Branches are yellowish green and leaves are yellowish (Krüssmann, 1984). Leaf colour is lime green at first, changing to bright gold at maturity (Newsholme, 1992). A herbarium specimen of this cultivar held at **WSY** is a female clone.

‘BASFORDIANA’ (syn. *S. basfordiana*, *S. × rubens* f. *basfordiana*, *S. × rubens* var. *basfordiana*, *S.* ‘BASFORDIANA’). This cultivar is represented by numerous clones, some of which have received their own names. Bean (1980) described this cultivar as a vigorous male plant with polished orange-yellow stems. Leaves are finely serrated, glabrous, bright green. Catkins are drooping, 6–10 cm long, appearing with the leaves. When it is pruned in spring, its stem colour is even brighter than that of *S. × fragilis* f. *vitellina*. This cultivar was selected by the basket maker and willow grower William Scaling of Basford, Nottinghamshire, UK, in the 1860s, named *S. basfordiana*, and described under the same name by James Salter in 1882 (Salter, 1882). According to Meikle (1984), there are male and female clones of this cultivar. It can be distinguished from ‘Vitellina,’ with which it is often confused, by its lustrous leaves and long



Figure 6. Cultivar *Salix × fragilis* L. f. *vitellina* (L.) I.V.Belyaeva ‘BASFORDIANA’, female plant in the Conservation Area of the the Botanic Gardens, Kew. a. whole tree, b. female catkin, c. male catkin. Photos by K.McGinn

pendulous catkins. Krüssmann (1984) listed it as *S. × ‘BASFORDIANA’* and stated that this cultivar is a descendant of *S. × rubens*, that was discovered in Arden (a historic area of England) around 1863. It is widely planted today as a basket selection with stems yellow at the base, orange in the middle and bright red at the tips (Stott, 2001). A few mature trees can be found in the Conservation Area at the Royal Botanic Gardens at Kew (Fig. 6).

‘BASFORDIANA FARNDON.’ A selection for basketry of ‘BASFORDIANA’ (listed as *S. alba* [unranked] *vitellina* × *S. × fragilis* (*S. × basfordiana*)) with stems yellow at the base, orange in the middle, and bright red at the tips (Stott, 2001).

‘Britzensis.’ A male cultivar (Späth, 1930). This red-stemmed cultivar is frequently mistakenly listed as a synonym of ‘Chermesina,’ which has carmine red stems and was discovered near Braunschweig, Germany, before 1851. ‘Britzensis’ was raised from seed by Späth at Britz near Berlin, Germany, and introduced into commerce in 1878 (Bean, 1980). According to the 2017 online catalogue of the Vermont Willow Nursery (Vermont, USA), it is a narrow, upright, relatively small tree with red stems even in summer, and has the reddest young stems of all willows grown in this nursery. Vermont Willow Nursery listed the Montreal Botanic Garden as a source of a mature pollarded specimen of this cultivar.

‘Cardinalis’ (syn. *S. cardinalis* Veitch, **nom. inval.** *S. alba* ‘Cardinalis,’ *S. alba* ‘Cardinal’). This is a basket selection with stems yellow at the base, orange in the middle and scarlet at the stem tips (listed as a selection of *S. alba* ‘Chermesina’) (Stott, 2001). Elwes and Henry (1913) described *S. cardinalis* Veitch as a synonym of *S. decipiens* cultivated in Belgium for basketry and producing remarkable crimson stems when cut; when originally imported, it was called “Belgian red willow.” A female clone, *S. alba* ‘Cardinal,’ was described by Bean (1980) as having stems the colour of ‘Britzensis,’ but with narrower leaves and of a different sex (‘Britzensis’ is a male clone). It has been in cultivation since the 1880s as “cardinal willow.” According to Meikle (1984), this name is usually applied to red-barked forms of *S. × fragilis* f. *vitellina* (listed as *S. alba* var. *vitellina*), or its hybrids with *S. euxina* (listed as *S. fragilis* auct., non L.).

‘Chermesina.’ An epithet that most likely corresponds to *S. alba* f. *chermesina* (syn. *S. alba* var. *chermesina*). This cultivar has carmine red stems and was discovered near Braunschweig, Germany, before 1851 (Bean, 1980). Several clonal selections of this cultivar have been brought into commercial trade (e.g. ‘Yelverton,’ ‘Vitellina Nova’).

