



## Article

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**Nomenclatural and taxonomic notes on some *Salix* L. (Salicaceae) from China**Alisa E. Grabovskaya-Borodina,<sup>1\*</sup> Ivan V. Tatanov,<sup>1</sup> and Irina V. Belyaeva<sup>2,3</sup><sup>1</sup>Komarov Botanical Institute, RAS, St Petersburg, Professor Popov str. 2., 197022, Russian Federation<sup>2</sup>Royal Botanic Gardens, Kew, Richmond, TW9 3AE, UK<sup>3</sup>Institute Botanic Garden, RAS, 8 Marta str., 202A, Yekaterinburg, 620144, Russian Federation\*Corresponding author. E-mail: [agrabovskaya@binran.ru](mailto:agrabovskaya@binran.ru)

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**Abstract**

During the preparation of a catalogue of type specimens for Chinese plants deposited at LE, the taxonomic status and synonymy of *Salix araeostachya* C.K.Schneid., *S. cantoniensis* Hance, *S. fargesii* Burkill, *S. henryi* Burkill, *S. heterochroma* Seemen, *S. heteromera* Hand.-Mazz. and *S. paraplesia* C.K.Schneid. were clarified and the names were typified where necessary. The original collections of these willows were discussed in connection to the historical circumstances of their authors and collectors.

**Keywords:** catalogue of type specimens, China, historical collections, Burkill, Farges, Hance, Handel-Mazzetti, Henry, Sampson, Schneider, Seemen, Wilson, plant collectors, *Salix*, Salicaceae, typification

**Introduction**

This work is part of the continuing projects of preparing a new edition of the catalogue of type specimens for Chinese plants deposited at LE (Herbarium codes follow Thiers, 2022+) by A.E. Grabovskaya-Borodina and I.V. Tatanov and compiling the *World Checklist of Salicaceae sensu stricto* (Belyaeva and Govaerts, 2022). In earlier publications arising from these projects, Popova (2000) presented information on *Salix serrulatifolia* E.L.Wolf, described from China, and then Raenko (2010) reported on another four willows, also from China, *S. hainanica* A.K.Skvortsov, *S. hirticaulis* Hand.-Mazz., *S. tetradenia* Hand.-Mazz. and *S. wilsonii* Seemen ex Diels. Later Grabovskaya-Borodina *et al.* (2020) discussed the taxonomy and nomenclature of four willows described from Korea, *S. blinii* H.Lév., *S. hallaisanensis* H.Lév., *S. hallaisanensis* H.Lév. var. *nervosa* H.Lév. and *S. maximoviczii* Kom.

Currently there are 350–520 species of *Salix* (Heywood *et al.*, 2006; Argus *et al.*, 2010; Belyaeva & Govaerts, 2022) worldwide and 275 species were listed in the latest Flora of China (Fang *et al.*, 1999).

Whilst cataloguing herbarium collections at LE the authors of the current paper came across herbarium specimens that were mentioned in the protologues and belong to the original material of seven willows described from Eastern China: *S. araeostachya* C.K.Schneid., *S. cantoniensis* Hance, *S. fargesii* Burkill, *S. henryi* Burkill, *S. heterochroma* Seemen, *S. heteromera* Hand.-Mazz. and *S. paraplesia* C.K.Schneid., for which typification and clarification of their taxonomic status and synonymy were needed.

## Material and Methods

Herbarium specimens were studied at A, BM, E, GH, K, LE, NY, **P**, S, **US**, WU (Herbaria codes in bold indicate that only digitized specimens were seen via *JSTOR Global Plants* [JSTOR, 2022+], *Global Biodiversity Information Facility* [GBIF, 2022+] and Virtual Herbaria [2022+]). Accepted names (in bold) and synonymy follow Belyaeva and Govaerts (2022) and *Plants of the World Online* (POWO, 2022+). Abbreviated authors of the names and periodicals are cited as in the *International Plant Names Index* (IPNI, 2022+). Names of collectors are given as in *Index of Botanists* (2013+). Typification of the names follows the *International Code of Nomenclature of Algae, Fungi and Plants* (ICN, Turland *et al.*, 2018). Here we accept the terminology discussed by Dyachenko (2017) and use the terms ‘male’ and ‘female’, rather than ‘staminate’ and ‘pistillate’, for flowers, catkins and plants. Distribution data are provided as recommended in the *World Geographical Scheme for Recording Plant Distribution* (Brummitt, 2001) and further updates on the website of the *Taxonomic Database Working Group* (TDWG, 2022+). The handwriting of collectors and authors of taxa included in the current paper were compared with the collection of letters and other historical documents in the Botany Department of the Natural History Museum, London.

## Historical background

Decisions concerning typification and taxonomic status should be made with an understanding of the methods the authors of taxa were using, as recommended in the ICN (Turland *et al.*, 2018, Rec. 9A.1). Authors of the scientific names were often the collectors, but in many cases, the scientific names were published based on the herbarium material collected by other botanists.

China is a vast country and there have been many botanists and plant collectors wandering the country over the centuries and yet, strangely, in the history of plant collecting in China a pattern emerges in the way that people, plants and places fall into the correct order (Cox, 1945).

