Himalayan Bamboo Hunting

Chris Stapleton

The publication of two field guides to the bamboos of Nepal and Bhutan is probably a good time to look back over the 13 years or so it took to produce them, and think of how our knowledge of Sino-Himalayan bamboos has progressed during that time. We have passed out of the dark ages in bamboo taxonomy, when bamboos were a severely neglected group: economically of apparently little significance (just the poor man's timber); morphologically misunderstood (a confusing mixture of primitive and advanced characters); often represented by fragmentary herbarium specimens; and, worst of all, growing in countries to which western taxonomists had severely restricted access. The lead in recognition of the importance of bamboos has largely come from the underdeveloped countries in which they grow. Great credit must be given to organisations such as IDRC that have fostered sustained interest in bamboos in so many countries, and arranged so many meetings where bamboo scientists can find that they are not alone in their respect for the humble bamboo. The Overseas Development Administration has also been very generous to me, funding my work from 1982 to 1994 under a variety of projects, schemes and programmes.

When I was recruited as an Aberdeen forestry graduate to work with Voluntary Service Overseas in Nepal in the summer of 1981, I thought I was to study the use of fodder trees. In the nature of all the best institutions, VSO switched me at the last minute to bamboos. Not that I cared too much – with my ice axe strapped to my rucksack I was off to Heathrow, full of development ideology and high ideals, ready to stop soil erosion in the high Himalayas single-handed. Before I left, Steve Renvoize had kindly shown me Kew's bamboo collections, and David Long at the Royal Botanic Garden Edinburgh had pointed me to the literature and collections there. Merlyn Edwards invited me to Glasgow to see his bamboos from Langtang in Central Nepal. I must admit the herbarium collections and the live plants all looked very much the same to me at that time, but the travel around the UK allowed me the opportunity to pay my farewells to two of my favourite mountains with my dog. The Cobbler and An Teallach would not seem quite the same again after the Himalayas, and my dog was not to survive my 2 year absence.

Arriving in Delhi and then Kathmandu in the late monsoon, I wondered what the ice-axe was for. Keeping pickpockets and taxi drivers under control was a good use to start with anyway. My first lesson was that bamboos are first and foremost tropical and subtropical plants in the third world, and that the snowy mountains in the background of all the best bamboo pictures are actually about two weeks walk away. At the Forestry Department in Kathmandu I quickly discovered that bamboos in Nepal were either *Dendrocalamus strictus* or *Arundinaria* sp., and I pressed on into the hills.

Walking up from the road-head at the Tamur River north of Dharan to what was to be my post in Hile in East Nepal (6,000ft), I was greatly impressed by the abundance of bamboo and the uses to which it was put. One smiling man was building the roof of his new bamboo home with poles of *Dendrocalamus hookeri* as we went past, while his goats below were eating the leaves he had just trimmed off, and his chicken sat broodily under a bamboo basket. There were only a few timber trees around and bamboo was obviously a very valuable substitute. Clearly it also yielded important products which no tree could provide. Counting the number of bamboo baskets carrying loads on the trail was like counting supermarket trolleys at Tesco's. Listing the uses became meaningless as bamboos were used for almost

everything. Shoots of *Dendrocalamus hamiltonii* were served up to accompany my rice and lentils when we arrived at the house which was to be my home for two years. Hile was then a village of Tibetan refugees, ex-soldiers from the Dalai Lama's army and Lhasa businessmen. It was an important staging post for Tibetan traders and Nepalese travellers, and the scene of a colourful weekly market which blocked the one street completely with a sea of bamboo baskets full of local produce. At night there was a serene tinkle of bells as Tibetan ponies grazed among tall fluttering bamboo prayer flags between spacious houses. Sometimes there was also the sound of the shuffling midnight dances of migratory Lhomi people from the upper reaches of the Arun River, who reeked of rancid butter and juniper smoke. The mist swirled in through the *Alnus nepalensis* and *Dendrocalamus hookeri*, obscuring and revealing the setting sun through the bamboo leaves. That atmosphere has now been replaced with the dust and noise of Indian Tata trucks ploughing through jostling crowds searching for the cheapest Indian saucepans, tin trays and cassettes of the latest Hindi movies. A road can bring new prosperity to an area when there are products to export. Eastern Nepal has a wealth of natural resources, including fruit, vegetables and of course bamboos, but exporting them requires easier access to Indian markets than is presently possible. However, new developments mean new uses for bamboos, and I was later to return to the East to help to plant bamboos along the roadsides to reduce the landslides which block it every monsoon. *Bambusa balcooa* was particularly useful for this because of its large size, thorny branchlets which deter browsing, and the ease of propagating it from culm cuttings. It forms a natural retaining wall, replacing expensive wire and stone gabions, and provides stability at the base of potential slope failures. The hanging branches also provide some shade for those who miss the bus and have to walk.