‘Chrysostela.’ An upright tree of paintbrush shape. The name means “column of gold,” referring to the colour of young stems that are similar to *S. ‘Vitellina,’* but red-orange at the tips (Thomas, 1992). This is a male cultivar with a narrow crown and fastigate habit much like Lombardy poplar, originally described by the French dendrologist Dode (Bean, 1980). A cultivar under this name was introduced to the US as an upright cultivar with coral red branches (specimen no. 13652 in the Plant Material Center, Beltsville, Maryland), but this clone was found to be female (Smith *et al.*, 1978; Santamour and McCray Batzli, 1990).

‘Farndon.’ A basket cultivar (listed as *S. alba* × *S. fragilis* (*S. × rubens*); *S. ‘Howitt’* × *S. viridis* Fr.) with stems orange at the base and scarlet at the stem tips (Stott, 2001). Note: This cultivar name has also been established for the nothospecies *S. mollissima* Hoffm. ex Elwert (Stott,

2001), so it is important that the cultivar name is accompanied by the name of the nothospecies which applies to it.

‘Flanders Red.’ A basket selection (listed as *S. alba* [unranked] *vitellina* × *S. × fragilis* (*S. sanguinea*)) with stems green at the base and dark red at the stem tips (Stott, 2001).

‘Frans Geel.’ A Belgian cultivar with yellow stems (“geel” means “yellow” in Dutch) (Strykers, 1966). It is listed as a preferred name by Hoffman (2010) (as a cultivar of *S. × rubens*).

‘Fransgeel Rood.’ A Dutch cultivar with red stems (“rood” means “red” in Dutch) (Strykers, 1966). A basket selection (listed as *S. alba* [unranked] *vitellina* × *S. × fragilis* (*S. sanguinea*)) with stems yellow at the base, orange in the middle and bright red at the tips (Stott, 2001).

‘Golden Ness.’ Branchlets are bright golden-yellow (Jewell, 2010). According to Dirr (2009), the specimen observed at Wisley, UK, during 2000 did not greatly differ from *S. ‘Vitellina.’*

‘Golden Willow.’ A basket cultivar (listed as *S. alba* × *S. × fragilis* (*S. × rubens*)) with stems yellow at the base, orange in the middle and dull red at the stem tips (Stott, 2001).

‘Hutchinson’s Yellow Bark’ (‘Hutchinson’s Yellow’). This is a basket selection listed as *S. alba* × *S. × fragilis* (*S. × rubens*). Note: ‘Hutchinson’s Yellow’ is listed by Hillier and Lancaster (2014) as a cultivar with very bright egg-yolk yellow winter stems. It is possible that ‘Hutchinson’s Yellow’ is a shortened name for ‘Hutchinson’s Yellow Bark.’

‘Jaune de Falaise.’ A basket selection (listed as *S. alba* [unranked] *vitellina* × *S. × fragilis* (*S. sanguinea*)) with stems orange at the base and bright red at the tips (Stott, 2001).

‘Jaune Hâtive.’ A basket selection (listed as *S. alba* [unranked] *vitellina* × *S. × fragilis* (*S. sanguinea*)) with stems yellow at the base and red at the tips (Stott 2001).

‘Laurina.’ A basket selection (listed as *S. alba* [unranked] *vitellina* × *S. fragilis* (*S. × sanguinea*)) with stems green at the base and dark red at the tips (Stott 2001).

‘Lyubimets.’ (**Nomenclatural standard:** WSY [WSY0108928!, WSY0108929!, WSY0108930!]; **duplicate standards** USNA [NA-0102519!, NA-0102520!, NA-0102521!] and MHA.) A male cultivar with a pyramidal crown and slightly pendulous, bright orange 1–2-year-old twigs. A mature tree can reach 18 m in height with a crown diameter of 8.5 m. This cultivar was developed at the Botanic Gardens of the Ural Branch of the Russian Academy of Sciences in Yekaterinburg, Russia, by Shaburov (listed as *S. alba* subsp. *vitellina* × *S. alba* by Marchenko, 2017) and later named by A. Marchenko. *S. ‘Lyubimets’* resembles *S. ‘Pamyati Bazhova’* but has a smaller trunk diameter and more compact crown. It develops a weeping habit by the age of seven years; in younger plants the crown is pyramidal. Flowering is more

spectacular than in *S. 'Pamyati Bazhova'* because of its larger catkins and flower bracts. The cultivar name translates from Russian as “A Favourite.”

