

# BOTANICAL EXPLORATION OF DARCHULA DISTRICT, FAR WEST NEPAL, 2012

Report for the Scottish Rock Garden Club



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**Image on Cover** – looking to Joge Tal from Thadgadi Gad

## Background

From the 3<sup>rd</sup> to the 31<sup>st</sup> of July I was part of an international expedition, part of the Flora of Nepal project, exploring the flora of the Darchula district of Far West Nepal. The expedition was organised and led by the Japanese Society of Himalayan Botany; the team consisted of six Japanese botanists from various universities and research institutes in Japan, Dr Colin Pendry and myself from the Royal Botanic Garden Edinburgh (RBGE) and two Nepalese members of staff from the Nepalese Department of Plant Resources (DPR) who, like myself, were to receive field skills training.

Prior to the trip, Darchula district had been identified as one of the most under collected regions in Nepal, meaning the flora was virtually unknown. This was due to its remoteness and the area being closed to visitors during the Maoist insurgency. Adam Stainton travelled some of the route in 1965 (see Figure 1) as he headed west through Nepal on his way to collect in Kashmir; however Stainton collected very few plants during his 1965 trip, although RBGE has Stainton's collections of *Clematis barbellata*, *Draba radicans* and *Primula drummondiana* from Darchula. Nepalese botanists have also collected in Darchula district. Databasing photographs of *Clematis* herbarium specimens from the National Herbarium in Kathmandu I took at the end of the expedition has revealed that a number of different Nepalese botanists have been to Darchula District, which is not surprising. However, it does appear that no collectors ventured further north than the valleys beyond Magarigath towards Api.

As this was a Japanese led expedition the collecting protocols were done in-line with what is standard for the Japanese and more generally best practice for collecting plants. This trip used the Japanese collecting number format of 1211001. The first two digits 12, signifying the year 2012, the following 1 being the first collection trip of the Society of Himalayan Botany of the year. The next digit was unique to the individual collector; for example the expedition leader, Hiroshi Ikaeda had 1, I had the number 7. The last three digits were the collector's sequential number.

Ideally we were looking for seven duplicates of the same collection, but as a minimum there had to be at least three, one for Tokyo, one for DPR and one RBGE. The exception from this was CITES listed plants for which only two duplicates were made both of which remained in Nepal, such as Orchidaceae.

At the time of collection the full collection number was assigned, various field notes made: altitude, latitude and longitude (from GPS), habitat notes and morphological characters that were likely to be lost once the specimens were pressed and dried. The specimens were placed in sheets of newspaper, annotated with the collection number and put into a field press. The collections were also photographed at the time of collection to try and capture some of the characters that would be lost when pressed.

Once at camp, the specimens were checked and rearranged if necessary before being put into a larger press, placed on a rack and dried over Kerosene stoves. These stoves generate an intense heat that resulted in rapid drying of the specimens, good when in monsoonal conditions, but it can make the specimens crispy and brittle. Most evenings data was transferred from our field books into the Flora of Nepal database we brought with us on a laptop and the Japanese would put their data into spreadsheets.

## Forests of West Nepal

The feel of the vegetation in the Far West of Nepal is very different to that of the eastern Himalaya and in general the number of species present reduces from east to west. Between 1000-2000m the predominant tree species was *Pinus roxburgii*; from about 1500-2500m *Quercus incana*-*Quercus languinosa* appeared. All

the vegetation to 2000m was very degraded by continual chopping for fodder and clearing for agriculture. Above 2500m *Quercus semecarpifolia* became dominant at times and then above 3000m *Abies spectabilis*, with interspersed *Tsuga dumosa* and *Betula utilis*, became dominant. (See Appendix for forest types by altitude.)

The tree line, like much of Nepal, was artificially low due to clearing for grazing. The dense *Quercus semecarpifolia* forest ended at 3500m and opened up to sub-alpine scrub; however we did find remnants of *Betula utilis* & *Rhododendron arboreum* forest at 4000m on north facing slopes with *Juniperus* on the degraded margin.

The riverine forests in the deep and steep sided valley beyond Khayekot above 2000m were a mix of a number of deciduous species including *Acer thomsonii*, *Aesculus indica*, *Alnus nepalensis*, *Juglans regia* var. *kamaonia*, *Betula utilis*, *Rhododendron arboretum*, *R. barbatum* and *R. campanulatum*.

