



SINO-HIMALAYAN BAMBOOS ON THE US WEST COAST

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The ABS and local Chapters invited me to the West Coast in October to identify several bamboos grown there, and to lecture to the Oregon Chapter in Portland and at the ABS national meeting in Saratoga. I am very grateful to all those who showed me such kind hospitality, and hope that I can help with some of the problems concerning naming of the Sino-Himalayan bamboos that I found in cultivation.

There are two aspects to bamboo names. Firstly all bamboos have to be correctly identified at species level. This is crucial and it is never acceptable for the wrong species name to be applied. Secondly the species should be grouped into genera of closely related species that share common morphological characters. This is less clear-cut as different people have different ideas on how small or large such genera should be, and which characters should be used to unite species. In this way a species can legitimately be listed under different genera.

Horticulturalists and foresters often feel that it is useful for the genera they recognize to reflect visible characteristics important to them, such as whether they spread widely or stay in clumps, and relative hardiness. They also prefer a simple 2-level classification system, with genus and species, the binomial system of Linnaeus, adding their own cultivar names to these for a third level. Pure taxonomists may group species according to cryptic characters such as those found in their anatomy, and may use many different levels of classification.

The subtropical Sino-Himalayan bamboos are growing surprisingly well in this part of the USA, despite the dry summers, even when given little or no irrigation. They are used to high daytime temperatures in the long dry winter and spring of the monsoon climate at southern latitudes, and that may make them better suited to the West Coast summer. Also the relatively cloudy monsoon summers are not all that different from the mild winter and spring in California. Sprouting in spring and autumn in California, they may be completely confused about what the season really is. On the whole though they seem to have adapted well, especially when they are sheltered from extremes of temperature by buildings or tall trees.

THE MANY-BRANCHED SUBTROPICAL BAMBOOS, GENERA *DREPANOSTACHYUM* AND *HIMALAYACALAMUS*

These bamboos are distinguished from the more temperate bamboos in genera such as *Fargesia* and *Yushania* by their shorter buds (onion-shaped rather than chilli-shaped), and by the delicate glumes in their spikelets. Keng (1983) named two genera for them. Further species have since been found in the Himalayas, giving a better picture of the characteristics of both these groups.

Drepanostachyum species are smaller in stature and culm diameter, have more swollen nodes, and the culm sheath interior is slightly to densely scabrous inside at the top, just below the ligule. This scabrous culm sheath interior is a very useful character, and can be felt by the

tongue even when not visible (not to be tried on plants that have been sprayed!). The spikelets are usually on curving sickle-shaped branchlets at first, hence the name (*drepanos* = sickle, *stachys* = ear of corn). Mid-culm branches are similar in size and there are up to 80 branches at each node. The type species of the genus is *Drepanostachyum falcatum*, named because of its falcate (sickle-shaped) flowering branches.

Himalayacalamus species are larger and taller with thinner-walled, straighter culms. At the culm base the internodes decrease in size progressively rather than suddenly. This gives extra strength in this region where lateral stresses are higher, and helps to support their thinner-walled, taller culms. Most spikelets contain just one floret, with less than half the spikelets containing two. The spikelets are usually in short racemes; initially single or later clustered in dense bunches. Mid-culm branches are subequal with a dominant central branch and there are up to 25 branches at each node. The type species is *Himalayacalamus falconeri*, named after Hugh Falconer, a Scottish botanist who worked in India.

Ecologically these two groups are found in rather different habitats. *Drepanostachyum* is more drought-tolerant and occurs naturally in dry subtropical Oak forest. *Himalayacalamus* is generally found at higher elevations in moister more mixed forest types. In terms of winter hardiness, as a rule *Drepanostachyum* species are Zone 10 plants, while *Himalayacalamus* species are successful in Zone 9 and with care and selection of hardier species and clones could be used in Zone 8.

