



# **Bulletin** of the ***Cupressus*** **Conservation** **Project**

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# Contents

Volume 2 Number 2

|  |    |
|--|----|
| Which Latin name for the Tsenden ? ..... | 39 |
|--|----|

D. Maerki

**Abstract** : The Tsenden is a beautiful tall cypress *Cupressus* and the national tree of Bhutan. It has received not less than eight Latin names since its first description by Griffith in the middle of the nineteenth century. After careful examination of the texts of the different authors since the introduction of this taxon into Europe, all these names are reviewed in detail. At the same time the living trees still cultivated in France and in Italy are studied taking into consideration their physiology and cone morphology, and not only the deceptive foliage. The conclusion draws attention to the fact that there are currently at least three *Cupressus* species on the southern slopes of the Himalaya : *Cupressus torulosa* D.Don (central Nepal to NW India), *Cupressus tortulosa* Griffith (Bhutan) and *Cupressus cashmeriana* Carrière (West Kameng district, Arunachal Pradesh, India). *Cupressus torulosa* and *tortulosa* are clearly typified in the original descriptions, but there is no herbarium specimen or illustration which provides a type for *cashmeriana* and thus a neotype is needed. The plants in cultivation in France as *cashmeriana* match the West Kameng population unlike the trees grown in Italy. Under the ICBN a neotype should match the protologue and where possible relate to material which the original author would have studied. Farjon's selection of a tree, received in 1894 without a name or history and only subsequently and wrongly identified as *cashmeriana* does not meet these criteria. Carrière worked at the Jardin des Plantes in Paris where a *Cupressus cashmeriana* is still present. As this specimen agrees with the protologue and is consistent with Carrière's place of work, a neotype taken from this tree is proposed.

|   |    |
|---|----|
| Book Review : <i>Araucaria</i> by Hubertus Nimsch ..... | 72 |
|---|----|

Jeff Bisbee

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© **Cover photos**: CCP : *Cupressus tortulosa* (top) and *Cupressus cashmeriana* (bottom), cultivated, France, 6 August 2013. The difference between the cones of both species is striking. The *Cupressus cashmeriana* cones are bigger. The origin of the *Cupressus tortulosa* is documented : collection by H. Ern, 1983, "Tiger's Nest", Paro, Bhutan.



## Which Latin name for the Tsenden ?

The Tsenden, the typical cypress *Cupressus* of Bhutan, is one of the most beautiful conifers. It finds its wild origin on the slopes of the deep valleys of Bhutan at altitudes to at least 3000 m. For many centuries it has been planted locally as a sacred tree close to monasteries and fortresses (dzongs). The Tsenden is the national tree of Bhutan. It is a long-lived and tall cypress ; one was measured as 91 m high<sup>1</sup> on a steep slope inside a small grove of twelve 60 m tall trees in East Bhutan (Temphel and Evans, 1995), making it the tallest tree in Asia.

If the common name is unambiguous, this is not the case with the Latin name<sup>2</sup>. No less than eight names<sup>3</sup> have been applied to this unique taxon. These are successively : *Cupressus pendula* Griffith 1848, *Cupressus tortulosa* ["*tortulosus*"] Griffith 1854, *Cupressus corneyana* Carrière 1855, *Cupressus torulosa* D.Don 1824 in Gordon 1858, *Cupressus cashmeriana* Carrière 1867, *Cupressus funebris* Endlicher 1847 in Hooker 1888, *Cupressus funebris* var. *glauca* Masters 1896, and *Cupressus himalaica* Silba 1987. The question arises : which is the valid name according to the International Code of Botanical Nomenclature (ICBN) ? A review of all the Latin names is presented here. The vernacular name Tsenden will be used throughout the following pages, as it is currently the only stable and unambiguous name for this taxon growing wild in Bhutan<sup>4</sup>.

### 1) *Cupressus pendula* Griffith 1848.

The Latin name *pendula* evokes the pendulous form of the foliage.

The name *Cupressus pendula* was first used by Thunberg in 1784 to describe a conifer species from Japan. Thunberg based his description on Kaempfer (1712, "*Fi moro*"), and on his own observations. This taxon was later equated to *Platyclusus orientalis* by Endlicher (1847), although the first description by Kaempfer points to a *Juniperus* species<sup>5</sup>.

In the same year 1784, the name *Cupressus pendula* was applied by L'Héritier to the Mexican Cypress ("Cedar of Goa"), already described by Miller as *Cupressus lusitanica*.

In 1797, the name *Cupressus pendula* was used again by Staunton to describe a true cypress growing in China, south of the lake Hu, west of Hangzhou<sup>6</sup>. He mistakenly referred it to Thunberg, although this Chinese tree is not native to Japan. Based on material collected by Staunton, a good description with plates was given by Lambert in his *Description of the Genus Pinus* (Lambert 1803)<sup>7</sup>. Finally, the Latin name of this taxon was corrected by Endlicher in 1847 to *Cupressus funebris*, under which it is currently known.

Royle in his *Illustrations of the Botany* (1839) also mentions the "Cedar of Goa (*Cupressus pendula*)" without an author name as "found within the limits of the Indian Flora" and "which succeed[s] in the gardens of the north as of the south of India" indicating that this species is

<sup>1</sup> And not to 95m as stated by Farjon (2010, 1, 296), from S.Miehe & D.B. Gurung 00-47834 (K). G.Miehe, S.Miehe and D.B.Gurung earlier (1999) wrote: "Tallest Tsenden individuals were estimated to measure between 45 and 50 metres in height, with maximum diameters (DBH) up to 3 metres."

<sup>2</sup> It is a weird observation that the common name is unique, when Latin names were designed first of all to name taxa unambiguously.

<sup>3</sup> Some names at an infraspecific rank have been excluded. For completeness, there is also : *Cupressus torulosa* var. *corneyana* Carrière 1867, *Cupressus torulosa* var. *kashmiriana* Kent 1900, and *Cupressus torulosa* var. *cashmeriana* (a homonym of var. *kashmiriana*). These bring the number of Latin names of the Tsenden to ten.

<sup>4</sup> Farjon (1994) uses the terms of "Weeping Cypress of Bhutan" although the descriptions of this botanical taxon are made from planted cultivars (namely samples originating from the Isola Madre tree – see below).

<sup>5</sup> "*Fi moro*. *Juniperus* Julifera, julis squamosis, croceo polline refertis, baccis Sabinae angulosis." Kaempfer 1712, Fasc. V, p. 883.

<sup>6</sup> George Staunton, *An Authentic Account of an Embassy from the King of Great Britain to the Emperor of China*, 1997, Vol. III, p. 363 and p. 275 as "weeping thuya".

<sup>7</sup> Lambert gives the reference using the second edition of 1798 in two volumes and one book of illustrations.

cultivated (p. 349). The question arises as to whether this pendulous “Cedar of Goa” was a tree imported from Mexico by the Portuguese, or if it came from the Himalayan slopes<sup>8</sup>.

Griffith died in 1845. His journal, which consists mainly of his trip reports, was published posthumously in 1848, quite unfortunately before his *Notulae* (1854). In this journal the name *Cupressus pendula* is applied to the cypress of Bhutan. Under the ICBN rules, a name used once – even mistakenly, even if later put into synonymy with another taxon – cannot be used again to describe a new taxon. For rescuing this first Griffith’s name it would be necessary to show that L’Héritier’s description is different from the Bussaco tree (*Cupressus lusitanica* described in 1768 by Miller) and that L’Héritier was published before Thunberg. Considering the illustration in L’Héritier, he was indeed describing unmistakably as the “Cedar of Goa” a *Cupressus lusitanica* and not the Tsenden.

## 2) *Cupressus tortulosa* Griffith 1854.

Griffith (1854) apparently became aware that his *Cupressus pendula* was an invalid name because of Thunberg or L’Héritier, and proposed *Cupressus tortulosa* [“*tortulosus*”]. Farjon (1994) failed to notice the different name, for he retained only the name written on the plate “*torulosus*”<sup>9</sup>. The name in the index of the plates is “*tortulosus*”, the correct epithet from the protologue. Silba (2009) rightly understood that “*tortulosa*” is different from “*torulosa*” and has priority over Carrière (1855 and 1867) to give a valid Latin name to the Tsenden.

So far these two first names because they are finding their origin in trees of Bhutan, even if cultivated there, are unambiguously defining the Tsenden. The confusion begins with the three following names all originating from cultivated trees introduced in Europe during the nineteenth century, some of which with an unrecorded or mistaken origin.

Unfortunately this perfectly valid name of *Cupressus tortulosa* is currently the subject of a proposal (Farjon 2010) to reject it. Farjon’s main argument is an *ad populum* one<sup>10</sup>, of the interest in the horticultural industry to maintain a famous name for an important ornamental tree (its importance is relative, for it is only hardy in warm temperate areas). This has of course nothing to do with science (if taxonomy has to be considered as a science) and one of the basic principles of the botanical nomenclature is the priority rule. Stability of nomenclature relies on the very stability of these rules<sup>11</sup>.

## 3) *Cupressus corneyana* Carrière 1855.

This name appeared for the first time in the nursery catalogue of Knight & Perry in 1850 with a minimal description (“elegant and drooping tree”, comparing it to *Cupressus funebris*). As this description does not allow distinguishing it from other cypresses with pendulous foliage, it is considered as a *nomen nudum*. Carrière gave a more extensive description in the first edition of his *Traité* (1855), validating the name. Three years later Gordon (1858) described it as a variety of *Juniperus chinensis* writing : “How Mr. Knight could have mistaken it for a Cypress is a mystery”. In his *Supplement* (1862), after receiving cones that made him aware it was not a juniper, Gordon continued, explaining his mistake : “a circumstance which arose from the plant never having previously produced cones in England, and to the neglect of that infallible rule, ‘Wherefore by their fruits ye shall know them’” (unfortunately an advice that is still not always followed !). In the second edition of his *Traité* (1867), Carrière transferred it to a variety of *Cupressus torulosa*.

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<sup>8</sup> It needs to be remembered that identification at that time was very poor, with a lot of confusing and erroneous synonyms described or simply listed.

<sup>9</sup> Griffith, *Icones Plantarum Asiaticarum*, 1854, part iv, plate 372.

<sup>10</sup> If to follow the horticultural industry, *Cupressus nootkatensis* should be kept as *Chamaecyparis nootkatensis*, for it is still massively so named by propagators and tree merchants, despite the proofs that it does not belong in that genus (see e.g. Frankis, 1993).

<sup>11</sup> See similarly the case *Xanthocyparis* – *Callitropsis*, when Mill & Farjon (2006) made a further error in their proposal to conserve *Xanthocyparis* (cf. *CCP Bull.* 1 (1): 19-21, 2012).