This is one of a few clones from the same hybrid combination of *S. × fragilis* f. *vitellina* × *S. alba* (listed as *S. alba* subsp. *vitellina* × *S. alba* by Marchenko, 2017) along with *S. 'Oranzhevaya Tolstostvol'naya'*, *S. 'Oranzhevaya Tonkostvol'naya'* and *S. 'Strela Kupidona.'*

These cultivars were described by Marchenko (2017) under the heading “Shaburov’s willow hybrids with yellow-orange bark and a late weeping habit.” They have very bright branches and branchlets, which are very dense (the densest, compared to other Shaburov’s hybrids). These cultivars have a distinctive appearance when their dynamic habit changes with age: when young, they have an upright, narrow pyramidal crown, which later becomes broadly oval and slightly weeping and, by the age of about nine years, the weeping crown is more pronounced. The late weeping habit and extreme cold hardiness are inherited from the male parent, *S. alba* from the Urals. The summer foliage has an attractive bluish green colour. There are both, male (*S. 'Lyubimets'* and *S. 'Strela Kupidona'*) and female (*S. 'Oranzhevaya Tolstostvol'naya'* and *S. 'Oranzhevaya Tonkostvol'naya'*) clones listed. The flowering of the male cultivars is profuse and spectacular. *S. 'Lyubimets,' S. 'Oranzhevaya Tonkostvol'naya'* and *S. 'Strela Kupidona'* have thinner stems than *S. 'Oranzhevaya Tolstostvol'naya.'*

‘Natural Red.’ A basket selection of *S. 'BASFORDIANA'* (listed as *S. alba* [unranked] *vitellina* × *S. × fragilis* (*S. × sanguinea*)) with stems bright yellow at the base and scarlet at the tips (Stott, 2001).

‘Nova.’ No description found. It is listed as a preferred name by Hoffman (2010). Stott (2001) describes the cultivar ‘VITELLINA NOVA’ as a basket selection of *S. alba* ‘Chermesina’ yellow at stem base, orange at mid-stem and scarlet at tips of branches. It is possible that ‘Nova’ is a shortened name for *S. 'VITELLINA NOVA.'*

‘Oranzhevaya Tolstostvol'naya.’ (Nomenclatural standard: WSY [WSY0108901!, WSY0108902!, WSY0108903!]; duplicate standards USNA [NA0102510!, NA0102511!, NA0102512!] and MHA.) A mature tree can reach 16 m in height, with a thick short trunk up to 1 m in diameter and a crown 10.5 m wide. Its elongated oval crown becomes weeping after a tree is 10 years old. Younger trees have a pyramidal, orange crown. Stems yellowish, becoming reddish brown at tips. The catkins are female, and its flowering is not very ornamental. This cultivar is as robust as Shaburov’s male cultivar *S. 'Pamyati Bazhova,'* but more compact. It tolerates industrial settings well and is used in urban landscapes in Perm, Russia. This selection was developed at the Botanic Gardens of the Ural Branch of the Russian Academy of Sciences in Yekaterinburg, Russia, by V.I.Shaburov (the cross was made in 1960)

and later was named by A. Marchenko (Marchenko, 2017). This is one of a few clones from the same cross of *S. × fragilis* f. *vitellina* × *S. alba* (the description of these willows is given under the cultivar name *S.* ‘Lyubimets’). The cultivar name translates from Russian as “An Orange Thick-Stemmed.”