Genetically these two Himalayan groups seem to be closely related, and in most characters a complete range of variation can be found. Species that are in the middle of the range can sometimes be placed in either group according to which character is considered most important. This is not unusual in the bamboos or the grasses as a whole as we are dealing with plants that can and do interbreed and are still evolving. The presence of discreet well-separated groups of plants that form clearly distinguishable taxa is, unfortunately, usually just wishful thinking on the part of *Homo sapiens*. Considering the ends of the spectrum of characters, and applying the breadth of generic concept traditionally applied in the bamboos, there is sufficient variation in a broad range of morphological and ecological characters to warrant recognition of two separate genera. I favour the use of presence of scabrous points inside the culm sheath to separate them, even if they are very small, as this is a very unusual character in the bamboos.

Although these two genera appear to be very closely related and could even be considered to represent one genus with a continual range of variation, they have often received substantially different treatments in the past. *Himalayacalamus* species have been included in *Thamnocalamus* because of their congested inflorescences (Clayton & Renvoize, 1986; Chao, 1989), while *Drepanostachyum* species have been included in *Sinarundinaria* (*Yushania*) because their inflorescences are more open (Clayton & Renvoize, 1986; Chao, 1989).

Because of its many branches, *Drepanostachyum* has even been placed alongside *Chusquea* at supra-generic levels, assuming that they are closely related (Keng, 1987; Yi, 1988; Yi, 1997; Keng & Wang 1996), while placing *Himalayacalamus* in a different tribe altogether. Our knowledge of phylogeny in the bamboos from molecular investigations now makes this impossible to accept.

They were both placed within *Fargesia* by T.P. Yi (1988), in Section *Sphaerigemma* (meaning rounded buds). Within that Section, species of *Himalayacalamus* were placed in Series *Collares* (with larger culms and a dominant central branch), and species of *Drepanostachyum* in Series *Ampullares* (with smaller culms and many similarly sized

branches). It would appear that Yi has inadvertently duplicated Keng's genera by describing this Section and his two Series.

Keng & Wang in the Chinese language Flora of China (1996) recognized both the genera *Drepanostachyum* and *Himalayacalamus*, in addition to T.P. Yi's two Series within *Fargesia*. In that way the same two taxa appeared at different places, at different levels, and with different names.

T.P. Yi himself also recognized *Drepanostachyum* in addition to two Series within *Fargesia* in his account of the Bamboo Flora of Sichuan (1997), but he seems to have used it for species that mostly seem to be *Ampelocalamus* instead.

In India the two genera *Drepanostachyum* and *Himalayacalamus* are recognised (Majumdar 1989; Tewari 1992), following the classification of Keng (1983).

Moving from the Himalayas into Central & SW China there are relatives of these groups that do not seem to fit into either Himalayan category. As these bamboos are little known, have not been studied in their natural habitats, and have not had their generic characters considered in depth, it is not possible at the present time to place them properly. Such bamboos would be placed in *Fargesia* by most Chinese, or possibly placed in a strange interpretation of *Drepanostachyum* along with the *Ampelocalamus* species. One such species, published with the unofficial name *Himalayacalamus intermedius* by Gerald Bol, is known only in cultivation. Further fieldwork in China is clearly required.

Species seen in Oregon & N California

1. *Himalayacalamus hookerianus* (Munro) Stapleton (still misidentified in USA as *Drepanostachyum falcatum*)

The Himalayan Blue Bamboo

For the full story on this bamboo see ABS Newsletter 15(3). It was realised in Europe in 1994 that this plant had become misidentified, and the name was corrected, with a colour painting commissioned for the first article of the New Plantsman magazine illustrating the beautiful blue culms. It can now be confirmed that the Blue Bamboo in California is indeed *H. hookerianus*.