Farjon (1994) wrote of the neotype designated by Franco, trying to discard the name *Cupressus corneyana* : “In the Kew Herbarium (K!) is a sheet with three specimens (or possibly collections) from Gordon's herbarium, annotated by Gordon as *C. corneyana* Knight, which are taxonomically *C. torulosa* D. Don.” Unfortunately Farjon’s identifications may be inaccurate : in the Paris herbarium, Farjon determined a *Cupressus lusitanica* as *Cupressus torulosa* (P01637415), and in Kew missing another *Cupressus lusitanica* long misidentified as *Cupressus cashmeriana* (K255215 – see figures 1 and 2 ; note for instance the typical 6-scaled *Cupressus lusitanica* cones, cf. (8-)10-14 scales in *Cupressus torulosa* and *Cupressus cashmeriana*).



Figure 1 : J. Bornmüller n° 1392, 8.1900 ; *Cupressus lusitanica* determined as *C. torulosa* by Farjon.  
© Collections Herbarium MNHN, Paris. (P01637415)



Figure 2 : C.G. Trevor s.n. 3.1934 ; *Cupressus lusitanica* determined as *C. cashmeriana* (aff.) by Farjon.  
© Kew herbarium, Royal Botanic Gardens, UK. (K000088095)

Another example is the herbarium sheet of *Cupressus tonkinensis* Silba from Vietnam also determined as *Cupressus torulosa*, when this species does not grow there and where there is no record of an introduction. From the herbarium sheet used as the holotype of *Cupressus tonkinensis* (Eberhardt 5073, NY00329218, isotype P00238726), Farjon (2005, 2009) put it into synonymy with *Cupressus torulosa*. Farjon annotated this sheet : “HOLOTYPE OF: *Cupressus tonkinensis* Silba, = *Cupressus torulosa* D. Don, det. Aljos Farjon (RBG Kew) Nov. 2000, (identity ± uncertain, introduced)”. Two years later he reannotated the same sheet : “HOLOTYPE OF: *Cupressus tonkinensis* Silba, J. Int. Conif. Preserv. Soc. 1 (1): 23 (1994). = *Cupressus* cf. *lusitanica* (probably originally introduced) A. Farjon Aug 2002”.

D.P. Little (2005, 2011) and Rushforth (2007) clearly demonstrated that *Cupressus tonkinensis* is a valid species, not closely related to *Cupressus torulosa*. Observation of the material collected by Eberhardt before September 1919 when it was received in Paris shows that it is not *Cupressus torulosa*, nor *Cupressus lusitanica*. Farjon always considered Eberhardt’s

specimen as an exotic conifer in Vietnam. Yet Pham Van The & al. (2013) showed that a relict population still exists, next to several cultivated trees. This wild population is constituted by so few specimens protected mainly by their location on a cliff, that this species shall be considered as critically endangered. Denying a valid species rank to these trees could only jeopardise their conservation.

Also in the Paris herbarium there are two sheets from a cypress cultivated in Cameroon (P01637524 and P01637525). Farjon determined them as *Cupressus corneyana* Carrière, when it is obvious that they do not belong there (determined here as *Cupressus benthamii*). By using the name *Cupressus corneyana* in 1992 and despite this error, Farjon was acknowledging *volens nolens* that it is a correct name, before he changed his mind subsequent to publication of *Cupressus himalaica* by Silba (1987) who considered the name *Cupressus cashmeriana* as doubtful, and led to the preparation of his own inquiry on “*Cupressus cashmeriana*” (Farjon 1994).

Interestingly there are a few sheets from cultivated material labelled *Cupressus corneyana* in the Paris herbarium. The oldest collection dates from 1857. These specimens are perfect matches for the Tsenden growing in the Villa Thuret (collection by H. Ern in 1982, origin Paro, Bhutan, cover page [top], fig. 8 & 9, p. 60, fig. 27, p. 69). As the material available in France at the time of Carrière in the 1850s points to exactly the same taxon and as the neotype designed by Franco belongs rightfully here and was misidentified by Farjon for *Cupressus torulosa* (not realizing that the Tsenden foliage when not a cultivar can be confused with the one of the Himalaya Cypress and that it is necessary to have a close look at the cones), the conclusions by Franco, and Grierson & Long and Rushforth assigning the Latin name *Cupressus corneyana* to the Tsenden are thus correct.<sup>12</sup>

Currently this Latin name is the one used in Bhutan for their national tree.

#### 4) *Cupressus torulosa* D. Don 1824, in Gordon 1858.

Gordon in the first edition of *The Pinetum* in 1858 listed *Cupressus pendula* Griffith 1848 as a mere synonym of *Cupressus torulosa*. D. Don gave the common name of Bhotan Cypress to his new taxon described in 1824, and as localities : “*Habitat in Indiâ Orientali (Roxburgh), in Bhotaniâ. W.S. Webb.*” As the types designed by D. Don point exclusively to populations of northern India west of Nepal (Uttarakhand), and in the absence of specific material from Bhutan, we can only conclude that the Tsenden does not belong here; it is obviously a different taxon, separated by more than 500 km from *Cupressus torulosa*. We are left only with hypothesis as for the reason of this extension of the distribution of the new species ; there are no known reports on a cypress species from Bhutan prior to Griffith. Likely the “Bhotan Alps” were understood as comprising the place where Webb collected his material as Loudon (1838) and Gordon (1862) are suggesting it.<sup>13</sup>

In fact Webb never went to Bhutan, but only to Milum (Milam) and Neetee (Niti) in Uttarakhand (1817 and 1818). W. Hamilton (1828) confirms our hypothesis under the article dedicated to BOOTAN. (*Bhutan.*) :

“This country on the west is separated from the Raja of Sikkim’s territories by the course of the eastern branch of the Teesta, from whence it stretches easterly to an undefined extent. To the north it is divided from Tibet by the Himalaya mountains ; and to the south it is bounded by Bengal, and a number of rude tribes scattered along the northern side of the Brahmaputra. In its greatest dimensions it may be estimated at 250 miles in length, by ninety

<sup>12</sup> The following consideration should be also taken into account : British botanists travelled to Bhutan and observed the Tsenden by the middle of the 19<sup>th</sup> century, though no material “should” have appeared of that taxon in United Kingdom before 1894. It looks difficult to understand, when already in 1850 *Cupressus gigantea* (as *Cupressus torulosa* var. *majestica* Carrière 1855) was in the Knight & Perry nursery catalogue of 1850, where *Cupressus corneyana* is also listed.

<sup>13</sup> Gordon about *Juniperus densa* : “It is also found plentiful on the Bhotan Alps, near the Netee Pass” p. 32. Netee or Neetee, now Niti, is in Uttarakhand, India. Loudon about *Juniperus communis* : “In Asia the common juniper was found by Capt. Webb in Nepal, and on the Bhotan Alps.” p. 2491.

the average breadth. The term Bhote is applied by the Hindoos not only to the country named Bootan by Europeans, but also to the tract extending along and immediately adjoining both sides of the Himalaya, in which sense it is a very extensive region, occupying the whole mountainous space from Cashmere to China.”

No mention is made by Hamilton of a cypress growing “within the limits above specified”. Let us add to explain the possible confusion that Hamilton is mentioning the names Bhutan, Bhote, Bhooteas and that they are all referring to places now in Garhwal (Gurwal) or Kumaon in Uttarakhand, India.

Because of the priority rule, and assuming (wrongly) that there was only one species of *Cupressus* growing south of the Himalaya main range and that D. Don was referring to the independent country of Bhutan or an extension of it, Griffith’s tree was merged into *Cupressus torulosa* first by Gordon and later by Carrière.<sup>14</sup> They were followed by the British authors until the reception at Kew of a clone of the Isola Madre tree<sup>15</sup>, which convinced the taxonomists that there was at least more than one *Cupressus* species in this part of Asia.

### 5) *Cupressus cashmeriana* Carrière 1867.

In the second edition (1867) of his *Traité Général des Conifères*, Carrière described a specimen he obviously had in front of him as *Cupressus cashmeriana*, and attributed it to Royle<sup>16</sup>. As noticed already by Elwes & Henry (1910)<sup>17</sup> and repeated by Farjon (1994)<sup>18</sup>, it was not known where Royle made use of that name. Did Carrière receive a personal communication about this taxon ?

Looking into the work of Royle, it is possible to find a lot of observations which lead to some important conclusions. What does Royle say in his main botanical opus *Illustrations of the Botany and other branches of the Natural History of the Himalayan Mountains and of the Flora of Cashmere* published in 1839 ?

The first observation is that indeed there is indeed no *Cupressus cashmeriana* mentioned in Royle’s work, and especially not in his *Flora of Cashmere* where it might have been expected. On the other hand there are several other plant taxa described with the specific name “*cashmeriana*”. Here is a review of all of them.

Quoting Royle :

- “7. *C[orydalis] Cashmeriana* [...]—Hab. Cashmere.” (p. 69)
- “21. *L[ychnis] Cashmeriana* (Royle MSS.) [...] Hab. Cashmere.—Royle.” (p. 80)
- “and *Herniaria*, having the distribution of the order, has a species in Cashmere, *H. Cashmeriana*, nob., nearly allied to *H. incana*.” (p. 222)
- “*Campanula Cashmeriana* ; [...] Hab. Kioonthul in Cashmere.” (p. 254)
- “*Gymnandra Cashmeriana*. Benth. Scroph. Indicae. p. 47. [...] Hab. Cashmere.” (p. 291)
- “*Phlomis Cashmeriana* (Royle), Benth. In Hook. Bot. Misc. 3. p. 382, [...] Hab. This, like the preceding, [...] is from Cashmere, [...]” (p. 303)
- “*Euphorbia Cashmeriana* ; [...] Hab. Cashmere and neighbouring mountains.” (p. 329)

<sup>14</sup> It is quite unfortunate for Carrière that he did not know the origin of his *Cupressus corneyana*. He gives 1847 for its introduction, a date which could be compatible with the earlier visit of Bhutan by Griffith (1837-38) (Rushforth, pers. comm.).

<sup>15</sup> See Appendix 1 for details.

<sup>16</sup> See protologue here : <http://www.cupressus.net/CUcashmerianaCarriere.html>

<sup>17</sup> “We are unaware of the reason why this species is ascribed to Royle, as no mention of it can be found in his published writings.” (Elwes & Henry 1910, p. 1161, note 2).

<sup>18</sup> “The reference to Royle is difficult to explain, because Royle neither published that name, nor collected herbarium material which can be attributed to it.” (Farjon 1994). It can be seen below that the reference to Royle has an explanation.