The sub-alpine pasture above 3500m was an impressive dense carpet of flowering herbs. The dwarf shrub flora associated with this altitude at the eastern end of the Himalaya was all but absent -*Rhododendron lepidotum* & *R. anthopogon* were the two most common shrub species we found, with the occasional *Juniperus* species. Finally the alpine slopes above 4100m were sparsely vegetated but still contained some interesting plants.

## The Expedition

The proposed itinerary was a circular route leaving the town of Darchula heading north along the border with India before turning east to Ghunsa and then north to Api Nampa Conservation area. We planned to return to Ghunsa and follow the Chamilaya Nadi back to a point where we could be collected by bus. By the time I had arrived in Kathmandu the proposed itinerary had changed because of landslides closing the road to Darchula and making it impossible for us to go the way we had planned. So a new route was decided on that followed the Chamilaya Nadi from Dethala to the southern slopes of Api (Figure 1) and we would retrace our steps part of the way before finding a slightly different route back before being picked up by bus.

On the 5<sup>th</sup> of July we flew from Kathmandu to Dhangadhi in Kailali District. The airport still showed the evidence of bunkers, trenches and barbed wire on the approach road from when the insurgency had been at its worst. As Nepal is relatively peaceful now nature was doing its best to take it back.

Next day we were hired a Tata bus north from Dhangadhi to take us north. For anyone who has never experienced a Tata bus; it is effectively a lorry with seats and no leg room. It is a beast of a vehicle that can deal with almost any condition and road surface. The journey was painfully slow and we took thirteen hours to travel a little over 150km.

Not far from Dhangadhi the southerly foothills suddenly start. The winding road was mostly single track and often in shocking poor condition with the debris from rockfalls and landslides along the route. We edged past vehicles coming in the other direction with the bus being very close to the often precarious drop. The spotter would hang out the door of the bus when we passed another vehicle and tap the side of the bus. A slow tap meant plenty of room; a frantically fast banging meant the bus was at the edge. Colin had some words of wisdom for me when he saw me looking out the window straight down to the valley floor – “Don’t look. It won’t change the outcome.” This part of the journey was easily the most dangerous of the trip. The Kathmandu Post reported the death toll on Nepal’s roads during July 2012 was well over 150.



We stopped at Gokuleshwar to check in with the local administrators and the trek leader finally got through to people at camp to find out exactly where to expect the camp. An hour later we were met by a line of head torches emerging from the darkness. Our Sherpa's had crossed the river from the school at Dethala to collect us. The porters and Sherpas had gone by road from Kathmandu two days earlier with the trek equipment so when we arrived the camp was ready and waiting for us. It wasn't until the morning that the scale of the operation was apparent; in total the expedition consisted of 10 botanists, 10 Sherpas, 1 Sherpa leader, 1 cook, 5 kitchen staff and 65 porters.

The normal routine for the trek was up at 6am to check the previous day's collections were dry. Breakfast was from about 6.30-7am and then we'd leave camp between 7-7.30am. The day consisted of walk and collect until we reached the next camp. When we did arrive at camp, and this varied from 12pm to 5pm; we'd process the specimens, have dinner and get a quick briefing about what to expect the following day before turning in.

Once we started the trek there were few facilities for trekking groups, with some of the trails found to be in very poor condition. Distances covered day to day varied as camp would be made wherever there was enough flat ground to accommodate us and where there was access to water for drinking and cooking. It was quickly realised that our revised itinerary was overly ambitious and a decision was made to try and reach the southern slopes of Api as quickly and return the same way.

### **7<sup>TH</sup> July - Dethala to Bitale**

Our trek started from Dethala at 770m in the warm temperate – subtropical valley floor. For the first two days we walked through agricultural land, relatively well populated, slowly gaining altitude. The vegetation was degraded due to land given over to agriculture and the collection of plants for animal fodder. The predominant crop was rice which was busily being planted as we were heading north; the other main crop in the valley was maize although there were also small banana plantations and most homes had at least some banana plants.

Our first camp was at a police checkpoint above a partially constructed hydroelectric dam, close to Bitale at 860m. The path immediately before the camp was a scaffolding walkway attached to a recently blasted rockface. The rock wall was particularly unstable with small bits breaking off and hitting the walkway and making a pinging noise as they hit the scaffolding. Most locals ran across at full speed because two people had been killed the previous weeks being hit by large falling rocks; a fact that we only became aware of once in camp.