My terms of reference for the first 6 months were quite specific. I just had to identify all the bamboos, determine how much of each species had been planted, find what they were used for, where they were planted, how they were managed and harvested, and collect seed to raise 100 plants of each species. Naive I may have been, but I actually tried, although I must admit I took 7 months to produce my first shaky account instead of six. Armed with a 1:250,000 map of the area with no contours, just rivers and villages and the odd spot height of 4,000 ft here and 13,000 ft there, a little note book, and a knowledge of Nepali restricted to food and bamboo, I wandered off. It is great credit to the villagers of East Nepal that I found food, lodging, and information along the way. They usually directed me on the right paths to the next village on the map, and my rucksack became piled high with rolled-up bamboo culm sheaths. Kind farmers showed me all their bamboos and explained carefully how they tell them apart, what they could be used for, and how they fitted in with their general farming system. I probably understood about 25% of what they told me, but I pieced most of it together in the end.

On my longest trek I took a porter to help me carry a tent and some food for a fortnight up the Arun River. Half a mile down the road he put the bamboo basket down and disappeared, saying he would be back in a minute. An hour and a half later another porter appeared to take his place. He said the first porter didn't think we were well enough equipped, and it took a braver man like him to explore areas where the mountains would be falling on our heads and there would be no tea shops in which to eat and sleep. Jhit Bahadur and I had a very successful trip. We found *Bambusa nutans* in flower (one culm out of the10,000 or so clumps we passed) north of Khandbari. Then one clump of *Dendrocalamus hookeri* was in flower further up the Arun beyond Num. This justified the trip as I could at last be sure of the identification of these two important bamboos, neither collected in flower before in Nepal, but there was still no seed for either of them, so I would have to concentrate on their

vegetative propagation at the Agricultural Research Centre where I was based if I was to raise my 100 plants. We stopped when we came to the top edge of the map. Tibet was not very far, it was turning cold, and we were running out of food.

The return along the temperate ridges brought the high-altitude bamboos to my attention. They were used in the smoky villages for fodder and for roofing mats, which replaced the thatch used at lower altitudes. They were also woven into the more demanding and durable forms of bamboo weaving, such as baskets which can hold millet seed without leaking. These would be taken down and sold at markets in the subtropical villages below. *Thamnocalamus spathiflorus* and *Yushania maling* were the predominant bamboos in the *Rhododendron* forest at around 10,000 ft, but these were not the best bamboos for weaving. *Himalayacalamus falconeri,* the beautiful blue *H. hookerianus, H. brevinodus,* and the exotic-looking *Ampelocalamus patellaris* were cultivated around the higher-altitude villages between 7,000 and 9,000 ft. Their long straight internodes made them the most suitable bamboos for weaving. Along this ridge I found my favourite spot in the Himalayas, where from a rocky ledge among the red flowers of *Rhododendron arboreum* and the red culms of *Thamnocalamus spathiflorus,* the Tamur winds its way 10,000 feet lower in the distant valley below Terhathum, while Makalu towers a further 16,000ft above, across the Arun gorge, looking close enough to touch. That is real amplitude of relief, providing a feeling of security and protection which is totally lacking in the open plains. Returning to subtropical areas, *Drepanostachyum intermedium,* a common bamboo seen in the subtropical forests up the Arun River, was again encountered, but this time as the much hairier cultivated form found around the houses and fields from 6,000ft down to 3,000ft. I'd found 15 bamboo species and varieties by then, all distinguished by the local population. Flowers for many of them were still missing, and I had to decide which I could lump together as species, and then which genera to put the smaller bamboos into. It was early 1982 and many of the Chinese genera we now use were still a twinkling in the eye of P.C. Keng and other Chinese taxonomists.

Back in the civilisation of Hile I washed off the BHC dust I'd coated myself with when the parasitic fauna of East Nepal demanded more attention than the flora. Experiments with bamboo propagation then began in earnest. Allocated a terrace below the south nursery at the bottom of Pakhribas Agricultural Centre I could rely upon enough water and heat to start bamboos growing very early in the year. After a chilly night in a thick sleeping bag in Hile at 6,000ft the mid-day sun would seem blisteringly hot on my bamboo terrace 1,500ft lower down, and I soon had to go down out of the hills to the Indian border to buy hessian to shade my delicate new shoots. Polythene sheeting was also purchased to make cloches, but when the sun managed to get onto them the temperatures inside rapidly rose to about 65°c, and they were more trouble than they were worth. I also noticed that they were getting progressively shorter and shorter, while odd pieces of polythene were showing around people's houses...