2. *Himalayacalamus falconeri* (Munro) Keng f. 'Damarapa' (still misidentified in USA as *Drepanostachyum hookerianum*)

The Candy-Stripe Bamboo

While *Himalayacalamus hookerianus* was misidentified, that name had become applied to a different bamboo with culms that take on rose-red, yellow and green stripes when chilled. Demoly (1991) realised this mistake and gave the bamboo the cultivar name 'Damarapa', from the Tibetan for red, assuming that it came from Tibet, and placing it in the species *H. falconeri*. It was interesting to see white stripes appearing on the leaves of some plants of this cultivar. Apparently this is common on plants grown in the heat of California. As we do not know where this cultivar originated and its flowers have never been found, its placement in the species *H. falconeri* is speculative.

3a. *Himalayacalamus asper* Stapleton (misidentified in USA as *Neomicrocalamus microphyllus*).

Kew Grass Garden clone.

Merlyn Edwards collected this dainty bamboo with small leaves in Nepal's Lower Langtang Valley. The delicate clone has peculiar and distinctive colouring when exposed to even slight cold, with patches of yellow, orange and purple-red to brown appearing on the leaves when chilled. In the Grass Garden at Kew it was rather unfortunately given the speculative name *Arundinaria microphylla* in the late 1980s. *Pleioblastus viridistriatus* was similarly given the non-existent and misleading name that it still bears, *Phyllostachys aureospicata*.

As *Arundinaria* is obviously the wrong genus for this clumping bamboo, some other helpful and anonymous soul decided that it must be *Neomicrocalamus microphyllus*. Under that name it became distributed in the USA, until Gib Cooper sent me some samples and I could start to speculate on how it might have obtained such a totally inappropriate generic name. Seeing the plant in real life in Gold Beach only confirmed my suspicions. It seems to be identical to the clone from the Kew Grass Garden. This clone could usefully be given a cultivar name such as 'Small-leaf'. Note that a Latin name such as 'Microphylla' cannot be given as a cultivar name according to the rules on cultivar names. Unfortunately any such naming may not be necessary, as the two other clones of this species collected in Langtang have both flowered, and its days are probably numbered.

3b. *Himalayacalamus asper* Stapleton (seedlings from flowering in Scotland). Ned's Seedlings.

Presently being raised in Portland at the Bamboo Garden, these seedlings are from a 2nd clone introduced by Merlyn Edwards, which attained substantial size in Scotland with larger leaves and culms, before flowering. Characteristics of the seedling clones should be watched.



4. *Drepanostachyum sengteeianum* Stapleton ined. (misidentified in USA as *Drepanostachyum falconeri*). Seedlings.

Presently being raised in Oregon & California, these plants have a curious history, under investigation since Gib Cooper sent material to Kew a few years ago. It seems that this bamboo was grown in the Temperate Palm House at Kew around 1900 but died. Misidentified at Kew as well as in the USA, it is closely related to *Drepanostachyum falcatum*, but differs in the ring of dense brown hairs around the culm node and culm sheath base. It is presently being described as a new species in honour of Dr Seng Tee Lee of Singapore, who has kindly funded my position at Kew from 1994 to the present time. It is suspected that it originated in the NW Indian Himalaya.



5. *Drepanostachyum khasianum* (Munro) Keng f.

The plants cultivated under this name would appear to be correctly named. This is surprising, as the name has so often been misapplied to other species. The origin of the plants is unknown. Compared to material in the herbarium at Kew, and to plants seen in Bhutan, it has larger leaves but otherwise the culm, culm sheath and leaf sheath characters seem to fit

correctly. This is a species that is near the centre of the variation in the *Drepanostachyum/Himalayacalamus* group. This makes it one of the hardest *Drepanostachyum* species. The scabrous points inside the culm sheath can just be felt by the tongue, but they require a good microscope to be seen.



6. *Himalayacalamus intermedius* sensu Bol ined. (no connection with *Drepanostachyum intermedium* (Munro) Keng f.)