- “Two other species found in gardens in Northern India are not known in the south ; one originally from the valley of Cashmere, *M[orus] Cashmeriana*, nob., [...]” (p. 337)

The different taxa cited by Royle and to which the specific name *cashmeriana* is attributed are all found growing in Cashmere, a province in northwest India, south of the Himalayan range. From this observation we can conclude that Royle would use *cashmeriana* for a cypress only if such a conifer was found native in Cashmere. But Royle wrote explicitly that he did not find a cypress in this region :

from Royle (1839) :

“The Flora of Cashmere has several anomalies” [among which the following one :]  
 “The *Coniferae* are, as to the eastward, 3 pines, 2 or 3 firs and Deodar, but I have not seen the *Cupressus torulosa*, the lofty cypress of the Mussooree hills.”  
 (p. XXV)

Royle twice mentions *Cupressus torulosa* :

- in reference to Captain Webb and the Neetee Pass (India) (p. 33) ;
- in a list of plants from Kunawur (Kinnaur or Kinnour, India) (p. 40).

Thus all *Cupressus torulosa* mentioned by Royle are from elsewhere in India, Neetee being the locality of an isotype specimen of this species (leg. Webb, *Wallich 6046A*, G!).

The other *Cupressus* species mentioned by Royle as belonging to the Indian flora are the “Cedar of Goa” (see above) and the “*Cupressus sempervirens* called *suroo*”.<sup>19</sup>

Royle returned to England in 1837, and after the publication of his botanical work in 1839 did not return to Kashmir to discover any hypothetical cypress to inform colleagues through any hypothetical personal communication.

This leaves the same original question : where did Carrière find the attribution to Royle ? The answer is simple : he found it in the index in Gordon’s *Pinetum* (1858), page 340<sup>20</sup> : “*Cashmeriana* Royle ... 69”. This is an obvious mistake by Gordon, for on page 69 it reads “Syn. *Cupressus Cashmeriana Hort.*”, a *nomen nudum* given as a synonym of *Cupressus torulosa*. There is no prior mention anywhere of the name *Cupressus cashmeriana*, not even in Knight and Perry (1850).

As *Cupressus cashmeriana* Royle is a *nomen nudum*, Carrière’s protologue reproduced quite usually as *Cupressus cashmeriana* Royle ex Carrière should be cited as *Cupressus cashmeriana* Carrière. The botanical identity of Carrière’s *Cupressus cashmeriana* is also in need of review : what material did Carrière have in front of him ? As he did not preserve any herbarium specimen, is it possible to say without reasonable doubt that it was a specimen of *Tsenden* ?

In the absence of a type, it is advisable to follow the recommendations of the ICBN ; especially recommendation 9B, where the following advice is given :

9B “In selecting a neotype, particular care and critical knowledge should be exercised because the reviewer usually has no guide except personal judgement as to what best fits the protologue; if this selection proves to be faulty it will inevitably result in further change.”

Also we think that the following advice given for choosing a lectotype should be taken into account with care when the holotype is missing (our emphasis) :

9A.1 “Typification of names for which no holotype was designated should only be carried out with an understanding of the author's method of working; [...]”

<sup>19</sup> Farjon (2005) mentions “Sooreh” without providing an explanation (locality or else?). In fact it is one of the vernacular names of the Himalayan Cypress, *Cupressus torulosa*. Other variants include : Sarai, Surai, Surroo, Surin, Soorahvhy, Saru and Surah oy (Camus 1914). To be complete a “*Cupressus juniperoides* of Linnaeus” is mentioned by Royle in a footnote (p. 348). [Allusion to a *Widdringtonia* species of The Cape.]

<sup>20</sup> Unfortunately this was overlooked by all previous reviewers.

9A.2 “Designation of a lectotype should be undertaken only in the light of an understanding of the group concerned. In choosing a lectotype, *all aspects of the protologue should be considered as a basic guide*. Mechanical methods, such as the automatic selection of the first element cited or of a specimen collected by the person after whom a species is named, should be avoided as unscientific and productive of possible future confusion and further changes.”

9A.4 “[...] it should be assumed that the specimen housed in the institution where the author is known to have worked is the holotype [...]”

There is no herbarium material left by Carrière, although he was head gardener of the Jardin des Plantes in Paris. He mentions that this plant is not hardy outside in Paris. Our investigation will have to be threefold :

- first, to examine in details the information contained in Carrière’s description ;
- second, the possibility – or not – for Carrière to have received a Tsenden specimen and from where ;
- third, to look for older living plants grown in France and Italy labelled *Cupressus cashmeriana* and to study them <sup>21</sup>.

From Carrière’s description, published in 1867, when he indicates an introduction around 1862, he had with him only a young plant, of which he could describe only the immature foliage. Is it sufficient to identify a *Cupressus* species among others, or at least to distinguish it from the other species ?

According to Farjon (1994), it is not : “Anyone who seriously studies Cupressaceae is aware that material from young plants grown in gardens features few, if any, macroscopic characters differentiating it from other related species”<sup>22</sup>. This is not completely true as far as some *Cupressus* species are concerned <sup>23</sup> : by studying several species of *Cupressus* statistically from germination to the seedling stage during the first two or three growing seasons, it is already possible to identify several of them at this point. Anyone who studies the genus *Cupressus* seriously will be aware of that fact. In the present case, we do not have to deal with a generality (the “Cupressaceae”), but with a specific claim which needs to be proved or disproved.

Carrière states : “Pourtant, en vieillissant, elle se rapproche du *Cupressus torulosa*, dont elle est très-probablement une forme.”<sup>24</sup> This is a very interesting observation which will help us to understand what Carrière described. It must be remembered that Carrière saw Tsenden specimens under the name *Cupressus corneyana*, reduced in the second edition of his *Traité* as a variety of *Cupressus torulosa*. And now under the new name *Cupressus cashmeriana*, Carrière is identifying something different at an early stage, but observing a convergence at a later development stage. Considering only the seedlings respectively of *Cupressus torulosa*, of the Tsenden and of *Cupressus cashmeriana* Carrière grown together, it is possible to make the following observations :

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<sup>21</sup> These two countries, not England, saw the first documented introductions of plants sooner or later labelled as *Cupressus cashmeriana*.

<sup>22</sup> This applies also even more to dry herbarium material. W.Armstrong (1978) commented “Cypress species are very difficult to identify from illustrations or dried herbarium specimens. The small woody cones and foliage of several species are remarkably similar. In fact, there has been considerable disagreement among authorities as to their exact classification. Probably the best way to distinguish them is to compare the foliage, cones, and bark of mature trees, preferably in the field.” Farjon’s remark is not pertinent, for here the discussion is not on Cupressaceae “en général”, but on a particular plant described for the first time.

Moreover the assertion by Farjon is not correct : there are several Cupressaceae species which *can* be identified easily during the first growing seasons : *Chamaecyparis obtusa* can be distinguished from *Chamaecyparis pisifera* and both from the other *Chamaecyparis* species very early, *Cupressus duclouxiana* from *Cupressus nootkatensis* and from the other *Cupressus* species ; this list is not exhaustive (see following note).

<sup>23</sup> For instance *Cupressus pygmaea* and *Cupressus bakeri* can be identified by cotyledon statistics and foliage colour.

<sup>24</sup> Carrière, 1967, page 161. [Although, while growing older, it gets closer to *Cupressus torulosa*, of which it is very probably a form.] Is the French “très-probablement” to be understood as “certinement”, certainly, surely ?

- *Cupressus torulosa* seedlings at an early stage cannot be confused with any other cypress species of the same age ; they grow more slowly than the other two, and display early a typical intermediate foliage ; cotyledon number is different from both other species ;
- Tsenden cotyledons and juvenile foliage are different from *Cupressus cashmeriana* ones ;
- both these are easily distinguished from *Cupressus torulosa* by the measurements of their cotyledons and by their growth rate ;
- some Tsenden seedlings can be confused with *Cupressus torulosa* ones if they are compared at different stages of their development, for they produce similar intermediate foliage ;
- at some stage, *Cupressus cashmeriana* intermediate foliage can be viewed in some parts only as similar to, but not identical to Tsenden intermediate foliage, but never similar to *Cupressus torulosa* foliage.

Considering all these observations together, conducted during three growing seasons after germination, we confirm Carrière's observation that *Cupressus cashmeriana*, described by him as "très-gracieuse et très-distincte, ne peut être confondue avec aucune autre lorsqu'elle est jeune."<sup>25</sup>

Now we have to understand that Carrière could make his final claim that his plant was "très-probablement" a form of *Cupressus torulosa* only because he could match it at one stage with a Tsenden (in his 1867 *Traité* edition as *Cupressus torulosa* var. *corneyana*), and not a *Cupressus torulosa* itself. It should be remembered that Tsenden adult foliage is highly variable and that the neotype designed by Farjon belongs to a cultivar of the Buthanese Cypress.

Carrière wrote about the shoots and branchlets : "Ramules et ramilles distiques, très-comprimés, horizontalement flabelliformes, réfléchis." Horizontally flabellate : this is not the case for typical Tsenden seedlings and saplings, nor for adult trees. Alone this precision in the description discards the attribution of *Cupressus cashmeriana* to the Tsenden (see fig. 31, p. 69).

Another unambiguous statement by Carrière is that the habitat of his *Cupressus cashmeriana* is Tibet. Commenting this origin, Farjon (1995) writes : "a somewhat more satisfactory geographical reference although we must remember that Tibet was not only larger in the mid-nineteenth century than it is now, but was thought by many Europeans to stretch across a good part of the Himalaya as well."<sup>26</sup> This is an unfortunate *ad hoc* trial to discard the fact that it is impossible to apply *Cupressus cashmeriana* to the Tsenden, a tree whose origin is only in Bhutan. It is true that in the past Tibet was larger, but its extension since the unification and independence of Bhutan in 1634 never included this new state, which resisted even British colonisation. Tibet extended eastward into what are today the Chinese provinces of Sichuan and Yunnan, and – southward of the main Himalayan range and the highest summits – only East of Bhutan, in what is now part of the Indian province of Arunachal Pradesh. However, in an opposite sense, the name Bhutan was used by many Europeans for a larger area than it is now, as the common name "Bhotan Cypress" for *Cupressus torulosa* testifies, when this species was first reported and collected from Uttarakhand and Himachal Pradesh in India. At that time, Nepal for instance is considered as part of the Bhotan Alps, but not as part of Tibet. Travellers – as they reported it in their works – had to climb the highest passes to arrive in Tibet.<sup>27</sup>

Had there been no *Cupressus* species growing wild in Tibet, there would have been maybe a reason not to discard Farjon's hypothesis that Carrière's statement about Tibet is wrong. But

<sup>25</sup> [This species, very graceful and very distinct, cannot be confused with any other one when it is young.]

<sup>26</sup> Unsupported affirmation by Farjon. Moreover Farjon (1993) suggested : "[Carrière] possibly obtained them from an English nursery, such as that of Knight & Perry at Chelsea." He also wrote (2010) : "Having received these plants from another horticulturist without sufficient evidence of provenance, his statements about origin were speculative." Nobody knows from whom Carrière received his material, nor that he had not "sufficient evidence of provenance". Farjon's suggestions or affirmations are purely speculative and must be discarded as such. We must rely on Carrière's statements in the protologue.