One of the early explorers of China was the British diplomat, **Henry Fletcher Hance**, who devoted his spare time to the study of Chinese plants while working in China. He was appointed to Hong Kong in 1844 and later became vice-consul to Whampoa (Guangzhou), then consul to Canton (Guangzhou), and finally consul to Xiamen (Fujian), where he died in 1886. In these capacities he assisted many Europeans visiting the area, including botanists and other scientists. Botanical material from the *HMS Herald* expedition (1846–1851) was sent back to Britain and George Bentham studied these and further collections, writing a large flora of Hong Kong to which Hance no doubt contributed material and observations. However, Hance later felt compelled to write a substantial supplement including cryptogamic plants. Hance corresponded with researchers, including Charles Darwin (1863–1868), who were based in Europe and were studying material from Asia, on subjects as varied as botany and the origin and early domestication of the goldfish. He graduated as Doctor of Philosophy at Giessen, Germany, in 1849 and became a Fellow of the Linnean Society of London in 1878 (Forbes, 1887; Bretschneider, 1880, 1898; Cox, 1945; Desmond, 1994: 313–314). According to IPNI (2022+) he described numerous plant taxa including three willows, one of which was *Salix cantoniensis* and is a subject of this research. Jackson (1901: 29) wrote that there are 614 specimens stored at Kew Herbarium that were collected by Hance between 1848 and 1888 in China. Forbes (1887: 6) described Hance’s work as “thorough and painstaking in the highest degree, and it bore worthy fruit, not only in the accuracy of his statements, but in a wealth of references and illustrations that was simply marvellous.” Forbes (1887: 7–8) pointed out that all Hance’s specimens were treated with poison, mounted and carefully arranged by himself as he had no assistant for herbarium work. After Hance’s death in 1887, as specified in his Will, 22,437 specimens from his private collections were donated to the Natural History Museum in London. They are generally annotated by the label 'HERB. H. F. HANCE. Recd. 1887' and include material from several other collectors (Murray, 1904: 153).

Three taxa included in this research, *Salix fargesii*, *S. henryi*, and *S. heterochroma*, were described by different authors at different times, all based on the specimens collected in Central China by the Irish botanist and collector **Augustine Henry** and by the French missionary and naturalist, **Rev. Père Paul Guillaume Farges**.

Farges travelled to China in 1867, and from 1892 to 1903 he collected plants in Tchen-keou-tin in NE Szechuan [Sichuan] and preserved over 4,000 during that time (Bretschneider, 1898: 922–923; Cox, 1945). He sent his herbarium specimens to France. The area of his exploration included the Ta-pa-shan [Daba Shan] in Sichuan, which was not as rich botanically as North-West Yunnan but, being more isolated, contained “more specific flora, in particular,

trees and shrubs” (Cox, 1945). According to Cox (1945) Farges was still collecting and identifying plants in China in the 1890s during which time E.H. Wilson was also in the area where he collected many of the plants discovered by Farges and introduced some into Europe.

Customs official and avid botanist, Augustine Henry, was also collecting plants in China in the 1890s as well as in the previous decade. He sent 15,000 plant specimens to the Royal Botanic Gardens at Kew, England and 3,090 were purchased by the British Museum, London, between 1891 and 1895 (Murray, 1904: 155). Unlike other collectors of that time Henry published little about his important work in Central China between the years 1882 and 1889 (Sargent, 1913; 1916; Morley, 1979). According to *Augustine Henry and Evelyn Gleason Papers* (1879–1928) “Henry's first posting was in Shanghai, but in March 1882 he was assigned to Ichang [Yichang], a port on the Yangtze [Yangzi] River more than 900 miles inland in Hupeh [Hubei] province. There he served as the assistant medical officer and also performed customs duties. Bored by the routine of life within the small European community, Henry began collecting plants in the vicinity of Ichang in November 1884. Four months later he contacted the Royal Botanic Gardens, Kew, offering to collect specimens and seeking assistance with identification. As a result, Henry became one of the most important botanical collectors to have worked in Central China, although he regarded this work as a hobby. He collected specimens on two long field trips in the Hupeh–Szechwan [Hubei–Sichuan] region and also paid native collectors for specimens. During the next four years he accumulated a vast collection of pressed, dried specimens; the first set is preserved at Kew.” In his own paper *Mr. A. Henry's collection of Chinese plants* (Henry, 1902) the author describes “his best herbarium series representing the Chinese flora,” and writes that “the greater part of this herbarium was gathered and dried by Mr. Henry himself and natives working under his direction.” Henry's collections were made in four regions: Central China (Hubei), Hainan, Formosa (now Taiwan), Sichuan and Yunnan. All herbarium specimens were annotated by Henry with the name of the place where the plants were collected. The specimens at Kew Gardens also include original labels with numbers. He describes his collection as “a duplicate of sets presented at various times to Kew; and while not so extensive, is of great value, as containing numerous type specimens of new species” (Henry, 1902: 51). According to a publication by Nelson (1983), between November 1884 and February 1889 Henry discovered ca. 500 species new to Western scientists, representing 25 new genera and a new family, Trapellaceae, represented by the species *Trapella sinensis* Oliv. Henry spent almost twenty years in remote districts of China (Wilson, 1905a). He and his native helpers acquired over 15,800 collection numbers. In each gathering there were an average of 10 specimens and, thus, a total of ca 160,000 herbarium

specimens were distributed by Henry around the world's herbaria that were mentioned by Stafleu and Cowan (1976–1988, connected to the names of I.H. Burkill and C.K. Schneider) and by Holway (2018: 7).