The time came to leave the eastern hills and the hospitality of the Agricultural Research Centre, and move to the big city of Kathmandu where I would be integrated into the Forestry Department, with a graduate forester to work as a counterpart. We found space in a Community Forestry nursery to continue propagation trials. For several years we refined our technique of rooting single-node culm cuttings for a variety of subtropical bamboo species, and trained nursery workers from all over the country in the propagation of their local bamboos. Bamboo pests were also investigated, and more seed was collected. We made several trips to areas of central and western Nepal, documenting the distribution and uses of the commoner species. One ten day *dasain* holiday I spent racing up to Langtang, to discover which bamboos Merlyn Edwards had brought back to the UK 10 years earlier. Three species

of *Himalayacalamus,* one fairly hardy and very attractive, and *Thamnocalamus spathiflorus* var *crassinodus* were all there. Another quick jaunt into temperate areas took me to a prospective pheasant reserve on the side of Macchapuchare, the famous fish-tail mountain near Annapurna. The most spectacular *Himalayacalamus* species I have seen *H. cupreus* is harvested from the forest there. It has very long internodes and culm sheaths with bright coppery cilia, and I was asked to assess whether the harvesting practices could be improved to avoid disturbance to nesting pheasants. The main problem was probably the use of its culms to make cunning pheasant traps rather than the time of harvesting. I wanted to bring a plant back down, as the presence of tessellation suggests it may be quite hardy, but the steep 7,000ft descent was too much for our porter's knees. He was almost crying and we all ended up carrying just what we could manage without permanent injury. Access to temperate zones in Nepal is now a little easier, with more tourist routes opened up, and roads pushing deeper into the mountains. Further collecting trips could be very profitable indeed. It would also be lovely to catch another glimpse of the kingfisher-blue Impeyan pheasant *Lophophorus impejanus* sweeping down through crimson *Berberis* bushes against the white diamond of Macchapuchare.

Back in the subtropics the nursery had been fenced but the goats still took their toll above ground, increasing the residual variation in my statistical analysis by the day. Below ground the fat white cockchafer larvae lay on their backs under the new shoots, waiting for the next meal to grow into their mouths. They can probably take the credit for my concentration upon taxonomy, as I never managed to get enough data from my propagation experiments to satisfy a PhD supervisor. The only solution to the shortage of data was to turn to taxonomy, and to expand my studies to cover more of the Himalayas.

Returning to Kew with my Nepal collections in 1983 I had been able to verify the identification of several species such as *Bambusa balcooa* and *Dendrocalamus hamiltonii,* with the help of Steve Renvoize, but the inflorescences of species now known to be *Drepanostachyum, Himalayacalamus* and *Ampelocalamus* were a different matter. Neither I nor Steve could really relate them properly to the herbarium collections. The inflorescence of *Ampelocalamus patellaris* was particularly problematic, as the species was thought at that time to belong in *Dendrocalamus,* and should have had 6 stamens instead of 3. Returning to Kew the next year I discovered the new Journal of Bamboo Research and things started to look up. The 1985 IDRC Bamboo Conference held in Hangzhou opened my eyes further to the new developments in bamboo research, especially taxonomy in China. At last I thought I might be able to put my long list of *Arundinaria* sp. straight into more satisfactory genera. Meeting Chinese taxonomists there gave me great respect for their sincerity and devotion to their subject. However, there was obviously still a great deal of disagreement and competition between different Chinese factions. It was not possible to follow the decisions of any single taxonomist, and there was no consensus of Chinese opinion to follow. This situation persists to this day in China. T.P. Yi, with about 80 species of *Fargesia* to his name, disagrees strongly with C.S. Chao, who still champions Nakai's *Sinarundinaria. Arundinaria* is treated as a monotypic American genus by some taxonomists, while others recognize many Chinese species. At Kew the Genera Graminum was still under production in 1985, and the authors had to adopt a conservative stance, basing their tentative and provisional treatment of bamboos upon the better known work of the Japanese taxonomists such as Nakai, rather than the new and untested genera of P.C. Keng and others. Meanwhile, I started to break my list of 3-stamened bamboos into what I thought were useful groupings, and then started hunting out the type species upon which the new Chinese genera were based. Julian Campbell was also

bravely trying to work out some sort of compromise between different Chinese taxonomic opinions, and we were to have many fruitful discussions when he visited the UK.