<sup>27</sup> See Royle (1839) for instance, and above discussion under 4) *Cupressus torulosa*.



there are now known to be at least two endemic *Cupressus* species in Tibet<sup>28</sup> and even four<sup>29</sup> if following Farjon as to the extension of the Tibetan borders eastward in the nineteenth century. That leaves the choice, still following Farjon, to compare *Cupressus cashmeriana* Carrière to one of those two, eventually four Tibetan species. Farjon considers *Cupressus austrotibetica* a synonym of *Cupressus torulosa* (Farjon 1998, 2001, 2005, 2010) and *Cupressus gigantea* as a variety of *Cupressus torulosa* (Farjon 2005, 2010).<sup>30</sup> The fact that Farjon is making this confusion between these very distinct taxa<sup>31</sup> can explain why Carrière was also commenting that his *Cupressus cashmeriana* “est très-probablement une forme [du *Cupressus torulosa*]”.

Carrière<sup>32</sup> puts the Tsenden – Griffith’s *Cupressus pendula* – as a synonym of *Cupressus torulosa*. If now to follow Farjon neotypification, we have the same tree under two different names in the same *Traité*, creating without necessity another confusion. And we know that only *Cupressus pendula* Griffith and *Cupressus tortulosa* are not ambiguous, because they were described from trees growing in Bhutan and not from cultivated trees of unrecorded origin.

Carrière dates the introduction of his *Cupressus cashmeriana* to “around 1862”. This is compatible with the first documented and recorded introduction of glaucous Tsenden seeds into Europe, but is incompatible with the name *Cupressus cashmeriana* Hort. given by Gordon at least 4 years before the supposed introduction. Farjon assumes without any evidence that Carrière received material from England. If such was the case, it would mean that the taxon described by Carrière was not a Tsenden, for the first recorded specimen introduced as *Cupressus cashmeriana* in the United Kingdom was not earlier than 1894 when a plant – and not seeds – was given to Kew Gardens quite probably from Italy.<sup>33</sup>

What do we know for sure about the introduction of the glaucous Tsenden into cultivation in Europe ? We will have to make a distinction between France (Carrière) and Italy. We already discussed the introduction in Paris.

The introduction in Italy is perfectly documented in the archives of the family Borromeo, and two of the first trees are still alive and growing. These records indicate that ten very fresh seeds of “*Cypressus Himalayano*” in an envelope were sent by the English agent of the Borromeo in India, William [Joseph?] B. Pentland, and were received in June 1862 in Italy by Giberto V Borromeo [Vitaliano IX Borromeo Arese] with the recommendation to care very quickly about the seeds. Three days before the seeds were shipped to Italy, they arrived at the “ministero delle Indie”. They were collected at most ten days before. Origin of the seeds : “Kashmere”. Common name of this new tree : “Cipresso del Kashmere”. As we already know from Royle and from more recent studies<sup>34</sup>, no Tsenden, no *Cupressus* species is growing wild in Kashmir. There are two possibilities for that name too have been transmitted to Italy :

- the seeds came from a cultivated Tsenden in Kashmir ;
- the information about their origin was wrong.

<sup>28</sup> *Cupressus gigantea* W.C. Cheng & L.K. Fu (1975) and *Cupressus austrotibetica* Silba (1988).

<sup>29</sup> *Cupressus duclouxiana* Hickel in Camus (1924) and *Cupressus chengiana* S.Y. Hu (1974)

<sup>30</sup> See Maerki 2013.

<sup>31</sup> Farjon’s taxonomy is based essentially on herbarium material, while reports from botanists who visited the trees in their native habitat are stating very clearly that these two taxa are quite different from *Cupressus torulosa* and cannot be confused (Keith Rushforth, pers. comm., Adrien Gollinelli, pers. comm., and pers. observ. of *Cupressus gigantea* seedlings, as well as adult trees cultivated in France). Molecular analysis using cpDNA are pointing to the fact that *Cupressus torulosa*, *Cupressus gigantea* and *Cupressus austrotibetica* although related are clearly distinct taxa. And that the closest related species to *Cupressus austrotibetica* is not *Cupressus torulosa*, as synonymised by Farjon, but the Tsenden .

<sup>32</sup> Carrière, 1867, p. 150. As well as Gordon, 1858, p. 69. It is to be noticed – to bring the confusion even further – that Carrière puts also a “*Cupressus cashmeriensis*, Hort.”, a homonym of *Cupressus cashmeriana*, in synonymy with *Cupressus torulosa*.

<sup>33</sup> See Appendix 1 – upon its arrival in England this new taxon encountered a great interest among botanists and horticulturists. And it did not happen earlier than the beginning of the 20th century, when it was first mistaken for *Cupressus funebris*.

<sup>34</sup> See Dar & Dar, 2006 and 2006a.

One tree was planted on Isola Madre, property of the Borromeo family. According to one testimony<sup>35</sup>, scions were later taken and grafted at the Rovelli nursery on the shore of the Lago Maggiore. From this nursery they were distributed to England. All reports show that, while the tree on Isola Madre was 18 to 20 meters tall, the tree in the greenhouse at Kew Gardens was only half that size (“30 feet”). This tree is a cultivar, and it is very unfortunate that it was used for the description of a taxon, when common wild specimens in Bhutan do not show such characteristics.

Unlike the Isola Madre tree, the second tree is a more typical Tsenden.

Is there a link between Carrière and the tree used by Farjon for the neotype? Did Carrière receive a seedling from the Borromeo? There is no trace of such gift. That said and to summarise, what is the evidence for and against the fact that Carrière could have received a Tsenden?

- For :

- there are roughly the same dates of introduction June 1862 and “around 1862” ;
- the names “Cipresso del Cashmere” and *Cupressus cashmeriana* (although the common name could have triggered the application of the existing Latin name which appeared as *Cupressus cashmeriana* Hort. before 1862) ;

- Against :

- Carrière would have known the exact year of the introduction if he had been in contact with the Borromeo family ;
- he would have also known that the supposed origin of the tree was not Tibet, but Kashmir (as that was the available – but mistaken – information at that time for the seeds received in Italy) ;
- Carrière used a name introduced in a book by Gordon before 1862, a name which is impossible to link to the Isola Madre tree; and there is no traceable material left from Gordon’s *Cupressus cashmeriana* Hort ;
- Carrière when giving the localities of the different species in his *Traité* is mostly accurate, not hesitating to bring a “?” when he is not sure of the information<sup>36</sup>; his mistakes – like for instance about *Cupressus funebris*, “Nord de la Chine”, are reflecting the current knowledge at that time. Suffice to say that there is no previous knowledge linking a cypress to Tibet ;
- Carrière put *Cupressus pendula* Griffith as a synonym of *Cupressus torulosa* and by doing this he acknowledged the existence of two different taxa, one growing in Bhutan and the second one east of Bhutan in Arunachal Pradesh [“Tibet”]<sup>37</sup>.

From all the present evidence, it appears that the name *Cupressus cashmeriana* Carrière cannot be linked with certainty to the Tsenden and that by all probabilities we are facing a series of coincidences which led to chose the Latin name not because of the description given by Carrière, but because of the name itself which corresponded to a locality name, when this locality name was also applied by mistake.

Now the following question is still open : what did have Carrière in front of him, if it was not a Tsenden? As already mentioned, there are at least two *Cupressus* species growing wild in Tibet, *C. austrotibetica* and *C. gigantea*. Both are north of the Himalaya main range. But closer to Bhutan, on the southern side of the Himalaya there is a third *Cupressus* species described as *Cupressus assamica* by Silba (1994) growing wild in what is now Arunachal Pradesh in India.

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<sup>35</sup> See Appendix 1.

<sup>36</sup> For instance : *Widdringtonia glauca*, p. 61, and *Retinospora juniperoides*, p. 141, Carrière 1867, and of course *Cupressus corneyana*, p. 128, Carrière 1855.

Farjon (1993) wrote : “With *C. corneyana* [Carrière] suggests ‘Japan?, China?’ (following Knight & Perry, 1850) as possible homelands.” Unfortunately, Farjon here is confused. Carrière (1855) first stated : “Cette espèce, dont l’origine est inconnue, [...]” (“This species whose origin is unknown.”) And in 1867, clearly : “Habite l’Himalaya”. The reference to Japan and China belongs to Gordon (1862 and 1880), who himself confused it with *Cupressus pendula* Staunton, that is *Cupressus funebris* Endlicher. If the question marks are present in Knight & Perry (“it is supposed”), they are absent in Gordon.

<sup>37</sup> The same conclusion could be put forward about *Cupressus torulosa* and *Cupressus corneyana*, except that by transferring in 1867 the later to a variety of *torulosa* he made this argument specifically invalid.

This region was still considered by European travellers to be part of Tibet in the first half of the twentieth century as one herbarium sheet at least testifies<sup>38</sup> (this area is nowadays still claimed by China as belonging to their country, part of the province of Tibet). Farjon is considering this species as a Tsenden, while Rushforth – who, unlike Farjon, had the opportunity to see the trees growing in the wild – confirms that it is different.

While we have tried to consider all theoretical possibilities following Carrière's protologue as tightly as possible, it is time to go for the real material cultivated in France. So far we considered only the trees grown in Italy and in United Kingdom, which are real Tsenden, although a cultivar selected for its beautiful appearance with drooping glaucous foliage. There are several trees labelled *Cupressus cashmeriana* in France and they are different from the Tsenden as usually circumscribed (Farjon 2005, D.Little 2005, etc.).

Among the oldest cultivated trees still living in France, there are three *Cupressus cashmeriana* at Les Cèdres Botanical Garden (private garden). Two of them were planted in 1935, while the third one – significantly larger than the two others – was likely planted at the beginning of the 20<sup>th</sup> century (archives were lost). Their origin is unknown, but they are different from the tree of Isola Madre or from any "*Cupressus cashmeriana*"<sup>39</sup> grown in Italy (see below for a summary of the differences). Younger and smaller trees are currently to be found in the following institutions :

- Botanical Garden of Lyon (in a greenhouse, without any pollen or seed cone) ;
- Botanical Garden of Geneva (growing outside, a cutting from the tree in Lyon, bearing numerous cones with fertile seeds) ;
- Villa Thuret in Antibes (a tree of unknown origin, grafted on a *Cupressus sempervirens* and producing lots of cones also with fertile seeds) ;
- Jardin des Plantes in Paris.

And this last tree is the most important information, for Carrière was the head gardener of the Jardin des Plantes. The tree currently growing in Paris is from a cutting taken from the previous tree which was uprooted by a tornado in circa 1985. It was grown at the beginning in a greenhouse and later planted outside, where it is currently thriving and coning. Although there is no archive allowing us to trace back this specimen to Carrière, it is reasonable to think that under glass or outside this taxon was propagated and distributed to several botanical gardens throughout France and especially in the south where the tree proved to be hardy, and more recently to Switzerland. All these trees have the same characteristics.