Henry became acquainted with another great plant collector, *Ernest Henry Wilson*, during that time (Wilson 1905a; Bretschneider, 1898; Komarov, 1908; Cox, 1945). Wilson's plant collecting in China was described in detail by Tatiana M. Holway (2018). He travelled through Southern, Central and Western China. According to Holway (2018: 3) Wilson arrived in Central China in 1900 to collect plants "on behalf of James Veitch & Sons' and was only the third commercial collector from Great Britain to make any inroads into the forbidden kingdom throughout the whole of the nineteenth century." At that time Wilson was employed at Kew Gardens and before going to China he studied Henry's collection of specimens at Kew. By the time he completed his second expedition for Veitch in 1905, Wilson was by far the most prolific collector ever. With a haul of over eighteen hundred species of hardy flora, he obtained more plants for the British Isles than were native there. Wilson went back to China twice more (1907–1909 and 1910–1911) as a collector employed by the Arnold Arboretum (Boston, Massachusetts, U.S.A.) and came back with specimens of over one thousand species, of which hundreds were unknown in the West. Having learned from the experienced plant hunter Augustine Henry, Wilson was working for C.S. Sargent in the Arnold Arboretum, although, being a member of the Kew Guild, he always proudly identified himself as a 'Kewite' regardless of who he was employed by at the time. Unfortunately, the authors of this paper could not find any information about how Wilson annotated his herbarium specimens (Wilson, 1903; 1905a, b; Sargent, 1913; 1916; Cox, 1945; Holway, 2018). While describing Chinese flora in his paper *Wandering in China*, Wilson (1905a) mentioned that he collected more than 70 species of ferns in one day, which shows its richness. However, he did not mention any willows, although he collected specimens and cuttings of 30 species, including 2 varieties of one of them, that were later described by Schneider (Liu *et al.*, 2020). Specimens and their duplicates collected by Wilson are in several herbaria around the world (Stafleu and Cowan, 1976–1988).

A comprehensive taxonomic work on the plants collected by E.H. Wilson in 1900–1911 was undertaken by *Camillo Karl Schneider* who was trained as a gardener, working in Zeitz, Dresden, Greifswald, Berlin and Darmstadt, before moving to Vienna in 1900 to receive further training from Richard von Wettstein. His first book was published in 1904 (the first volume of a handbook of broad-leaved trees). Serving as general secretary and traveller for the Austro-Hungarian Dendrological Society, Schneider conducted an expedition in the Balkan Peninsula and the Caucasus in 1907–1908. He was then financed by the Society to collect plants in

western China for the Průhonice Botanical Garden, accompanied by the botanist Heinrich Handel-Mazzetti. Schneider went on to publish the series “Arbores Fruticesque Chinenses Novi” in the *Botanical Gazette* in 1917. In 1915 Schneider left Shanghai for Boston in the U.S.A. and worked at the Arnold Arboretum, returning to Vienna four years later. During that period, he published his taxonomic treatment on Salicaceae in Sargent’s *Plantae Wilsonianae* (Schneider, 1916).

Later (1914–1919), the Austrian botanist *Heinrich Freiherr von Handel-Mazzetti* explored the flora in China (Stafleu and Cowan, 1976–1988). He was invited to travel together with Camillo Schneider, who was at that time General Secretary of the Austro-Hungarian Dendrological Society, from Tonkin (Vietnam) to Yunnan for one year and then, during the First World War, he continued his work and was collecting plants alone for three years in Yunnan and at Irrawadi (Myanmar) and Muli (South-West Sichuan) (Just, 1942). In 1917 he travelled through Kweichou [Guizhou] to Hunan and continued botanising during the summer of 1918. He used the opportunity to make extensive collections in Yunnan, southern Sichuan, Guizhou, Hunan and Upper Myanmar that numbered ca. 13100, including Cryptogams, by the time he returned to Vienna. The results of his botanical research were published as a series under the title “Symbolae Sinicae” from 1929 (Janchen, 1940). An account of his travels, including his itinerary, was published under the title “Naturbilder aus Südwest China” (Handel-Mazzetti, 1927) and translated into English by David Winstanley (1996). Handel-Mazzetti’s findings from Hunan and Yunnan are particularly significant. After he returned home in 1919 his specimens were sent to Vienna and arrived only in 1922. It was a very large collection of over 13,000 herbarium specimens, comprising 8,015 species, 1,307 of which were new, together with 35 new genera (Walker, 1998). His specimens were distributed to different herbaria (Stafleu and Cowan, 1976–1988) and his work was recognized in his home country and abroad. He was made an Honorary Member of the Royal Horticultural Society of London and of the Botanical Society of Edinburgh. He also became a corresponding member of the Botanical Society of Geneva and of the Viennese Academy of Sciences (Janchen, 1940; Just, 1942).