This bamboo, cultivated in Japan but reportedly originating in Sichuan, shows how much further work is still required on Chinese bamboos. Bol reported (1990) that it was cultivated in the Fuji Bamboo Garden in Japan, having been brought at some time from Sichuan Province of China, but it does not seem to fit any of the species described from China. The well-separated culms indicate longer rhizome necks than those of Himalayan *Drepanostachyum* or *Himalayacalamus* species. Other combinations of floral and vegetative characters show that the Himalayan genera *Drepanostachyum* and *Himalayacalamus* cannot simply be extrapolated into China proper. Gib Cooper has supplied flowers of this plant for the Kew herbarium, and George Shor has sent material too. Hopefully investigations in collaboration with Chinese taxonomists can take the identification further at some point. Meanwhile in horticultural circles it can be called by the name published, albeit invalidly, by Bol, which may have been given at Fuji Bamboo Garden although it does not seem to have been published by them.

Surprisingly conspicuous by its absence in California is the real *Drepanostachyum falcatum*, common in Southern Europe where it was known as *Bambusa gracilis*.

Also in Europe are three further species of *Himalayacalamus* that may well spread to the USA. *H. cupreus* from Nepal has prominent shiny copper-coloured cilia on the new culm sheaths and very vigorous growth. The long-cultivated *H. falconeri* from NW India is probably cultivated there somewhere. It is very similar to *H. asper*, but with larger leaves. *H. porcatum* from Nepal has finely ridged culms. In Japan *H. fimbriatum* from Kathmandu with its long fimbriate culm sheath ligule is also now grown.

THE FEWER-BRANCHED TEMPERATE BAMBOOS, GENERA *FARGESIA*, *YUSHANIA*, *BORINDA* & *THAMNOCALAMUS*

Fargesia was described as a genus with tightly compressed unilateral inflorescences supported by spathes. The type species, defining the genus, is *Fargesia spathacea*. Since the flowering of the umbrella bamboo, *Fargesia murieliae*, the fountain bamboo *Fargesia nitida*, and species such as *F. dracocephala*, *F. robusta*, and *F. denudata*, we have seen the consistent production in bamboos from C China (E Qinghai, E Sichuan, Gansu, Shaanxi, and W Hupeh) of tight, unilateral racemes with leafy spathes, looking like little toothbrushes. Such inflorescences are also seen in the tropical bamboo genus *Cathariostachys* and in younger inflorescences of *Cephalostachyum*.

Yushania was described as a new genus to separate running bamboos with pachymorph rhizomes and loose, open inflorescences from those with leptomorph rhizomes in *Arundinaria* and related genera. Spreading from Taiwan through China to the W Himalaya it seems consistent in its characteristics, and it is already a large genus, with more than 70

species. For a while *Yushania* was known as *Sinarundinaria*, because it was thought that the flowers of the type species of *Sinarundinaria*, the fountain bamboo, would be open, like those of *Yushania*. When they were seen to be tight racemes instead, those of a true *Fargesia*, *Sinarundinaria* became a synonym of *Fargesia*. *Sinarundinaria*, being published before *Yushania*, but after *Fargesia*, could usurp the name *Yushania*, but it sinks into synonymy of *Fargesia* when considered the same as that genus, as it was named later.

When listing Chinese temperate pachymorph-rhizomed bamboos in recent decades, species have usually been placed in one of the two genera *Fargesia* or *Yushania* by Chinese taxonomists, according simply to the length of the rhizome. Other genera have not been considered properly. This has resulted in the inclusion in *Fargesia* of a very large and polymorphic variety of bamboos, many of which we now know should have been placed in genera such as *Drepanostachyum*, *Himalayacalamus*, *Thamnocalamus*, and even *Arundinaria*. With around 100 species, the genus became swollen and unnatural. A large genus like this becomes impossible to define, and identifying the species within it is very difficult. Indeed *Fargesia* became so large that it even included a previously described genus *Thamnocalamus*, which is unrelated and has different branching. Therefore for a while just two genera were recognized, *Sinarundinaria* and *Thamnocalamus*.