ODA had kindly given me a return ticket from Kathmandu via Hong Kong to go to Hangzhou, but after the conference and the inspiring tours around immensely impressive *Phyllostachys* forests, I spurned the champagne on Thai. I found myself travelling by train across China from Nanjing to Chengdu with Professors Hsiung Wen-Yue and Walter Liese rather by accident, and then across Tibet's dirt roads to the Nepalese border on an old bus. Reaching Lhasa I was still clutching a bamboo eagle, and dragging a conference briefcase weighed down with reams of valuable papers on the latest bamboo developments. I am afraid the thin air was too much for me, and, desperate to reach a lodge before I collapsed, I started handing the erudite conference papers to Tibetan nomads in sheepskins. Their faces, encrusted with dust and grime after their long pilgrimages to their most holy sites, lit up with warm gratitude at the free gifts. Goodness only knows what they did with them, but my briefcase became bearable again.

Most of Tibet was too cold and too dry for any bamboo to grow, yet wherever I went, in the courtyard of a ramshackle old monastery, or on a lonely mountain pass, there were bamboo artefacts to be found. Baskets, trays, mats, cages, and the inevitable fluttering prayer flags all signalled the importance of the bamboo plant, even several days travel from its natural habitat. Leaving the vast Tibetan plateau a lone wolf was prowling the snowfields by the 17,000ft pass, which was of course adorned with bamboo prayerflags. Travelling down into the first scrub vegetation on the monsoonal face of the Himalayas the first bamboo I saw was conveniently located by a slushy landslide. This slowed the bus down enough for me to jump out, pull up a section of rhizome and join the bus at the next hairpin. Thus a very hardy specimen of Tibetan *Thamnocalamus spathiflorus* subsp. *nepalensis* started its journey back to the UK, and has been with me as a reminder of Tibet ever since. Growing beside a plant of the red-culmed *Thamnocalamus spathiflorus* subsp. *spathiflorus* from the summit of Shivapuri (the mountain on which both it and *Himalayacalamus falconeri* were probably first collected by Wallich around 1821, and at the foot of which lies Kipling's Green-eyed Goddess to the north of Kathmandu) it is easy to see the differences between the two subspecies, but their flowers are identical.

The opportunity for a 2-week visit to Bhutan in 1985 was also too good to be true, and in September I found myself in suit and tie knocking on the door of the Forestry Department in Thimphu, asking for permission to study their bamboos. Thus began several years of commuting between Nepal and Bhutan, working on the cultivation of subtropical bamboos in many development projects across Nepal, and then returning to study the temperate bamboos of Bhutan from the herbarium of the Forestry Department Research Division. Bhutan has the benefit of several high altitude roads, crossing passes up to 13,000ft. This gave me the access I needed to higher altitude bamboos, and to the wonderfully wet, misty, and still densely forested Bhutanese mountains which are home to several genera of bamboos which would soon expire in the degraded and more semi-arid hills of Nepal. Planting the temperate Bhutanese bamboos in my garden in Thimphu to watch them grow, and driving up to the high passes, allowed a detailed study of their buds, rhizomes, and branch development. At the 1985 IDRC Conference in Hangzhou Professor Hsiung Wen-Yue had commented that branching in the alpine bamboos was very important and required further study, and I have found it to be a crucial key to an understanding of their taxonomy.

While driving through West Bengal down-river from Kalimpong on my way between Nepal and Bhutan I found the most vigorous flowering of *Dendrocalamus hamiltonii* I have

ever seen. The seed hitting the ground sounded like light rain, and I persuaded local seed collectors to gather 15Kg of fat round seed for me. Most of this was sown in southern Bhutan, where a Forestry Department nursery soon became a sea of thousands of waving bamboo seedlings. Some was brought back to the UK, where I ran a freezing experiment for the ultimate method of seed storage. After 2 weeks at -18°c the seed of this tropical bamboo germinated as well as the control, and one formerly deep-frozen seedling has now surreptitiously risen up behind a statue of David to hit the roof of the temperate house at Kew, after being nurtured by Peter Addington for a while.