The main differences between the Tsenden and *Cupressus cashmeriana* are presented here briefly and will be discussed more at length in an article in preparation.

*Cones* : larger and serotinous in *Cupressus cashmeriana*, smaller and not serotinous in Tsenden ; number of scales to 14 in the former, to 12 in the later ;

*Seeds/cone* : higher in *Cupressus cashmeriana* than in Tsenden ;

*Pollen release* in Europe : the taxa do not release their pollen at the same time of year : cultivated *Cupressus cashmeriana* in October ; cultivated Tsenden in January ;

*Foliage* : foliage of Tsenden is variable, the glaucous-blue form, especially attractive for ornament, is a cultivar, the wild trees bearing a dark green foliage, like several cultivated

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<sup>38</sup> *Cupressus cashmeriana*, Pangchen, Nyam Jang Chu, S.Tibet, 7000 ft, 31.3.1936, F. Ludlow & G. Sherriff n° 1254 – BM835381. Pangchen is in Arunachal Pradesh, close to the border of East Bhutan.

<sup>39</sup> There are two other Tsenden on Isola Madre, one labelled *Cupressus funebris*, the second a younger one from Hillier's nursery ; there are also two more Tsenden in Villa Taranto, one large, but without cones, and one which is undoubtedly a clone or a seedling of the Isola Madre tree ; a tree close to a building in Intra was cut recently ; and finally there is a tree in Montreux, Switzerland and another at the horticultural school of Geneva, where it is barely surviving producing but a very few cones quite similar as those of the Isola Madre tree (a cutting from a tree cultivated in a greenhouse of the Botanical Garden of Geneva, which was cut down when the top reached the roof – it is common practice in botanical gardens to propagate a tree which has fallen or was cut because it became too big in a greenhouse).



ones ; the foliage of *Cupressus cashmeriana* is glaucous-grey and trees in the wild do not look different<sup>40</sup> ;

*Hardiness* : under cultivation, young *Cupressus cashmeriana* are less hardy than young Tsenden.

The specimen at the Botanical Garden of Geneva (CJB), although protected from the cold wind by a greenhouse, suffered badly from the cold wave of February 2012 and several branches and the top were killed ;

*Cotyledons* : longer with the Tsenden than with *Cupressus cashmeriana* ;

*Seedlings* : juvenile leaves of young seedlings of *Cupressus cashmeriana* are longer than Tsenden ones and the branching pattern is different ; *Cupressus cashmeriana* seedlings can be distinguished from any other *Cupressus* species ;

*Growth rate* : as a seedling, *Cupressus cashmeriana* grows quicker than the Tsenden.

Farjon by designating a neotype of *Cupressus cashmeriana* failed to study the trees still growing in France, especially in the Jardin des Plantes in Paris and in the south of France where the tree is hardy. He made an unnecessary critical assumption about the locality of origin and he did not consider one meaningful part of Carrière's description. As a consequence, Farjon's conclusions and neotypification of *Cupressus cashmeriana* Carrière have to be rejected altogether in application of the ICBN recommendation 9B and as belonging to another taxon.

Considering all the available material, considering the fact that we are able to distinguish at least two different taxa growing from Bhutan to Arunachal Pradesh ("Southern Tibet"), considering the ICBN recommendations, we have to discard the Latin name *Cupressus cashmeriana* to designate the Tsenden, we have to give back to Carrière what belongs to Carrière and to choose another neotype for *Cupressus cashmeriana* among the trees still growing in France. At the same time, *Cupressus assamica* Silba becomes a later synonym of *Cupressus cashmeriana* Carrière. Silba designated *Kingdon-Ward 12449* (BM) as the type of *Cupressus assamica* : the cones are showing the typical pattern of *Cupressus cashmeriana*. A photo by Rushforth of a tree growing in the wild near Rupa matches the trees growing in France (fig. 16 & 17, p. 64-65). The range of *Cupressus cashmeriana* is in Arunachal Pradesh close to Rupa : the wild stand of *Cupressus cashmeriana* occurs between Rupa and Shergoan, between 27° 10' 33" to 40" North and 92° 22' 7" to 40" East, at circa 2000m on limestone ; individual trees are planted such as at Rupa (Rushforth, pers. comm.). Field studies shall be undertaken to delimit it more exactly in a westward direction. In any case, the observations by Rushforth are confirming that this taxon, here attributed to *Cupressus cashmeriana* Carrière, is different from the taxon (or taxa) growing in Bhutan, namely is different from the Tsenden to which it was mistakenly appended.

To design a new neotype of *Cupressus cashmeriana* Carrière we choose a collection made at our request by Yves Pauthier at the Jardin des Plantes de Paris in December 2011.

**Neotypus (here designated)** : *Y.Pauthier s.n.* December 2011, **(P)** one specimen consisting in three herbarium sheets<sup>41</sup> :

- P02088769 : shoot with 2 seed cones ;
- P02088792 : shoot with pollen cones and 1 seed cone (in an envelope) ;
- P02088793 : shoot with pollen cones.

**Neoisotypus** : G, K.

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<sup>40</sup> The mature foliage shape of the glaucous Tsenden cultivar looks much the same as the *Cupressus cashmeriana* one, hence the confusion between both species. *Cupressus* foliage is quite usually deceptive, for it is an adaptative character, with quite few if any phylogenetic importance. *Cupressus nootkatensis* was classified as a *Chamaecyparis* mainly on its foliage characteristics, in complete contradiction with the very diagnosis of the genus *Chamaecyparis* by Spach.

<sup>41</sup> See ICBN, 8.3 : "A specimen may be mounted as more than one preparation, as long as the parts are clearly labelled as being part of that same specimen. Multiple preparations from a single gathering that are not clearly labelled as being part of a single specimen are duplicates, irrespective of whether the source was one organism or more than one (but see Art. 8.5)." G. Flament of the MNHN made sure that the 3 sheets have been "clearly labelled as being part of that same specimen."

## 6) *Cupressus funebris* Endlicher 1847, in Hooker 1888.

Hooker visited the Himalayan slopes during his trip to India from 1847 to 1851. He was in Sikkim in 1849 and 1850. There he observed more than once cultivated weeping cypresses. He gave the following description (1854, 1, XIV, 315-316) :

Here [Tassiding hill in Sikkim] I saw for the first time the funereal cypress, of which some very old trees spread their weeping limbs and pensile branchlets over the buildings.\* It is not wild in Sikkim, but imported there and into Bhotan from Tibet : it does not thrive well above 6000 feet elevation. It is called "Tchenden" by the Lepchas, Bhoteeas, and Tibetans, and its fragrant red wood is burnt in the temples.

\* I was not then aware of this tree having been introduced into England by the intrepid Mr. Fortune from China ; and as I was unable to procure seeds, which are said not to ripen in Sikkim, it was a great and unexpected pleasure, on my return home, to find it alive and flourishing at Kew.

The mention that the tree is imported is interesting and shall rely on hearsay as the true *Cupressus funebris* grows in China only east of Tibet and is likely not hardy in that province. Hooker in his Flora of India (1888, XV, 646) confirmed his opinion about the identity of the Tsenden with *Cupressus funebris*. He added the following precisions :

Planted near Buddhist temples in NEPAL, SIKKIM and BHOTAN, alt. 4-8000 fts.— DISTRIB. Wild in China.

A very handsom tree, attaining 60 ft., remarkable for its wide-spreading branches, and pendulous distichous Branchlets.— *C. pendula* is the first name given to this species, but it was preoccupied for *Thuja pendula*, Lamb., the *Biota pendula*, Endl., which genera are now reduced to *Cupressus*.

And at the same time, to add to the confusion, the following reference to the Tsenden, *Griff. Itin. Notes* 240 ; *l.c. Pl. Asiat.* t. 372, is given under *Cupressus torulosa* (Hooker 1888, XV, 645). This inadequate treatment will last until the very beginning of the 20<sup>th</sup> century and the production of cones on an imported sapling in England. A.B.Jackson remarked<sup>42</sup> :

It was formerly considered to be a well-marked variety of the Chinese Cypress (*Cupressus funebris*, Endlicher), [...] but it differs from *C. funebris* in having about ten seeds on each scale of the strobile instead of only three or four; it is probably, therefore, nearly allied to *O. torulosa*, and, indeed, may have be a seminal variety of that species.

The *cashmeriana* name applied hereafter will bring a further confusion.

## 7) *Cupressus funebris* var. *glauca* Masters 1896.

In 1910, Elwes & Henry explained in a footnote (5: 1162 [1]) how the tree arrived in Great Britain<sup>43</sup> :

This tree was presented to Kew in 1894 by Mrs. Forster, Homewood, Chislehurst, who informs us that she had received it from the Rev. F. Murray, formerly Rector of Chislehurst. Its origin is unknown.

Masters (1896), following Hooker 1888 for the species name, chose the *Cupressus funebris* var. *glauca* to designate the tree received at Kew two years before which is a clone of the Isola Madre tree, propagated in the Fratelli Rovelli nursery on the shore of the Lago Maggiore (see Appendix 1). It means that the name *Cupressus cashmeriana* applied to the Tsenden did not originate in the United Kingdom, and was also not imported with the tree. The same year Masters (1896a) is listing the Bhutan Cypress under *Cupressus torulosa*, giving the reference of Griffith illustration (1854a, plate 472 under the mistaken name "*Cupressus torulosis*"). Thus two different Latin names are given to the Tsenden without recognising their synonymy. In the second edition of the *Hand-List of Coniferae* (Masters 1903), *Cupressus kashmiriana* Hort. is further given as synonym of *Cupressus funebris* var. *glauca*.

Masters' identification has to be discarded taxonomically, for the Tsenden bears no close relation with *Cupressus funebris*.

<sup>42</sup> *The Gardeners' Chronicle*. 25 September 1915, p. 196. Jackson is right about the number of seeds of this cultivar. It matches the tree planted on Isola Madre. The photograph on the same page represents a shoot with the same cones and foliage as those of the mother Italian tree.

<sup>43</sup> See Appendix 1 for the available evidence about "*Cupressus cashmeriana*" in the British Islands.

## 8) *Cupressus himalaica* Silba 1987.

Understanding that there was a problem with *Cupressus cashmeriana* being applied to the Tsenden, especially as there was no type designated by Carrière, Silba (1987) chose to describe the Bhutan Cypress as a new species under the name *Cupressus himalaica*. The designated holotype was correctly collected on a tree from Nordbing and corresponds to material from a wild population in Bhutan. The merit of the name chosen by Silba is that it is not ambiguous.