### **8<sup>th</sup> July - Bitale to Pari Bagar**

The expedition coincided with fruiting of an interesting and locally important crop, the Chiuri tree, *Aesandra butyracea* (Figure 2) in the Sapotaceae. We all had the opportunity to sample the excellent fruits and learn about its importance to the local economy. At Chureni village we were told that each family has 2 trees, from which they obtain about 200 kg of fruit which contain 100 kg of seed which yield about 80 l of edible oil, making them completely self-sufficient in oil. We were interested in the potential for commercialisation of this crop, and later at DPR we learned that there is a small scale processing plant at Gokuleshwar, but that it has met with limited success because of the presence of saponins in the fruit.

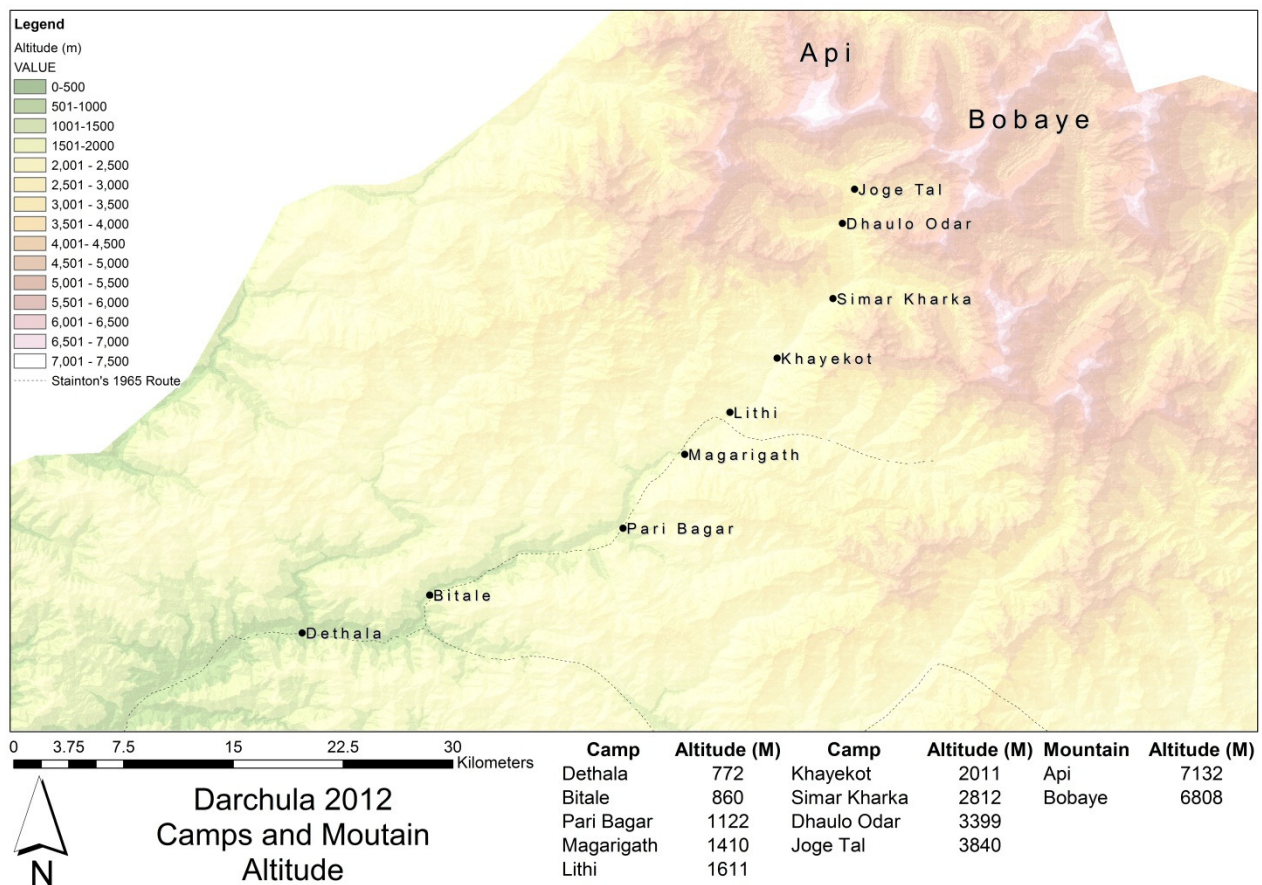
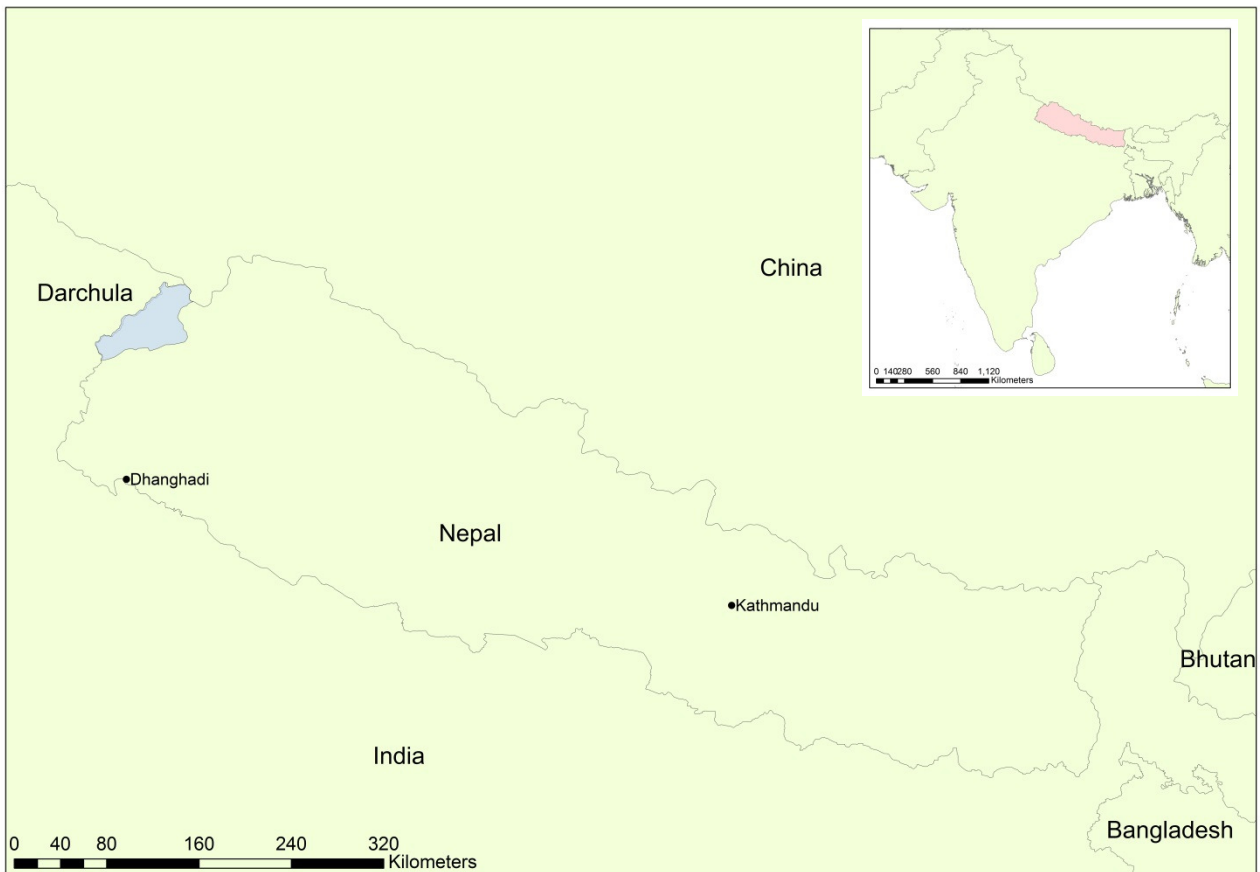