### **Nomenclature and taxonomy**

All willows included in this research are arranged below in chronological order according to the dates when their names were published. The first is *Salix cantoniensis* the description of which, by H.F. Hance, was based on the herbarium specimens collected by his co-collector, G.T. Sampson, whose specimens were sent to Britain, stored at Kew Gardens

(Jackson, 1901: 58) and the Natural History Museum (Forbes, 1887), and from there distributed to other herbaria.

*Salix* × *cantoniensis* Hance, [J. Bot. 6 \(62\): 48. 1868](#) (Fig. 1).

(*S. babylonica* L. × *S. tetrasperma* Roxb.)

**Type:** Southeastern China, Guandong, Canton [Guangzhou], in the delta of the River Canton, II.1867, *Sampson 13757*, ♂ ([K000335162!](#) – lectotype, **designated here** by I.V.Belyaeva; isolectotypes: [GH00303919!](#), [K000335556!](#), [LE01013773!](#), [LE01013774!](#), [P00760943!](#), [P00760945!](#)).

**Protologue citation:** “Ad rivulorum margines in delta fl. Cantoniensis, certe spontaneam, m. Februario 1867, collegit Sampson. (Exsicc. n. 13757.)”.

**Note:** Specimens located in K, GH, LE and P that belong to the original material and listed above are syntypes according to Art. 9.6 of the ICN (Turland *et al.*, 2018). All specimens contain fragments of twigs with male flowers, belong to the same taxon, correspond to the protologue and are part of the single gathering under number 13757 collected by Sampson in February 1867. The specimen K000335162 was annotated by Hance, the original label written by Sampson, is in good condition and selected here as the lectotype. There are specimens collected by Sampson in *locus classicus* and distributed by Hance to other herbaria after he published the name *Salix cantoniensis*. These specimens, K000335556, LE01013774, P00760943, P00760945, have labels written by Hance and the date on the labels is the date of sending them by Hance, not the date of their collection by Sampson. Thus, these specimens belong to the original material and after lectotypification become isolectotypes.

In the protologue Hance wrote: “It is to be regretted that Mr. Sampson did not meet with female of this tree”. Schneider (1916: 42) synonymised *S. cantoniensis* with *S. babylonica* with a question mark and he, in the distribution information for *S. babylonica*, included herbarium specimen 13757 collected by Sampson in February 1867 which Hance had used for his description of *S. cantoniensis*. The authors of the current paper believe that *S. cantoniensis* is a hybrid between *S. babylonica* and *S. tetrasperma* Roxb., that according to Hance (1868: 49) were cultivated in *locus classicus* at that time. There are specimens of *S. babylonica* with male catkins collected by Sampson in Canton at K (K000335557) and its duplicate at BM, both have the same original label handwritten by Sampson “Canton, March 1885. A commonly planted tree”. The specimen at BM has an additional original label by the same hand “Herb: 646. *Salix babylonica*, L.”. Specimens of *S. cantoniensis* were compared to specimens of *S. babylonica* collected by Sampson. *S. cantoniensis* has buds similar to *S. babylonica* but the



Figure 1. Isolectotype of *Salix cantoniensis* Hance (<http://species.keew.org/herbarium/K000335556>)



buds of the former have bud-scale margins overlapping adaxially, the buds of the latter having connate bud-scale margins. This feature is a usual character for willows from the section *Humboldtianae* Pax. which *S. tetrasperma* does not belong to. Another feature that distinguishes *S. cantoniensis* from *S. babylonica* is the number of stamens in a single flower: the former has 2–7 stamens in each flower, similarly to *S. tetrasperma*, the latter only two stamens in each flower. The remaining characteristics of *S. cantoniensis* are intermediate although leaf serration and length of catkins have more similarity to *S. babylonica* than to *S. tetrasperma*.

Soon after herbarium specimens collected by A. Henry were available for other European botanists, two willows were described based on his herbarium from South-Central China. The first one, *Salix heterochroma*, was published by **Karl Otto von Seemen**, a German botanist who specialised in *Salix* and worked in the Botanical Museum in Berlin (Stafleu and Cowan, 1976–1988). The second willow, *S. henryi*, was described three years later by British botanist, **Isaac Henry Burkill**, who was appointed to the herbarium staff at the Royal Botanic Gardens, Kew in 1897 (Holtum, 1965). It is remarkable that Seemen and Burkill mentioned in the protologues of the two described willows the same herbarium specimens collected by Henry in Central China (see below).

*Salix heterochroma* Seemen, [Bot. Jahrb. Syst. 21, Beibl. 53: 56. 1896](#) ≡ *Salix henryi* Burkill, [J. Linn. Soc., Bot. 26, 178: 530. 1899](#) (Figs. 2–4).