## Conclusion

According to the ICBN nomenclature rules, the correct Latin name for the Tsenden, the Cypress of Bhutan, is *Cupressus tortulosa*. Farjon, to cover his mistake, made a proposal to conserve *Cupressus cashmeriana* against *Cupressus tortulosa*. This is a further mistake because Farjon is confusing two distinct taxa. In an article in preparation we will bring statistical data and develop our observations (only summarised here) leading to this conclusion. Because there are two species, this makes Farjon's proposal (Farjon 2010) irrelevant as his neotype of *Cupressus cashmeriana* is in fact a Tsenden, for which the priority name *Cupressus tortulosa* will remain. Should nevertheless Farjon's proposal been formally accepted – apparently not for the very reasons advanced by him, but on the similarity of the names *tortulosa* and *torulosa*<sup>44</sup> – a new proposal should be brought forward to get rid of *Cupressus tortulosa* in favour of *Cupressus corneyana*.

Currently the correct taxonomical treatment for the species discussed here is the following :

***Cupressus tortulosa*** Griffith 1854, *Notul. Pl. Asiat.* 4: 26.

= *Cupressus corneyana* Knight & Perry 1850, *Traité des Conifères*, 19, *nomen nudum*.

= *Cupressus corneyana* Carrière 1855, *Traité des Conifères*, 1<sup>st</sup> ed., 128.

= *Cupressus funebris* var. *pendula* Masters 1896, *Kew Hand-List Conif.* 37, *nomen nudum*.

= *Cupressus himalaica* Silba 1987, *Phytologia*, 64 (1): 80.

**Syntypes** : Plate 372, *Icones Plantarum Asiaticorum* Vol. 4 ; Griffith 27 (K) ; Griffith 529.

***Cupressus cashmeriana*** Carrière 1867, *Traité des Conifères*, 2<sup>nd</sup> ed., 160.

= *Cupressus assamica* Silba, 1994, *J. Int. Conifer Preserv. Soc.* 1 (1): 19.

= *Cupressus pseudohimalaica* Silba, 1994, *J. Int. Conifer Preserv. Soc.* 1 (1): 23<sup>45</sup>.

**Neotype** : Y.Pauthier s.n., December 2011 (P!).

Now, there are still several points to clarify. All the described species from Bhutan found their origin in cultivated trees grown close to temples or fortresses, except *Cupressus himalaica* collected wild by Grierson & Long in 1979<sup>46</sup>. Do these trees originate in the wild populations of Bhutan or were they imported from another area, like Hooker (1854) is hinting ? Are they conspecific or are they different ? In the later case, *Cupressus himalaica* would be resurrected. So far, there is no evidence that the wild population near Nordbing is different from the cultivated trees : these trees are mostly cultivars selected inside the wild Tsenden populations as shown by G.Miehe, S.Miehe & Gurung (1999). Currently available statistical information shows no meaningful differences in cone size, shape, scale number or seeds by cone.

Further studies are necessary to clarify the relationships of the wild populations of cypresses growing south of the Himalayan main range, between themselves and with the cultivated trees both around the fortresses and monasteries and in Europe. Most wild populations are difficult to access. So far three distinct species are recorded (*Cupressus torulosa*, *tortulosa* and *cashmeriana*, the last two described from cultivated material in Bhutan or in Europe). The

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<sup>44</sup> To decide to reject a name because of that rule is highly arbitrary as per the examples given in the rules. It is our opinion that the priority rule is of much greater importance and shall be respected and enforced with the only exceptions of two words having the same pronunciation.

<sup>45</sup> Based on one of the trees cultivated in Les Cèdres Private Garden, this species merely represents the French taxon described by Carrière.

<sup>46</sup> Certainly the easiest wild Tsenden population to access. As such it will be worth investigating its history.



isolation of some populations in deep valleys of the Himalaya, several notes in articles and other information are leading to the provisory conclusion that the case for this group of beautiful trees is still far from closed. D.B.Gurung is hinting that there could be more than the currently described and recognised species. If such is the case, the research shall be conducted not on a few dry herbarium specimens, but with a scientific approach (see appendix 2).

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## Appendix 1 : “*Cupressus cashmeriana*” in the British Isles.

As already acknowledged the first record of the name *Cupressus cashmeriana* appears in Gordon 1858 under *Cupressus cashmeriana* Hort. as a *nomen nudum* (and under *Cupressus cashmeriana* Royle in the index) which will be unearthed by Carrière 1867 in the second edition of his *Traité des Conifères*. Gordon is considering it as a mere synonym of *Cupressus torulosa*, which seems quite impossible if he had examined any tree later listed under *Cupressus cashmeriana*.

The second mention is in *The Journal of Horticulture* 18 July 1871, 323, in an article describing a tour in some Irish gardens, here in Powerscourt, Co. Wicklow :

Near this, on the way to the kitchen garden, are many more Conifers of the rarer sorts—*Picea grandis*, *Picea nobilis magnifica*, both very fine ; *Cupressus cashmeriana*, very elegant ; *Thuja elegantissima*, truly elegant ; two very handsome plants of *Thujopsis dolabrata* and *T. laetevirens* ;

Unfortunately no other information was found on that tree, which did not arrive to Kew in any way.

In his second edition of *The Pinetum*, Gordon (1875) did not bring any change about his *Cupressus cashmeriana* listed as Hort. in the synonym list under *Cupressus torulosa* and still listed as Royle in the index. In the November 1874 catalogue of the Lawson Seed and Nursery Company appended at the end of Gordon's book, a *Cupressus cashmeriana* Hort. appears together with *Cupressus corneyana* and *Cupressus torulosa* among other cypress species. It was sold 1s6d to 2s6d. The first edition of the *Veitch's Manual* (1881), following Gordon, mentioned *Cupressus cashmeriana* Hort. as a synonym of *Cupressus torulosa*. This is again the case in the *Illustrated Dictionary of Gardening* published in 1884.

The first author to make a link between the taxon described by Carrière and the plant growing in the temperate house at Kew since 1894 was Kent in the second edition of *Veitch's Manual of the Coniferae* published in 1900<sup>47</sup>. He described it as *Cupressus torulosa* var. *kashmiriana* giving *C. cashmeriana* Royle ex Carrière as synonym. Nothing is said about its origin. Prior to that date the tree was misidentified as a *Cupressus funebris* by Hooker (1854, 1888) or as a glaucous variety of this species by Masters (1896).

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<sup>47</sup> In the first edition of the *Veitch's Manual of the Coniferae* published in 1881, *Cupressus cashmeriana* as a distinct species is unknown.

In *The Garden* of the 6 July 1907, p. 320, *Cupressus cashmeriana* appears in a list of trees damaged by frost during the previous winter. This list is a summary of 20 reports gathered from throughout the country. Obviously there is at least one tree grown outside. But there is no information about its origin.

In 1910, Elwes & Henry are giving the first as far as possible complete description of the tree growing at Kew, including the cones, and referencing it under the very taxon described by Carrière. Although the tree is traced back to the donor, the very origin itself is still unknown. But following Beissner (1906)<sup>48</sup>, Elwes identifies it as the same species as the one growing on Isola Madre and already 60 feet high (20 m) in 1906 when he visited Northern Italy. The tree in Kew is half that size in the greenhouse. Elwes comes back with viable seeds which he will sow in Colesborne.

In 1912, Elwes wins a first prize by exhibiting 12 species of conifers, among which is listed the *Cupressus cashmeriana* (*The Gardener's Chronicle*, 25 May 1912). And the next year finally the word spreads out that this tree can be purchased at the Rovelli nursery on the shore of the Lago Maggiore in Italy where it is propagated by cuttings. The author Clinton-Barker (1913, 3: 47) is also the first to publish a photograph of a shoot bearing cones of the tree in the Kew greenhouse. It is the first evidence that this tree is identical as the one growing on Isola Madre.

Jackson in 1915 summarises what is known about this taxon and repeats most of the information already published (*The Gardener's Chronicle*, 25 September 1915, p. 196).

Reacting to this last article, one Mr. Arkwright informs that he purchased from Rovelli nursery in Pallanza *Cupressus cashmeriana*, *Cupressus* species "Hills of India" and *Cupressus Kamaon*. (*The Gardener's Chronicle*, 23 October 1915). One week later, the next article by A. Henry (*The Gardener's Chronicle*, 30 October 1915) brings new information identifying "undoubtedly" and with "all probability" the two last species of Mr. Arkwright as *Cupressus lusitanica*. Unfortunately no description is given to support these assertions. He is apparently not aware that Elwes brought to England viable seeds from his trip in 1906.

Later mentions of "*Cupressus cashmeriana*" do not bring new information about its arrival in Great-Britain or its taxonomy.

From the preceding evidence, it is possible to propose a few conclusions :

- the *Cupressus cashmeriana* Hort. is a *nomen nudum* first mentioned by Gordon in 1858 as a mere synonym of *Cupressus torulosa* and copied later on ; as a *nomen nudum* the binomial name was not validly published and remained available to describe a new taxon ; no trace of the trees obviously sold by some nurseries remained and it is impossible to identify those trees ;
- there is no way to trace back the taxon described by Carrière to Great Britain ; it is obvious that the taxon described by Carrière, if present in Great Britain, would never have been considered as synonymous of the *Cupressus torulosa* ; also, when several of the *Cupressus* species displayed at Knight & Perry nursery remained without knowledge of their origin or with erroneous ones<sup>49</sup>, Carrière gave a clear information about Tibet, an information that cannot be discarded without being proved wrong, which is not the case ;
- the tree given to Kew in 1894 came without a Latin name or with a false one, as it was not immediately matched with Carrière's *cashmeriana* ; but its origin can be traced to the Rovelli nursery in Pallanza when they were propagated by cloning ; it is not possible to decide if the name was lost by the first purchaser or if Rovelli nursery had sold it under another name, for instance the common name "Cipresso del Kashmere" or *Cupressus* sp. "Hills of India" ;
- in 1906, Beissner reported of two *Cupressus* species introduced recently in Germany : *Cupressus* sp. "Hills of India" and "*Cupressus cashmeriana* Royle aus Tibet"<sup>50</sup> ; contrary of what Elwes understood, it is clear from Beissner's report that only the first species came from Rovelli nursery in Pallanza. He gave identical descriptions of the foliage for both species, neither one matching the *Cupressus lusitanica* advocated by A. Henry ; so that it is possible to make the hypothesis that the *Cupressus cashmeriana* observed by Beissner was coming from France, especially from the "South" where he saw immaculate plants of unsurpassable elegance, and that the Rovelli plant was a sister of the Isola Madre tree, but not the cultivar growing on the island of the Lago Maggiore. A further precision by Beissner says that the *Cupressus cashmeriana* Royle aus Tibet is "[e]ine noch zartere reizendere hellblau gefärbte Erscheinung"<sup>51</sup> ;
- as Carrière's specimen was not yet producing cones, his description relied only on the foliage of a young plant and as his description was matching more or less (except for the flabellate shoots of seedlings) the foliage of the Isola Madre tree, the identity was accepted without a further investigation on the trees grown in France. This lack of inquiry persisted until D.Little (2005) and Farjon (2011). Silba gave a new Latin name *Cupressus pseudohimalaica* for the trees growing in Les Cèdres Private Garden, but failed to connect the dots to bring *Cupressus cashmeriana* Carrière in the front scene with statistical data to separate both taxa, one growing in France the other in Italy, the Tsenden. As a common name for *Cupressus cashmeriana* Carrière, we propose Carrière Cypress or Arunachal Cypress, but certainly not Kashmir Cypress which is a misnomer.