‘**Oranzhevaya Tonkostvol’naya.**’ (Nomenclatural standard: WSY [WSY0108919!, WSY0108920!, WSY0108921!]; duplicate standards USNA [NA0102531!, NA0102532!, NA0102533!] and MHA.) A mature tree can reach 14.5 m height with a trunk 0.5 m in diameter and crown 9–12 m wide. This cultivar resembles another one of Shaburov’s cultivars, *S.* ‘Lyubimets,’ which also has thin stems, but *S.* ‘Oranzhevaya Tonkostvol’naya’ has a wider crown and female catkins. One- or two-year-old stems are yellow-orange but lighter than in *S.* ‘Oranzhevaya Tolstostvol’naya.’ Younger trees have a pyramidal crown which becomes weeping at the age of five to eight years. It tolerates industrial environments well and is used in urban landscaping in Perm, Russia. This cultivar was developed at the Botanic Gardens of the Ural Branch of the Russian Academy of Sciences in Yekaterinburg, Russia, by V Shaburov (the cross was made in 1960) and later was named by A. Marchenko (Marchenko, 2017). This is one of a few clones from the same cross of *S. × fragilis* f. *vitellina* × *S. alba* (the description of these willows is given under the cultivar name *S.* ‘Lyubimets’). The cultivar name translates from Russian as “An Orange Thin-Stemmed.”

‘**Q802.**’ A basket selection (listed as *S. alba* [unranked] *vitellina* × *S. × fragilis*. (*S. × sanguinea*)) with stems yellow at the base, orange in the middle, and red at the tips (Stott, 2001).

‘**Redskins.**’ A basket selection (listed as *S. alba* [unranked] *vitellina* × *S. × fragilis* (*S. × sanguinea*)) with stems yellow at the base, orange in the middle, and red at the tips (Stott, 2001).

‘**Rouge Ardennais.**’ A basket selection (listed as *S. alba* [unranked] *vitellina* × *S. fragilis* (*S. × sanguinea*)) with stems orange at the base and bright red at the tips (Stott, 2001).

‘**Rouge Folle.**’ A basket selection (listed as *S. alba* [unranked] *vitellina* × *S. × fragilis* (*S. × sanguinea*)) with stems orange at the base and bright red at the tips (Stott, 2001).

‘**Russet.**’ A basket selection (listed as *S. alba* [unranked] *vitellina* × *S. × fragilis* (*S. × sanguinea*)) with stems yellow-green at the base and pale red at the tips (Stott, 2001).

‘**Sanguinea.**’ This epithet most likely corresponds to *S. × rubens* var. *basfordiana* f. *sanguinea*; *S. × sanguinea*, **nom. inval.** This is a female clone with red twigs and smaller, less tapered leaves than the species (Bean, 1980). It is lower growing and less vigorous than *S.* ‘Basfordiana,’ often with a shrubby form. Branchlets are less colourful than in *S.*

‘Basfordiana’ (Meikle, 1984). It was distributed by Scaling, who discovered it in the French Ardennes, possibly as a cultivated tree.

‘**Strela Cupidona.**’ (Nomenclatural standard: WSY [WSY0108916!, WSY0108917!, WSY0108918!]; duplicate standards USNA [NA0102516!, NA0102517!, NA0102518!] and MHA.) A male cultivar with a narrow pyramidal, very dense crown and bright orange one- to two-year-old stems. A mature tree can reach up to 11 m in height with a 0.27 m trunk diameter; the diameter of the crown at the base can reach 5 m (Marchenko, 2017). This selection was developed at the Botanic Gardens of the Ural Branch of the Russian Academy of Sciences in Yekaterinburg, Russia, by Shaburov (the cross was made in 1960). The plant was grown in a nursery near Perm, Russia, where it was



Figure 7. Cultivar *Salix* × *fragilis* L. f. *vitellina* (L.) I.V.Belyaeva ‘Vitellina’, U.S.A. Photo by Y.Kuzovkina

discovered in 2011 and named by Marchenko (2017). This is one of five clones from the same cross of *S.* × *fragilis* f. *vitellina* × *S. alba* (the description of these willows is given under the cultivar name *S.* ‘Lyubimets’). *S.* ‘Strela Cupidona’ is a compact cultivar suitable for smaller gardens or as a street tree. It has a rather upright crown and its late weeping habit is less pronounced, compared to *S.* ‘Lyubimets.’ *S.* ‘Strela Cupidona’ resembles *S. alba* ‘Liempde’ but has brighter stems and is very cold hardy. The cultivar name translates from Russian as “Cupid’s Arrow.”