**Type:** South-Central China, Sichuan [S. Wuchan], s.d. [1885–1888], A. Henry 5671, ♀, fr. (K000335552! – lectotype, **designated here** by I.V.Belyaeva; isolectotypes: [BM00958026!](#), [GH00031170!](#), [LE01042566!](#), [P00761029!](#), [US801258!](#)). Syntypes: South-Central China, Hubei, Chiensih, s.d. [1885–1888], A. Henry 5843, ♀, fr. (K000335553!, [LE01042567!](#), [US801381!](#)); South-Central China, Hubei, Chiensih, s.d. [1885–1888], A. Henry 5349, ♀ (K000335554!, [LE01042568!](#)); South-Central China, Sichuan, Tchen-keou-tin, s.d., *Farges s.n.*, ♀, fr. ([P00761030!](#), [P00761031!](#), [P00761032!](#)).

**Protologue citation** for *S. heterochroma*: “Central-China, Prov. Hupeh (Dr. Aug. Henry’s Collections from Central-China, 1885—88. № 5671, 5843).”

**Protologue citation** for *S. henryi*: “Chiensih (A. Henry, 5349, 5843!); Sechuen: South Wushan (A Henry, 5671!), Tchenkeoutin (Farges!) Mus. Brit.; Herb. Kew.; Mus. Paris.”

**Note:** Fourteen specimens located in different herbaria belong to the original material and are cited above. Specimens from Henry’s collection, 5671 and 5843, were seen and cited by



Figure 2. Lectotype of *Salix heteromera* Seemen and *S. henryi* Burkill  
<http://species.kew.org/herbarium/K000335552>



Figure 3. Syntype of *Salix heteromera* Seemen and *S. henryi* Burkhill  
<http://species.kew.org/herbarium/K000335553>



Figure 4. Syntype of *Salix henryi* Burkill (<http://species.kew.org/herbarium/K000335554>)

Seemen in the protologue of *S. heterochroma* and by Burkill in the protologue of *S. henryi*. However, Seemen had not seen the original specimens collected by Henry and stored at K with original numbers and the correct annotation of place of collection. For this reason, he cited in his protologue as location ‘Hupeh’ [Hubei] as it had appeared on some of the printed labels on duplicates sent from Kew to other herbaria although this was not correct. All specimens under these two numbers belong to the same taxon and correspond to the original descriptions of *S. heterochroma* by Seemen and *S. henryi* by Burkill. Herbarium specimens with Henry’s original labels that included numbers and annotations were sent by Henry to K, duplicates with typographical labels being distributed to other herbaria (Henry, 1902). However, the specimen P00761029 has two labels on the herbarium sheet, the one at lower left is the original by Henry but the label on the right was printed at the Museum in P and has incorrect information about the locality of collection. As specimens at B which were seen by Seemen were destroyed during the Second World War, we selected here specimen K000335552 as the lectotype, and thus, *S. heterochroma* and *S. henryi* became nomenclatural synonyms by lectotypification. Burkill also cited in his protologue specimens collected by Farges which he saw in P. However, the species name, *S. henryi*, suggests the author’s first choice of specimens for his description and also choice of the lectotype by the authors of this paper.

In the same publication Burkill (1889) described another species, *Salix fargesii*, which is also a subject of the current research. This ornamental willow was for a long time cultivated around the world under the incorrectly applied name *S. moupinensis* Franch. Burkill described his new willow, *S. fargesii*, using specimens collected by A. Henry and R.P. Farges and named it after the latter.

***Salix fargesii*** Burkill, [J. Linn. Soc., Bot. 26, 178: 528. 1899.](#)

**Type:** South-Central China, Sichuan, Tchen-keou-tin, s.d., *R.P. Farges* 795, ♂, ([P00761008!](#) – lectotype, **designated here** by I.V.Belyaeva; isolectotypes: [K000335218!](#), [P00761009!](#), [US00503603!](#)). South-Central China, Sichuan [S. Wuchan], s.d. [1885–1888], *A. Henry* 5678, ♀, fr. ([K000335216!](#) – epitype, **designated here** by I.V.Belyaeva; isoepitypes: [GH00055823!](#), [LE01031067!](#), [P00761006!](#)). Syntypes: South-Central China, Sichuan, Tchen-keou-tin, s.d., *R.P. Farges* 795, ♀, fr. ([P00761007!](#)); South-Central China, Sichuan, Tchen-keou-tin, s.d., *Farges s.n.*, ♀ ([K000335217!](#)).

**Protologue citation:** “Szechuen: South Wushan (A. Henry, 5678!), Tchenkeoutin (Farges, 795!). Mus. Brit.; Herb. Kew.; Mus. Paris.”

**Note:** Ten specimens in different herbaria belong to the original material as listed above, they are syntypes according to Art. 9.6 of the ICN (Turland *et al.*, 2018). There are two series of duplicates cited in the protologue: one is a single gathering under number 795 by R.P. Farges (fragments of twigs with male catkins) and the other is a single gathering under number 5678 by A. Henry (fragments of twigs with female catkins), for a definition of a single gathering see Art. 8.2, footnote 2 of the ICN (Turland *et al.*, 2018). There is a specimen, P00761007, which was numbered as 795 but has a fragment with female catkins. Specimen, K000335217, has also fragments with female catkins but at a different stage of development from fragments of specimen P00761007 but the collector's number is missing, and it is not clear to which gathering it belongs. All specimens represent one taxon, *Salix fargesii*, and all fragments in each gathering were collected at the same stage of development. Herbarium specimen P00761008 selected here as the lectotype contains two fragments with male catkins but does not demonstrate all the characteristics of this taxon that are important for identification. Thus, the epitype, K000335216, a specimen with female catkins was chosen here in accordance with Art. 9.9, Ex. 10 of the ICN (Turland *et al.*, 2018) to support the selected lectotype. Specimens selected here as the lectotype and epitype were seen and annotated by I. H. Burkill and are in good condition.