Following the classification of Keng (1982), many western and Indian botanists have recognized additional genera, including *Drepanostachyum*, *Himalayacalamus*, and *Thamnocalamus*. New molecular evidence has shown that larger groups such as *Sinarundinaria* and a broadly interpreted *Fargesia* are artificial and include elements that are not closely related at all.

The problem then arose of what to do with the Tibetan bamboos, which I started to encounter in Bhutan. Similar bamboos spread from the E Himalayas through the mountains of the autonomous areas of the Tibetan, Burmese and Vietnamese borderlands of China. These bamboos do not have the tightly compressed unilateral inflorescences of *Fargesia* species from Central China, nor are they running bamboos like *Yushania*. One characteristic most of them share is a finely ridged culm surface. *Fargesia* species have very smooth culms, and *Yushania* species mainly have flat but usually somewhat rough culms. The leaves of these bamboos are also often larger and more delicate, and several species are almost completely deciduous in winter.

I have resisted the assimilation of these bamboos into the Central Chinese genus *Fargesia* and described a new genus, *Borinda*, to distinguish them. T.P. Yi (1997) prefers these bamboos to remain into the Central Chinese genus *Fargesia*. D.Z. Li (1997) has considered their transferral into *Yushania* (as *Sinarundinaria*), as they have less tight inflorescences, even though this would mean that the original concept of the genus *Yushania* as one of running bamboos would be abandoned, and the genus would become even larger and very unwieldy. Demoly has also followed this approach, making the combination *Yushania fungosa* (T.P. Yi) J.-P. Demoly. On the other hand, Z.P. Wang (1997) has recognized the genus *Borinda* and included it in a proposed classification of Chinese bamboos.

This is the present debate about genera in temperate Sino-Himalayan bamboos. Whether these Tibetan bamboos should simply be assimilated with Chinese bamboos into the genera *Fargesia* or *Yushania*, despite their obvious differences, or should have their own genus *Borinda* is presently under discussion. Molecular data may eventually shed some light, but presently it is a matter for individual consideration on the part of others who write about, grow or sell bamboos.

Species seen in Oregon & N California

The flowering of a bamboo cultivated as *Fargesia adpressa* has reinforced the decision I made earlier when Gib Cooper sent me material grown under that name (and as Tung Chuan No. 4) in Gold Beach. It is *Fargesia murielae* and not *Fargesia adpressa* at all.

The presence of two very different bamboos under the name of *Yushania chungii* suggests that something has gone wrong with their names somewhere. The plant with tough culm sheaths and spreading oral setae appears to be the real *Yushania chungii*.

Several other species from these genera were seen in Oregon & N California in October 1999, but most were very recent introductions and it is not possible at this stage to be completely certain of their identification to species. However, plants cultivated as *Fargesia rufa* seem to represent a true *Fargesia* species. *Fargesia angustissima* on the other hand would appear to be a species that could better be placed in the genus *Borinda*. A collection from very high on Cang Shan near Dali in the old Bai Kingdom in W Yunnan, which had been assumed to be *Borinda frigidorum* is not that species at all. It appears instead that there is a re-appearance of the normally lower elevation species identified by the Chinese as *Fargesia hygrophila*, another species that could be placed in *Borinda*. Plants grown from seed sent from Kunming that were thought to be *Borinda papyrifera* need to grow a little larger before their identity can be confirmed.

Very few plants from the genus *Thamnocalamus* were seen, and the only mature specimen was *Thamnocalamus spathiflorus* var *crassinodus*, from Langtang Valley in Nepal.

Horticulturally especially worthy of note were recent seedling selections of *Fargesia dracocephala* with white-striped leaves, and of *Borinda fungosa* with Akebono or 'dawn-like' leaf variegation.

Thank you for the opportunity to travel to Oregon and California. I hope that the exchange of plants, identifications, and information between Europe and the USA will continue to strengthen the horticultural position of these wonderful plants.

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