‘**Vitellina.**’ This cultivar name corresponds to the epithet *S.* × *fragilis* f. *vitellina*. A cultivar with pure egg-yolk yellow stems (Stott, 2001) (Fig. 7). Späth (1930) stated that this is a male cultivar. However, according to Meikle (1984), it is an assemblage of male and female clones, less robust than *S.* × *fragilis*, with yellow branchlets and more glabrescent leaves, with the upper surface becoming bright and rather lustrous green; the catkins have a characteristic lean and somewhat ragged appearance, with longer scales. This variant had been known since 1623 when it was referred to as “the cultivated golden willow” by the Swiss botanist Caspar Bauhin (Bean, 1980). Bean (1980) stated that this variant was not found in the wild. According to Krüssmann (1984), it was discovered in Switzerland around 1671. Many clonal selections of this form have been brought into commercial trade.

‘Vitellina Nova.’ This epithet most likely corresponds to *S. alba* var. *vitellina nova* hort. A basket cultivar (listed as *S. alba* ‘Chermesina’) with stems yellow at the base, orange in the middle and scarlet at the tips (Stott, 2001). This is a female cultivar, according to Späth (1930). **‘Yelverton.’** A basket cultivar (listed as *S. alba* ‘Chermesina’) with stems yellow at the base, orange in the middle and scarlet at the tips (Stott, 2001).

Salix × *pendulina* f. *salamonii* (= *S. babylonica* × *S. × fragilis* f. *vitellina*)

The following cultivars all belong under this name.

‘Aurea.’ Listed as a cultivar of *S. babylonica* with golden yellow branches by Bailey and Bailey (1976).

‘Chrysocoma’ (syn. [S. × sepulcralis](#) var. *chrysocoma*, *S. chrysocoma*, *S. alba* ‘Tristis’



Figure 8. *Salix* × *pendulina* f. *salamonii*
I.V.Belyaeva ‘Pamiati Bazhova’, Yekaterinburg,
Russia. Photo by O.Epantchintseva

misapplied; *S. alba* [unranked] *vitellina pendula* misapplied; *S. × sepulcralis* ‘Tristis’, *S. vitellina* ‘Pendula’). It is a cross of *S. babylonica* × (*S. babylonica* × *S. × fragilis* f. *vitellina*). A fast-growing weeping willow with stout branches ascending at an angle of 45° or 50° and long, steeply pendulous, golden secondary branchlets, usually reaching the ground. Both male and female flowers are present in the same catkin, or both sexes occur on the same or separate branchlets (Bean, 1980). *S.* ‘Chrysocoma’ inherited yellow stems and cold hardiness from *S. × fragilis* f. *vitellina* and the weeping habit and heat tolerance from a subtropical clone, *S. babylonica* ‘Babylon.’

This cultivar is the most common weeping willow today (it can grow even in tropical gardens), and has largely replaced all other weeping willows (<http://www.kew.org/science-conservation/plants-fungi/salix-x-sepulcralis-golden-weeping-willow> *Plants of the World Online* 2018).

‘Oeresundiana.’ Listed in Chmelař (1983) as a clone of *Salix* × *pendulina* f. *salamonii* (listed as *S. × chrysocoma*) from Scandinavia. **‘Pamyati Bazhova.’** (**Nomenclatural standard: MHA; duplicate standard: SVER.**) A tree with a large trunk and an elongate oval crown, which drops any dead branches. This cultivar was developed at the Botanic Gardens of the Ural

Branch of the Russian Academy of Sciences in Yekaterinburg, Russia. The cross of *S. alba* × *S. pendulina* f. *salamonii* (as *S. alba* × *S. alba* var. *vitellina pendula*) was made in 1960 by Shaburov (Shaburov, 1986; Belyaeva *et al.*, 1999). The cultivar name translates from Russian as “In Memory of Bazhov” – Pavel Bazhov was a Russian writer. This cultivar is very ornamental all year round. It reaches a height of 15–18 m in 40–45 years (Fig. 8).