<sup>48</sup> As we will see, the report by Beissner was likely misunderstood by the authors.

<sup>49</sup> *Cupressus majestica*, *Cupressus knightiana*, *Cupressus corneyana* to name three of them.

<sup>50</sup> ["*Cupressus cashmeriana* from Tibet."]

<sup>51</sup> ["An even more tender more charming light blue coloured appearance."]

## Appendix 2 : Short note on the methodology for building a taxonomy.

Several studies on the Cupressaceae are using the foliage to separate the taxa. The main problem with such approach is that it led in the past to several serious mistakes which were corrected only recently, but which are still widely reproduced. The foliage is highly variable and under the direct influence of the climate, when adaptation is a necessity to allow the plants to develop and survive. The great number of cultivars is testimony that foliage is not reliable to build a taxonomy. The most well known confusing mistake was done with *Cupressus nootkatensis*, which was long wrongly classified under *Chamaecyparis*. The main reason for that choice was the foliage viewed as similar to the *Chamaecyparis* taxa. The same mistake was done in the opposite direction when the genus *Fokienia* was created. Rushforth (2007) considering the cones rather than the deceptive foliage merged *Fokienia hodginsii* (Dunn) A. Henry & H.H. Thomas into *Chamaecyparis* [*Chamaecyparis hodginsii* (Dunn) Rushforth]. Rushforth's observations are confirmed by all recent molecular analysis. Farjon (1998, 2001), until he described a new genus *Xanthocyparis* for *Cupressus vietnamensis* (Farjon & Hiep) Silba, was perpetuating this mistake (*Chamaecyparis nootkatensis*) despite the analysis by Frankis (1993). *Cupressus funebris* for the same reason (foliage) like the Nootka Cypress was often put under *Chamaecyparis*, when not under the resurrected genus *Callitropsis* (de Laubenfels 2012). In an article in preparation we will deal more in details with this case. It is enough to consider the conclusive results of Frankis (1988) when dealing with the taxonomy of the Pinaceae by studying and comparing the reproductive organs. More recently Schulz & Stützel (2006) studied in details the pollen cones of the *Chamaecyparis* species to build an identification key based on a statistical approach, which was able to separate the different species decisively. The conclusion follows that the observation of foliage (under direct weather influence) cannot have the same weight as the study of the reproductive organs.

The second problem is the treatment of the data. Quite generally there is no statistics and the sample size is ignored. When molecular analyses are treated by computer algorithms with the hypothesis that evolution has followed a most parsimonious path (has this hypothesis ever been verified and how to verify it ?), no morphological data has been submitted even to a simple statistical presentation (Krüssmann 1983, Silba 1983, Farjon 2005, 2010, Eckenwalder 2009, Debreczy & Rácz 2011, etc.). D.P. Little (2005) first is providing partial statistical data, but still forgets to give the sample sizes and if the samples are from herbarium sheets or from fresh material and if from wild or cultivated trees. The Italian team dedicated to the study of the *Cupressus* species in Firenze and lead by P. Raddi (see for instance Raddi & al. 2013) are providing interesting statistical data in separated articles for the German *Enzyklopädie der Holzgewächse*.

The last problem is the copy of previous data without further new observations. For instance in his dissertation, Schulz (2005) gives for the number of *Cupressus* cotyledons exactly the same data as Silba (1986). Any possible mistake is thus reproduced without end, especially when the source is not specifically mentioned. Another example : the cotyledons of *Cupressus torulosa* are usually given as more than 2 (Camus 1914 : "Cotylédons 3-5", Farjon 2005 : "Cotyledons (2-)3-4(-5)" without mention of any exact reference. The source of this mistake is provided by A. Camus (1914, 43) : "Hill and De Fraine in *Ann. Bot.*, XXII, p. 699 (1890)." <sup>52</sup> Unfortunately the origin of the seeds is not recorded by Hill and De Fraine, who observed : "The number of cotyledons varies from three to five ; thus out of twelve plants, nine had three, two had four, and one had five seed-leaves." <sup>53</sup> Silba (1986) and D.P. Little (2005) give the correct number of cotyledons, two, confirmed quite recently by Silba (2013) from seeds with a perfectly documented wild origin.

Is taxonomy a science or an art? If it is only a matter of opinion, the later will be true, if a scientific methodology is used combining morphological and molecular data as well as thorough observations on phenology, physiology, ecology (edaphic conditions and climatic exposures) and geography, then taxonomy may become a science. The path is open.

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<sup>52</sup> The exact reference is : *Annals of Botany*, Vol. XXII. No. LXXXVIII. October, 1908.

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**Fig. 3 & 4 :** *Cupressus tortulosa*, cultivated, Isola Madre, northern Italy. The seed which gave rise to this magnificent tree was received by the family Borromeo in 1862. These photos were taken on the 9 September 2004, before the huge tree was uprooted by a local tornado in Jun 2006. The tree was replanted and it is recovering slowly but surely. **Fig. 5 :** Two younger *Cupressus tortulosa*, cultivated, Isola Madre. **Fig. 6 :** *Cupressus tortulosa*, cultivated, Italy. This specimen has the same cone and foliage characteristics as the 151 years old cypress.





**Fig. 7 :** *Cupressus tortulosa*, cultivated, northern Italy. 18 May 2011.











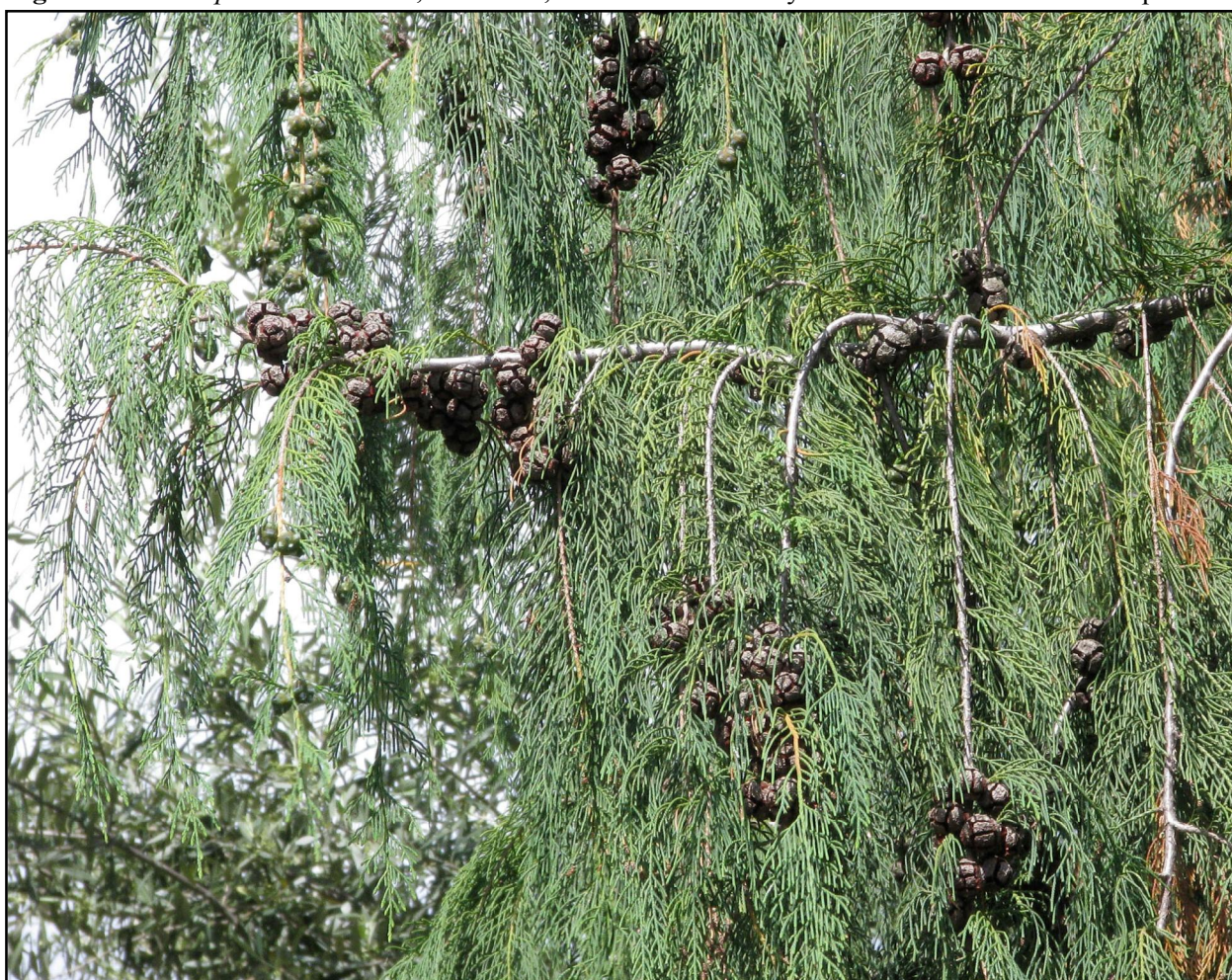
**Fig. 8, page 60 :** *Cupressus tortulosa*, cultivated, France, origin Bhutan. **Fig. 9, p. 60 :** *Cupressus tortulosa*, *C. gigantea* & *C. cashmeriana* planted side by side [from left to right], France. 6.8.2013. **Fig. 10, 11 & 12 :** *Cupressus tortulosa*, cultivated, northern Italy. 29 September 2010. All cones older than 18 months are open.







**Fig. 13 & 14 :** *Cupressus tortulosa*, cultivated, Switzerland. 17 May 2011. All mature cones are open.





**Fig 15 :** *Cupressus cashmeriana*, Jardin des Plantes de Paris, 7 September 2011. Neotype.





**Fig. 16 :** *Cupressus cashmeriana* growing wild near Rupa, Arunachal Pradesh, India. Note the pendulous foliage and the very similar appearance with the tree in Geneva. Photo © Keith Rushforth, October-November 2008.





**Fig. 17 :** *Cupressus cashmeriana*, cultivated, CJB Geneva, Switzerland. The actual foliage is greyer.



**Fig. 18 :** Cones of *Cupressus cashmeriana*, CJB Geneva. [Ruler with cm and mm.]





Fig. 19 & 20 : *Cupressus cashmeriana*, cultivated, Les Cèdres Private Garden, France. 20 February 2012.