Another two willows, *Salix araeostachya* and *S. paraplesia*, included in this research were described by C.K. Schneider who used specimens collected by Henry and Wilson respectively. Although Schneider annotated specimens of certain gatherings as “types”, he did not mention in his publication (1916) in which Institution these “types” were located. Thus, all specimens of the same gathering are syntypes according to Art. 9.6 of the ICN (Turland *et al.*, 2018). Sargent (1916: vi) mentioned in his *Plantae Wilsonianae* that “the herbarium staff of the Arboretum, consisting of Messrs. Rehder, Wilson, Shaw and Schneider, have been assisted in this work by a number of European specialists,” following which information the authors of the current paper assume that all data given by Schneider in the protologues were thoroughly checked by Wilson himself.

*Salix araeostachya* C.K.Schneid., [Pl. Wilson. \(C.S.Sargent\) 3, 1: 96. 1916](#) (Figs. 5–7).

**Type:** South-Central China, Yunnan, Mengze, 1800 m [5000'], s.d., A. Henry 9338, ♂ ([A00031149!](#) – lectotype, **designated here** by I.V.Belyaeva; isolectotype: K000335550!). South-Central China, Yunnan, Mengze, 1600 m [4600'], s.d., A. Henry 9338d, ♀, fr. ([K000335549!](#) – epitype, **designated here** by I.V.Belyaeva; isoeptypes: [A00055786!](#), [E00301542!](#), [LE01042570!](#), [S13-9624!](#)). Syntypes: South-Central China, Yunnan, Mengze,



Figure 5. Isolectotype of *Salix araeostachya* C.K.Schneid. (<http://species.kew.org/herbarium/K000335550>)



Figure 6. Epitype of *Salix araeostachya* C.K.Schneid. (<http://species.kew.org/herbarium/K000335549>)