Comparing the Himalayan bamboos from Nepal and Bhutan with *Fargesia* species *F. murielae* and *F. nitida* growing in Aberdeen, I felt more convinced than ever that many of the new Chinese genera were valid and useful. The first flowering last year of *F. nitida,* the type species of Nakai's *Sinarundinaria,* has eventually shown that his entire treatment of the bamboos is on very shaky ground indeed. The placement of so many pachymorph bamboos in *Chimonobambusa*, and the description of *Sinarundinaria* as a new genus when *Fargesia* and *Thamnocalamus* already existed for very similar bamboos, suggest that he did not really have enough material available to make reliable decisions. The status of his other bamboo genus, *Pleioblastus* has also been questioned. Bamboo taxonomy has now moved on so far that the bamboo herbarium collections at Kew can now be more confidently reorganised to give recognition to many relatively new genera. This is a collaborative effort between myself, Steve Renvoize, Soejatmi Dransfield, and other international experts such as Lynn Clark, who has provided valuable advice on South American bamboos. A provisional list of bamboo genera under which the collections will now be arranged has been produced, and it is given below. It is not final, and changes week by week, but it may give some indication of the present direction of thinking. Names on the living collections will also be changed in consultation with the curator of Kew's living bamboo collection, Ray Townsend, although producing new labels will take some time. We expect lively discussion with bamboo taxonomists who have different points of view. New taxonomic techniques on the horizon may change all our concepts again in the future, but this is an exciting time to be involved in bamboo taxonomy as many institutions around the world are taking such an active interest.

Study of live plants is still very important in plant taxonomy, and the bamboos, with their paucity of taxonomic characters and infrequent flowering, are more difficult to deal with in the herbarium than almost any other flowering plants. My sympathy goes out to all those who are faced with identification of bamboos from live material in the field, but also to the taxonomists who have been obliged to give names and write descriptions or accounts of bamboos from the herbarium without being allowed sufficient fieldwork. I have been very fortunate in the amount of fieldwork I have been able to carry out, visiting areas out of bounds to so many previous bamboo taxonomists. I hope that the field guides will allow some of my knowledge to be shared widely with all others who appreciate bamboos, and will even entice some of them to go and appreciate them where they are at their best, in their natural Himalayan environments. Now, after 13 years, I might just have fulfilled the terms of reference for my first 6 months work.

Re-organisation of Kew herbarium bamboo collections June 1994

Bambusinae
(incl. Dendrocalaminae)

1 *Bambusa*

2 *Holttumochloa*
3 *Thyrsostachys*
4 *Gigantochloa*
5 *Oreobambos*
6 *Dendrocalamus*
7 *Oxytenanthera*
8 *Sphaerobambos*
9 *Melocalamus*
10 *Dinochloa*

Melocanninae
(= Schizostachydinae)

11 *Melocanna*
12 *Ochlandra*
13 *Schizostachyum*
14 *Neohouzeaua*
15 *Cephalostachyum*
16 *Teinostachyum*
17 *Davidsea*
18 *Pseudostachyum*

Nastinae

19 *Nastus*
20 *Perrierbambus*
21 *Hitchcockella*
22 *Hickelia*
23 *Decaryochloa*
24 *Greslania*

Racemobambosinae

25 *Neomicrocalamus*
26 *Racemobambos*
27 *Vietnamosasa*

Arundinariinae
(incl. Thamnocalaminae,
Sasinae, Pleioblastinae, & Chimonocalameae)

28 *Thamnocalamus*
29 *Fargesia*
30 *Borinda*
31 *Chimonocalamus*
32 *Himalayacalamus*
33 *Drepanostachyum*
34 *Ampelocalamus*
35 *Yushania*

36 *Arundinaria*
37 *Sasa*
38 *Indocalamus*
39 *Indosasa*
40 *Pseudosasa*
41 *Acidosasa*

Shibateinae

42 *Phyllostachys*
43 *Semiarundinaria*
44 *Sinobambusa*
45 *Shibataea*
46 *Chimonobambusa*

Guaduinae

47 *Guadua*
48 *Criciuma*
49 *Eremocaulon*
50 *Olmeca*
51 *Otatea*

Arthrostylidiinae

52 *Elytrostachys*
53 *Atractantha*
54 *Alvimia*
55 *Athroostachys*
56 *Arthrostylidium*
57 *Rhipidocladum*
58 *Merostachys*
59 *Actinocladum*
60 *Aulonemia*
61 *Colanthelia*
62 *Myriocladus*
63 *Apoclada*
64 *Glaziophyton*

Chusqueinae

65 *Chusquea*
66 *Neurolepis*

Excluded genera
(referable to new tribes of African herbaceous bambusoid grasses ?)

Guaduella
Puelia