**Fig. 21 :** *Cupressus cashmeriana*, young cones after pollination, Les Cèdres Private Garden, France. 20.2.2012.



**Fig. 22 :** *Cupressus cashmeriana*, one year old cones, Les Cèdres Private Garden, France. 20.2.2012.



**Fig. 23 :** *C. cashmeriana*, mature cones more than 2 years after pollination, Les Cèdres Private Garden. 20.2.2012.





Fig. 24, 25 & 26 : *Cupressus cashmeriana*, cultivated, grafted, Villa Thuret, France. 6 August 2013.







**Fig. 27 :** *Cupressus tortulosa* foliage, cultivated, France, origin Bhutan.



**Fig. 28 :** *C. tortulosa* foliage, cultivated, northern Italy.

**Fig. 29 :** *Cupressus tortulosa* foliage, cultivated, Italy.



**Fig. 30 :** *C. tortulosa* cones and foliage, cultivated, Italy. The cones are still immature. 11 September 2009.



**Fig. 31 :** Foliage of a *Cupressus cashmeriana* seedling showing a somewhat flabellate disposition of the tip of the shoot.







**Fig. 32 :** *Cupressus tortulosa*, cultivated, Isola Madre, Italy. First tree.

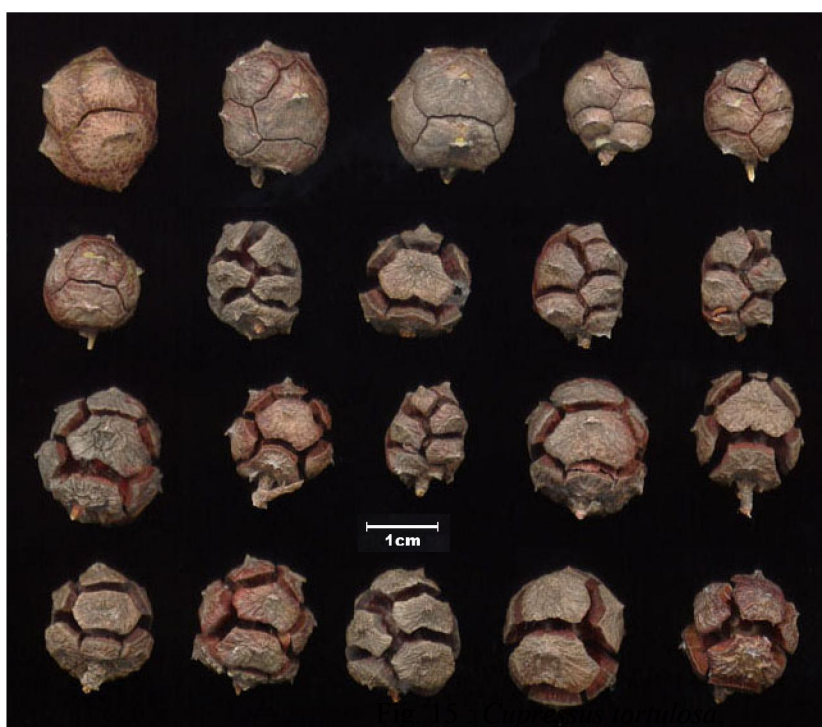
[All photos of cones on these two pages are at the same scale.]

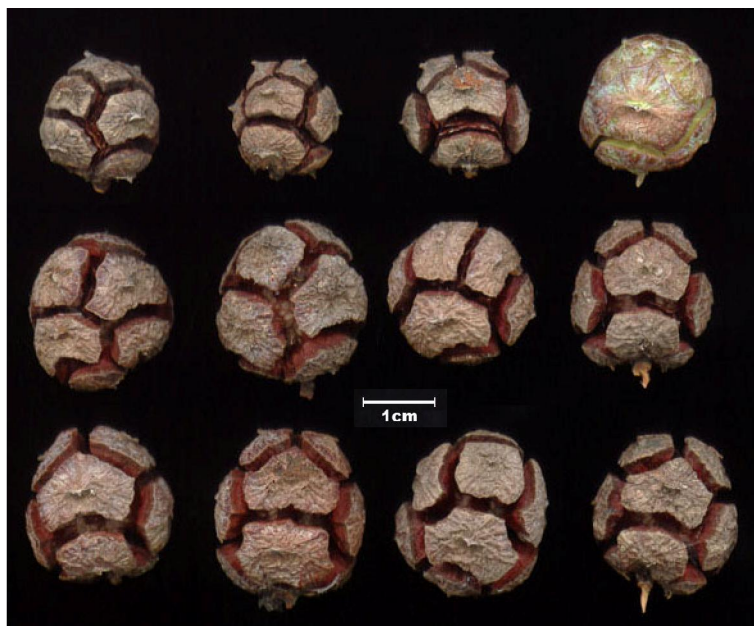


**Fig. 33 :** *Cupressus tortulosa*, cultivated, Isola Madre, Italy. Second tree.



**Fig. 34 :** *Cupressus tortulosa*, cultivated, northern, Italy. Third tree.



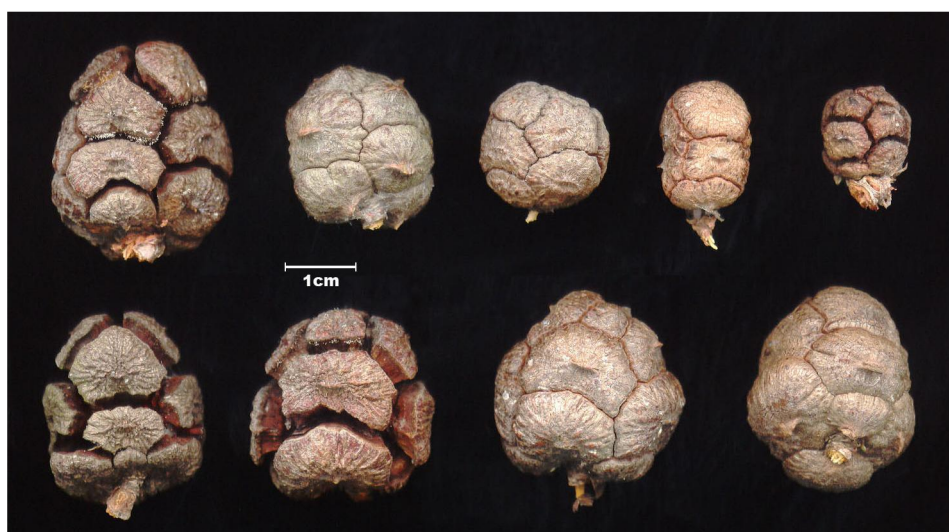


**Fig. 35 :** *Cupressus tortulosa*, cultivated, northern, Italy. Fourth tree.



**Fig. 36 :** *Cupressus cashmeriana*, Les Cèdres Private Garden, France.

Note the light brown one year old cones and the grey mature cones, two years and a few months after pollination.



**Fig. 37 :** *Cupressus cashmeriana* cultivated, CJB Geneva, Switzerland.

Note : the smallest cones present a very high percentage of aborted seeds.



## BOOK REVIEW

– ‘**The genus Araucaria** - An illustrated overview of its species’  
 (“Araucaria – Alle Arten der Gattung in Bild und Text”)

by **Hubertus Nimsch**

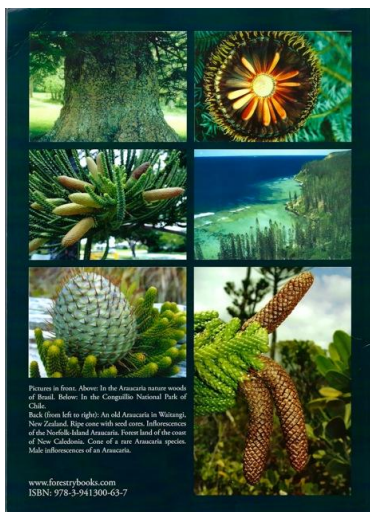
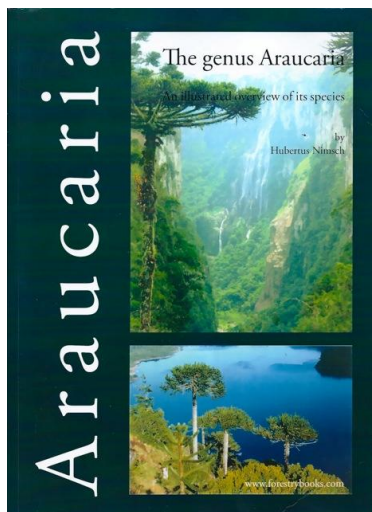


Fig. 1 & 2 : Covers of the Edition in English

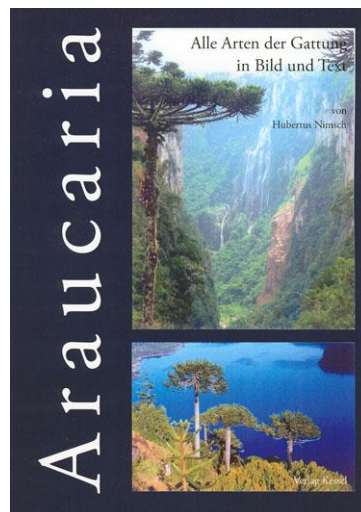


Fig. 3 : German original edition

2011, Kessel Publishing House, 241 pp.  
 ISBN: 978-3-941300-63-7  
 \$58.00 Euro

After visiting the Andes of southern Argentina and Chile, and seeing the beauty of *Araucaria araucana* (see <http://www.pinetum.org/JeffARaraucana.htm>) I became interested in learning more about this unusual genus. Upon returning, I made a search on the web only to be disappointed to find that there were no books available on the subject. In 2011 finally, a book was published covering the entire genus. However I was once again disappointed to find it was only available in German. Now with the release of the English and French additions of *The genus Araucaria* - An illustrated overview of its species I finally have a book I can read on the subject, and it was well worth the wait!

This unique genus of southern hemisphere conifers is composed of 19 species. Two are in South America, three in Australia and Papua New Guinea, one on Norfolk Island and amazingly, thirteen species on the island of New Caledonia. The book covers all nineteen species with interesting, easy to understand comments, a short description for quick reference, range maps and 6-8 pages of line drawings and beautiful photographs. The photographs include each species in its native habitat, detailed photos of cones, foliage and bark along with other details, and some of the associated flora. Several *Araucaria* species were photographed by H. Nimsch at the Arboretum Freiburg Gunterstal in Germany where they are cultivated. Silba recently observed over 12 species of *Araucaria* cultivated at Balboa Park in San Diego, of which many are now showing adult morphological features of strobili and cones. Also, great efforts are being taken by a joint effort between UC Santa Cruz, Atlanta Botanic Garden and Montgomery Botanical Center (Coral Gables, Florida) to make the general public more aware of these magnificent trees and the need to conserve them through *ex-situ* conservation in botanic gardens worldwide.

Few of us will have the opportunity to see these uniquely beautiful conifers in their native habitats, however, with this book it is not hard to imagine yourself there. We highly recommend this book to anyone interested in these strangely beautiful, almost pre-historic looking trees, or anyone who wants to explore some of the many treasures found in the far corners of the earth.