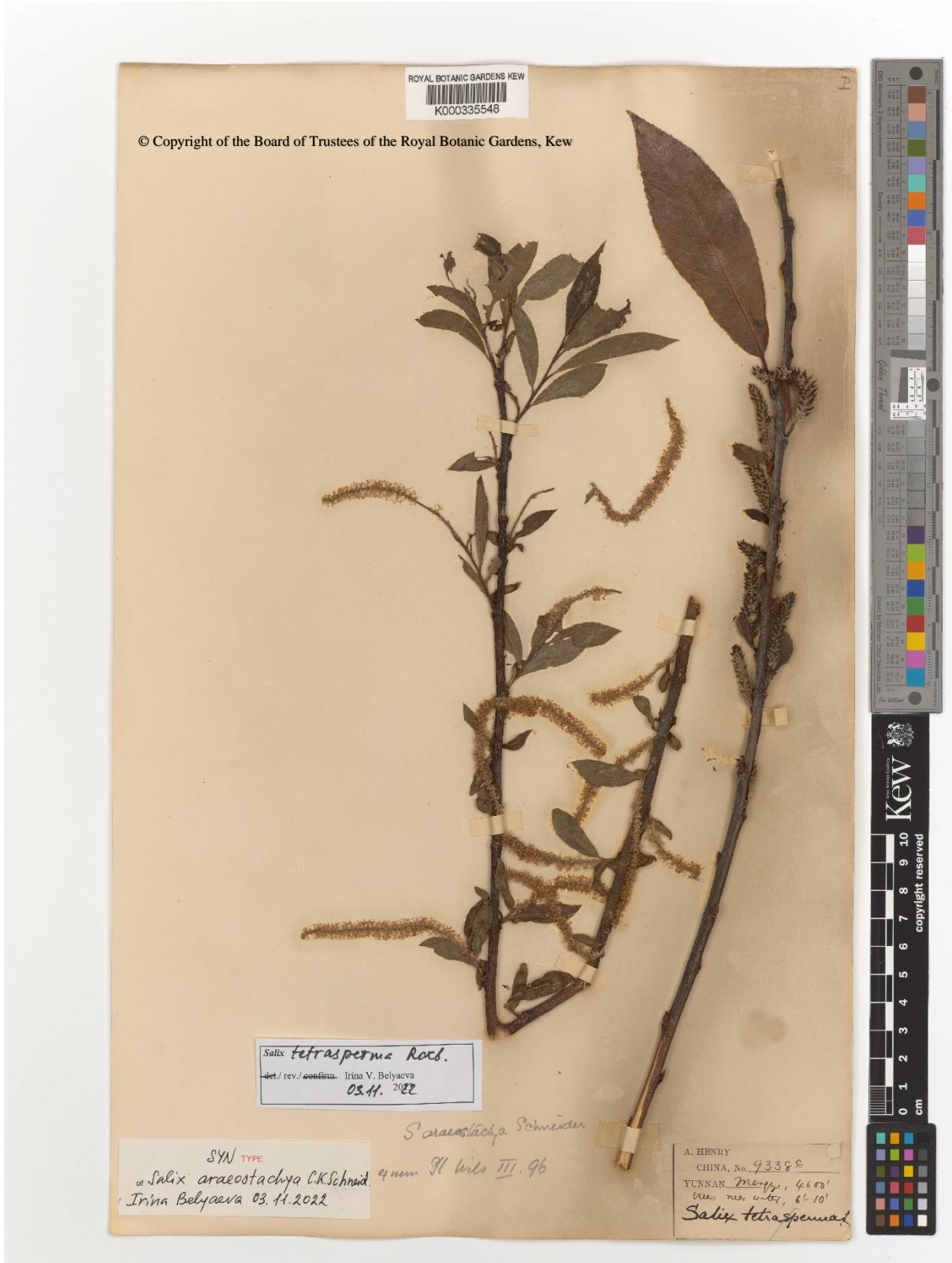


Figure 7. Syntype of *Salix araeostachya* C.K.Schneid. (<http://species.kew.org/herbarium/K000335548>)

near water 1600 m [4600´], s.d., *A. Henry* 9338c, ♀, ♂ ([A00031148!](#), [E00301541!](#), K000335548!, [LE01042569!](#)); South-Central China, Yunnan, Mengze, southeastern mountain forest, 1800 m [5000´], s.d., *A. Henry* 11250, ♀ ([LE01042571!](#)). Not mentioned in the protologue specimens that are part of the original material: South-Central China, Yunnan, Mengze, 1800 m [5000´], s.d., *A. Henry* 9338, ♀ (K000335551!); South-Central China, Yunnan, Mengze, 1600 m [4600´], s.d., *A. Henry* 9338A, ♀ ([E00301540!](#)); South-Central China, Yunnan, Mengze, 1600 m [4600´], s.d., *A. Henry* 9338B, ♂ ([E00301539!](#), [US00105051!](#)).

**Protologue citation:** “China. Yunnan: Mengtsze, alt. 1800 m., *A. Henry* (№ 9338, type ♂; tree 6.5 m. tall); same locality, alt. 1600 m., near water, *A. Henry* (№ 9338c, ♀ co-type, 9338d; tree 1.5—3.5 m. tall; with fruits); same locality, southeastern mountain forests, alt. 18000 m., *A. Henry* (№ 11250; tree 3 m. tall; ♀).”

**Note:** Sixteen specimens in different herbaria that belong to the original material are listed above. They are syntypes, that belong to the same taxon and correspond to the protologue. Duplicates of specimens collected in three different locations under numbers 9338 (male and female plants at elevation 1800m [5000´]), 9338c (male plant at elevation 1600 m [4600´]), 9338d (female plant with fruits at elevation 1600 m [4600´]) and 11250 (female plants with immature capsules at elevation 1800 m [5000´]). Specimens at A were seen and annotated by Schneider, one of which, A00031149 (three fragments with leaves and male catkins mounted on the same sheet), is labelled as “type,” the other specimens from this gathering are male (K000335550) and female (K000335551) fragments mounted on the same herbarium sheet. Obviously, Schneider has seen only specimens with male catkins from this gathering stored at A and, because of this, did not mention female fragments of this gathering in the protologue. Herbarium specimen A00031149 selected here as the lectotype contains fragments with male catkins and does not demonstrate all the characteristics that are important for identification of this taxon. Thus, the epitype, K000335549, a specimen with female fruiting catkins is chosen here in accordance with Art. 9.9, Ex. 10 of the ICN (Turland *et al.*, 2018) to support the selected lectotype.

*Salix araeostachya* is a synonym of *S. tetrasperma* Roxb. Pl. Coromandel 1(4): 66, t. 97. 1798 according to Belyaeva and Govaerts (2022) and POWO (2022+).

***Salix paraplesia*** C.K.Schneid., [Pl. Wilson. \(C.S.Sargent\) 3, 1: 40. 1916.](#)

**Type:** South-Central China, Sichuan, mountains west of Tachien-lu [Kangding], 2700–4100 m [9,000´–13,500´], 8.VI.1904, *E.H. Wilson* 4518, ♂ ([A00031190!](#) – lectotype, **designated**

here by I.V.Belyaeva; isolectotypes: [A00031191!](#), [K000335184!](#)). South-Central China, Sichuan, mountains west of Tachien-lu [Kangding], 3200–3700 m [10,500′–12,300′], 1.IX.1903, *E.H. Wilson 4518*, ♀, fr. ([LE01031069!](#) – epitype, **designated here** by I.V.Belyaeva). Syntypes: South-Central China, Sichuan, mountains west of Tachien-lu [Kangding], 2700–3900 m [9,000′–13,000′], IX.1904, *E.H. Wilson 4518<sup>a</sup>*, ♀, fr. ([A00031191!](#), [K000335185!](#))

**Protologue citation:** “Western Szech’uan: mountains west of Tachien-lu, alt. 2600—3800 m., June 1904 (№ 4518, type; tree 6—7 m. tall; ♂); same locality, September 1904 (№ 4518<sup>a</sup>; with fruits)”.