‘Pamyati Mindovskogo.’ (Nomenclatural standard: MHA duplicate standard: SVER). A hybrid of *S. alba* × (*S. babylonica* × *S. × fragilis* [*S. alba* × *S. euxina*]) (as *S. alba* × *S. × blanda* (Belyaeva, 1999) or as *S. alba* × *S. × pendulina* (Marchenko, 2017)) with strongly pendulous branches touching the ground. It was developed at the Botanic Gardens of the Ural Branch of the Russian Academy of Sciences in Yekaterinburg, Russia; the cross was made by Shaburov in 1960 (Shaburov, 1976; Belyaeva *et al.*, 1999). Shaburov noted that while most of the seedlings that originated from this cross were green-barked, this cultivar had yellow stems that likely appeared due to the hybrid nature of one of its parents, *S. × pendulina*. Cultivar *S. ‘Pamyati Mindovskogo’* has an interesting characteristic: the upper portion of the trunk can bend so as to become almost prostrate; then a new leader stem can grow upward, creating a unique crown habit (Marchenko, 2017). This willow has mostly female flowers, but occasionally there are branches with male flowers or flowers of both sexes. *S. ‘Pamyati Mindovskogo’* is the most cold-tolerant yellow-barked weeping cultivar, being hardy to -40°C. The cultivar epithet translates as “In Memory of Mindovskiy” – Valentin Mindovskiy was a Russian agronomist and landscape architect. Listed in the Community Plant Variety Office database (<http://cpvoextranet.cpvo.europa.eu>). It is also known by the trade designation PAMIATI RAISY GORBACHEVOĬ.

‘Pamyati Shaburova.’ (Nomenclatural standard: WSY [WSY0108937!, WSY0108938!, WSY0108939!]; duplicate standards USNA [NA0102501!, NA0102502!, NA0102503!] and MHA.) A hybrid of *S. alba* × *S. × pendulina* f. *salamonii* (listed as *S. alba* × *S. × sepulcralis* var. *chrysocoma* by Marchenko (2017)) with an oval crown and strongly pendulous branches. It was developed at the Botanic Gardens of the Ural Branch of the Russian Academy of Sciences in Yekaterinburg, Russia, by Shaburov (the cross was made by Shaburov in 1960). The two original plants were grown at the Botanic Gardens of the Ural Branch of the Russian Academy of Sciences in Yekaterinburg Russia, where they were discovered in 2010 and named by Marchenko (2017). This is a very ornamental hybrid reaching 12–16 m in height at 35–40 years. Its trunk is not very straight. The branchlets are the thinnest and most graceful of all cultivars developed by Shaburov, having the most resemblance to *S. babylonica*. The leaves are very narrowly lanceolate, slightly falcate, which also makes them look similar to *S.*

babylonica (Marchenko, 2017). Catkins are male (mostly at proximal parts of branchlets), female (mostly at distal parts of branchlets) or containing flowers of both sexes. This is one of the most ornamental specimen trees developed by Shaburov representing an excellent weeping willow for northern climates. The cultivar name translates as “In Memory of Shaburov.”

‘Resistentia.’ A synonym of *S. × pendulina f. salamonii* **‘Tristis Resistentia’**.

‘Salamonii.’ This cultivar name corresponds to the epithet *S. × pendulina f. salamonii*. Bean (1980) considered this cultivar one of the most handsome and vigorous of all willows. It appeared on the property of Baron de Salamon at Manosque, France, before 1864 and was put into commerce in that country by Simon-Louis of Metz in 1869. This cultivar is less weeping than *S. babylonica*, and it forms a broad head of branches. Leaves are first pubescent, later becoming glabrous, remaining on the tree until December. Flowers are mostly female and occasionally androgynous. Bean mentioned that older weeping willows, including this cultivar, became uncommon when *S. ‘Chrysocoma’* began to spread at the end of the 19th century. Bean considers *S. ‘Salamonii’* synonymous with *S. ‘Sepulcralis.’* Santamour and McArdle (1988) quoted Elwes and Henry (1913) as saying that the young plants (only female trees known) develop pyramidal crowns with only the tips of the branches pendulous. Trees with this growth habit have been observed in the Washington, DC area.

‘Sepulcralis.’ This cultivar is less weeping than ‘Salamonii,’ often with more pronounced yellow coloration of branchlets. It originated in Romania from the hybrid of *S. × pendulina f. salamonii* ‘Vitellina-tristis’ × *S. babylonica* ‘Babylon.’

‘Tristis.’ A synonym of *S. × pendulina f. salamonii* **‘Vitellina-tristis.’**

‘Tristis Resistentia’ (syn. *S. ‘Resistentia’*). A cultivar with yellow new twigs becoming dark orange to red in winter. A selection of *S. ‘Vitellina-tristis’* that is more resistant to disease. Originated at Holstein, Germany in the 1950s (Krüssmann, 1978). This cultivar was listed by Chmelař (1983) as a new clone of *S. alba* ‘Resistentia’ that is resistant to fungal diseases, with the note that this name is invalid, being in Latin form. This cultivar is listed in a few German nursery catalogues and on some gardening websites.

‘Ural’skaya Krasavitsa.’ (Nomenclatural standard: MHA; duplicate standard: SVER). A hybrid of *S. alba* × *S. × pendulina f. salamonii* ‘Chrysocoma’ developed at the Botanic Gardens of the Ural Branch of the Russian Academy of Sciences in Yekaterinburg, Russia (the cross was made by Shaburov in 1960 as *S. alba* × *S. alba vitellina* ‘Pendula’ (Shaburov (1986) and Belyaeva *et al.* (1999); *S. alba* × *S. × sepulcralis* nothovar. *chrysocoma* (Marchenko, 2017)). It was derived from the same hybrid combination as *S. ‘Pamyati Shaburova’* only the male parent *S. × pendulina f. salamonii* ‘Chrysocoma’ was a specimen from Kiev, Ukraine, while

the male parent of ‘Pamyati Shaburova’ was a specimen from Uman, Ukraine. A female hybrid with a leader trunk and a lacy crown, with short, bright orange, pendulous branchlets. Generally, this cultivar has low rooting ability (ca. 10% success rate), but green cuttings root easily forming abundant roots at the base, where callus tissue forms. *S.* ‘Ural’skaya Krasavitsa’ is less ornamental than others of Shaburov’s selections (Marchenko, 2017). The cultivar name translates from Russian as ‘Ural’s Beauty.’

‘**Vitellina Pendula.**’ A synonym of *S.* ‘**Vitellina-tristis.**’

‘**Vitellina-tristis.**’ This epithet most likely corresponds to *S.* × *pendulina* f. *salamonii*; syn. *S. alba* var. *vitellina-tristis*; *S. alba* f. *tristis*; *S. alba* var. *tristis*, *S. alba* var. *vitellina pendula*, ‘Tristis’, *S.* ‘Vitellina Pendula.’ This is a widely grown weeping willow with yellow branches representing a selection from the hybrid taxon *S.* × *pendulina* f. *salamonii*. It is most popular in central and eastern Europe. This cultivar originated in Switzerland before 1815. *S.* ‘Vitellina-tristis’ is now superseded by *S.* × *pendulina* f. *salamonii* ‘Chrysocoma’ in much of western Europe. Often cultivated under the later name *S.* ‘Tristis.’ The name is misapplied widely to other cultivars, particularly to *S.* ‘Chrysocoma,’ which also has yellow branchlets. According to Chmelař (1983), who listed it as *S.* ‘Tristis,’ it is a widely distributed female weeping cultivar that was first noticed in France in 1815; it closely resembles *S.* × *pendulina* f. *salamonii* ‘Chrysocoma,’ but its growth is less vigorous. Older specimens of this cultivar look like younger trees of *S.* ‘Chrysocoma;’ its branches are shorter and less pendent, and it sheds leaves much earlier. This cultivar is sensitive to late frost. Almost all old trees display symptoms of fungal infestation. Krüssmann (1978) states that *S.* ‘Tristis Resistentia’ is a selection of *S.* ‘Vitellina-tristis.’

S. × *pendulina* f. *erythroflexuosa* (= *S. babylonica* f. *tortuosa* × *S. pendulina* f. *salamonii*)

The following cultivars belong under this name.