**Note:** Five specimens in different herbaria belong to the original material. One specimen, LE01031069, that was not mentioned in the protologue was collected at the same place in a different year, has the original label by Wilson and was annotated by someone as *Salix paraplesia*. All specimens are listed above, they belong to the same taxon and correspond to the protologue. Duplicates of specimens belong to two gatherings collected at different times, but in the same location are cited in the protologue under numbers 4518 (male plants collected in June 1904) and 4518<sup>a</sup> (female plants with fruits collected in September 1904). The original labels were written by Wilson. It is very difficult to read his numbers, as he has written numbers ‘3’ and ‘5’ in the same style. Specimens at A were seen and annotated by Schneider, one of which, A00031190 (a fragment with young leaves and male catkins), was annotated by someone in pencil as “type”, the other specimens from this gathering, A00031191, K000335184, K000335185, have male and female fragments mounted on the same herbarium sheet. Schneider saw and annotated only specimens at A. Herbarium specimen A00031190 selected here as the lectotype contains a fragment with male catkins and leaves but does not demonstrate all the characteristics of this taxon that are important for its identification. Thus, the epitype, LE01031069, a specimen with female fruiting catkins was chosen here in accordance with Art. 9.9, Ex. 10 of the ICN (Turland *et al.*, 2018) to support the selected lectotype.

*Salix heteromera* Hand.-Mazz., [Symb. Sin. 7\(1\): 61, pl. 1, f. 1, 2. 1929.](#)

(*S. babylonica* L. × *S. cavaleriei* H.Lév.?)

**Type:** China, Yunnan, Yünnanfu [Kunming], gegen den Bahnhof, 11.III.1917, *Handel-Mazzetti 13061*, ♂ ([WU0031526!](#) – lectotype, **designated here** by I.V.Belyaeva; isolectotypes: [A00031171!](#), [LE01013775!](#), [NY04205517!](#), [WU0031529!](#)). Syntypes: China, Yunnan, Yünnanfu [Kunming], opposite Bidjigwan, 21.II.1914, *Handel-Mazzetti 161*, sterile

([WU0031527!](#)); China, Yunnan, at Tjitiaowan on the way from Yungbei to Yungning 25.VI.1914, *Handel-Mazzetti* 3208, sterile ([A000558228!](#), [WU0031528!](#)); China, Sichuan: At Ningyüen (Lingyüen), 11.IV.1914, *Handel-Mazzetti* 1219, sterile ([WU0031525!](#)).

**Protologue citation:** “Y.: Yünnanfu, gegen den Bahnhof, 11.III.1917 (13061 ♂), gegen Bidjigwan, 21.II.1914 (161 ♂) und häufig bei Schilungba, 20. II. 1914 (Schneider 162 ♂). Tälchen e der Stadt, 16., 27. V. 1906 (Ducloux 639 ster., 656 ♂). Um Tjitiaowan am Wege von Yungbei nach Yungning 25.VI.1914 (3208 ster.). S.: Um Ningyüen (Lingyüen), 11.IV.1914 (1219 ster.).”

**Note:** Nine specimens cited in the protologue and listed above are in various herbaria. All were annotated by Handel-Mazzetti and belong to the same taxon except the specimen from Sichuan (WU0031525). The latter is identified here as *Salix triandroides* Fang and does not correspond to the protologue. The remaining specimens are part of the original material, belong to the same taxon and represent three different gatherings that were collected under different numbers (13061 [♂], 161 [sterile] and 3208 [sterile]) at different times and in different places. The gathering under number 13061 consists of five duplicates (A00031171, LE01013775, NY04205517, WU0031526, and WU0031529). The specimen WU0031526 is in good condition, contains two fragments with male catkins and young leaves and is selected here as the lectotype.

Handel-Mazzetti (1929) was not sure of the identity of his new taxon and reported it as a hybrid between *S. babylonica* and *S. cavaleriei* with a question mark. Hao (1936: 65) synonymized *S. heteromera* with *S. babylonica*. In *Flora of China* (Fang *et al.*, 1999) *S. heteromera* was treated as a separate species. The authors of the current paper agree that this willow is of a hybrid nature and one parent is *S. babylonica*. The identity of the second parent needs further investigation.

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### **Author's contributions**

Alisa E. Grabovskaya- Borodina (AG) together with Ivan V. Tatanov (IT) initiated the project, curated all available herbarium material at LE, revised herbarium specimens at LE, K and BM and prepared a first draft of the manuscript.

Irina V. Belyaeva (IB) investigated the historical background of the botanical collections and revised all available herbarium material at A, BM, E, GH, K, LE, NY, P, S, US, WU, discussed with AG and IT the taxonomic and nomenclatural problems, took the necessary nomenclatural actions and taxonomic decisions, wrote the final version of the manuscript and coordinated the project.

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