‘**Caradoc.**’ An upright cultivar with yellow or orange contorted stems (Fig. 9). In the Vermont Willow Nursery (Vermont, USA) 2017 online catalogue it is listed as *S.* × *erythroflexuosa* ‘Caradoc,’ or “yellow curly willow.” It grows 6–9 m tall and has a columnar crown if left unpruned. The foliage is contorted, bright green. This cultivar is less prone to die back than other twisted willows. Listed in the Community Plant Variety Office database (<http://cpvoextranet.cpvo.europa.eu>) as registered by the Kolster BV in 1996; published in the *Plantscope data—Origin Floricode*.



Figure 9. *Salix* × *pendulina* f. *erythroflexuosa* I.V.Belyaeva ‘Erythroflexuosa’ in the Alter Botanischer Garten Hamburg (Old Botanical Garden Hamburg), Germany. This cultivar has semi-pendulous orange-red contorted stems. Photo by A.M.Marchenko

‘Erythroflexuosa’ (syn. *S.* × *erythroflexuosa*, **nom. inval.**, *S.* × *sepulcralis* ‘Erythroflexuosa’). This epithet corresponds to *S.* × *pendulina* f. *erythroflexuosa*. This is a cultivar similar in appearance to *S. babylonica* ‘Tortuosa’, but with widely arching branches, golden-orange bark and twigs and leaves crispate and twisted (Ragonese and Alberti

1961) (Fig. 9). It is listed by Krüssmann (1984) as *S.* × *erythroflexuosa* (as *S. alba* ‘Tristis’ × *S. babylonica* (as *S. matsudana* Koidz. ‘Tortuosa’). According to Krüssmann, this cultivar was discovered in Argentina between 1958 and 1971 and brought into trade by the Beardslee Nursery, Perry, Ohio, USA, in 1972. According to Chmelař (1983), this cross was made in Argentina in 1961, and was first distributed by the Brno Arboretum, Czechoslovakia; in 1972 some nurseries in the United States distributed it as *S. matsudana* ‘Tortuosa Aurea Pendula’. According to the Vermont Willow Nursery (Vermont, USA) 2017 online catalogue, *S.* × *erythroflexuosa*, or “scarlet curly willow” is a male selection. This cultivar grows 3.6–4.6 m tall and is much brighter scarlet in winter than SCARLET CURLS (‘Scarcuzam’).

‘Golden Curls’. A golden-leaved willow, according to Santamour and McArdle (1988), who also report that this selection was listed for the first time by Girards Nursery (Geneva, Ohio, USA) in their 1976 Catalogue (p. 29) as *S. tortuosa* [unranked] *aurea pendula*, a new selection introduced by Charles Beardsley for the first time that year. It had been grown for four years prior to this date. Santamour and McArdle (1988) mistakenly list this cultivar as a “golden-leaved” willow. According to Wandell (1989), this is a golden-barked tree with multiple twisting “corkscrew” trunks, reaching 7.6 m tall and 6 m wide. It has slightly tortuous semi-pendulous branches and somewhat curled leaves; most often a shrub, though it can be a small tree (Dirr 2009). Dirr suggested that it should be correctly listed as *S.* ‘Erythroflexuosa’. According to M. Dodge (pers. comm.), the stems of this cultivar are very contorted, not just “slightly” tortuous, and this selection is different from *S.* ‘Erythroflexuosa’ because its stems

are not as red; it is also more weeping than other willows with contorted stems. All plants cultivated in the USA have green leaves.

‘Golden Spiral.’ A fast-growing cultivar with stems that are light yellow in summer turning rich golden orange in winter. Possibly a spontaneous hybrid of *S. babylonica* ‘Tortuosa’ × *S. × pendulina* f. *salamonii* ‘Vitellina-tristis’ (listed by Schmidt (1992) as *S. matsudana* ‘Tortuosa’ and *S. alba* ‘Tristis’) found as a seedling near Lake Velencei, Hungary (Schmidt, 1992).

‘Scarcuzam.’ This patented selection from the Lake County Nursery (Perry, Ohio, USA) is frequently sold under its trademark name SCARLET CURLS. It reaches 9 m in height and 4.5 m in diameter and has bright red corkscrew branches and unique curly leaves. The stem colour intensifies with the first frost and cold weather. Dirr (2009) noted that this cultivar, which he lists under *S. × erythroflexuosa* is less hardy than *S.* ‘Golden Curls.’

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