Figure 1 Nepal with Darchula District highlighted (above) and the route up the Chamilaya Nadi: Dethala to Joge Tal (below)

For the expedition to achieve the most comprehensive collection of the flora as possible each member was assigned specific families to collect to prevent duplication. The three families I was assigned were Ranunculaceae, Papaveraceae and Leguminosae. Although I did make ad-hoc collections of other plants if I felt there was little chance of others finding the same population. Two interesting plants I collected at 900m, growing in wet limestone rock face under a waterfall, were *Primula floribunda* and *Pentstemon wallichii*.

The common, but never abundant, *Arisaema* species in the valley was *Arisaema tortuosum*. It was found growing amongst rocks and often in the dry stone walls by the side of the track, especially around villages. It is one of my favourite *Arisaema* with its mushroom scented inflorescence.



Figure 2 *Aesandra butyracea* an important local crop.

Camp that night was near at the edge of the large village of Pari Bagar at 1128m, where we provided the evening entertainment for the locals who were content to watch us process specimens and eat dinner.

### **9<sup>th</sup> July - Pari Bagar to Magarigath**

It was not until third day that the terrain became more rugged and we were over 1400m that the vegetation began to change from sub-tropical to more montane. There was less cultivation and more trees on the valley sides although the vegetation was still degraded. The dominant tree species at this altitude was *Pinus roxburghii* and formed open stands on the grassy hillsides. The best find of the day for me was *Theropogon pallidus* growing amongst boulders in a steep side valley of the Makari Gad.

Camp that night was in the small village of Magarigath at 1410m. There was no flat ground for us to camp so we stayed in the attics of three of the houses, with the Sherpas and porters making the best of it as they

could. Just beyond the village was where the Makari Gad joined the Chamilaya Nadi there were two small mill houses one of which had a convenient channel created to divert water from the river and drive the mill wheel. It had been a scorching hot day and after processing the specimens most of us went for a bath and to wash clothes in that icy cold channel.

We cracked open a bottle of Laphoraig that evening and had a little “Callo Cheea” - “Black tea”. It was beautiful evening with clear skies and plenty of stars to be seen. We watched flashes from a lightning storm light up the sky far off to the south before turning in. At some point during the night the lightning storm and torrential rain made it up the valley to us and we were grateful to be under a roof, rather than in our tents, until the roof started leaking. The strength of the storm was enough to partially flatten the fields of Maize.

### 10<sup>th</sup> of July - Magarigath to Lithi

The morning started with the group crossing what turned out to be the last “good” bridge in the valley. The steep walk out of Magarigath resulted in finding *Meizotropis buteiformis* growing on steep grassy slopes below *Pinus roxburghii*. *Meizotropis buteiformis* (Figure 3) is an impressive plant, one of my favourites from the trek, with large trifoliate leaves up to 1m long and the large 2m inflorescence with many bright orange-red pea-like flowers.

The vegetation on the hillsides and by the track became woodier and less degraded as we continued up the valley. We had planned to stay near Ghunsa that night but we found camp at the base of a large cliff about 500m below the village of Lithi. *Tagetes patula* and *Verbascum thapsus* were in flower around camp and we jokingly suggested it must have been a bit of amenity horticulture to improve the trail to Ghunsa.

### 11<sup>th</sup> July - Lithi to Khayekot

Up to this point we had basically been following the river, never being too far away from it until today. The valley became a very steep and completely impassable gorge beyond camp so the trail headed up the hillside to avoid the gorge. It was a long day that started at 1600m where the steep path took us up to Lithi at 2100m before levelling out and steadily rising to Ghunsa at 2265m. Beyond there the highest point I recorded that day 2446m. From that point we descended back down to the river and the last village in the valley, Khayekot at 2011m.

The vegetation changed today with the 800m gain in altitude. The trail beyond Ghunsa cut through grassy open hillsides which had many familiar favourites; individuals of *Lilium nepalense* (Figure 4) scattered about, thousands of purple/red stemmed *Roscoeia purpurea* not yet in flower, *Androsace lanuginosa*, *Cotoneaster microphyllus*, *Spiraea bella* and a robust *Arisaema flavum* growing on the grassy slopes. The most exciting plant of the day was a beautiful little Ranunculaceae that is so unusual that it has so far eluded a name, even to genus level.

While collecting a group of school boys coming back from Khayakot stopped to watch. One of them was carrying a *Lilium nepalense* flower and they told us that they eat the ripe fruit, just before it starts to dry out, because it is very sweet – perhaps a reason why there are so few about. When we told them that we were heading up to Api they also told us that they all spend a month up there collecting *Cordyceps* (*Ophiocordyceps sinensis*), the fungus that parasitises several species of moth larvae. They get about 6000 rupees (67 USD) for their work, which helps pay for their education. We asked if their teacher’s minded that the missed school for this and they said no because even their teachers also go up to make some extra cash.





Figure 3 Habitat of *Meizotropis buteiformis* (Top), Inflorescence (below left), Myce holding the single large trifoliate leaf (below right)





Figure 4 The village of Ghunsa (above) and *Lilium nepalense* (below)



## 12<sup>th</sup> July - Khayekot to Simar Kharka

This section of the trek was an easier and steadier walk through mixed broadleaf forest (Figure 5) containing *Acer thomsonii*, *Aesculus indica*, *Alnus nepalensis*, *Juglans regia* var. *kamaonia*, *Betula utilis*, *Rhododendron arboretum*, *R. barbatum* and *R. campanulatum*. The valley was, at times, narrow and very dramatic especially with the constant roar of the Chamilaya Nadi by your side. The 3D representation of this section of the valley on Google Earth does not give a sense of how steep the hillsides actually were. Today had the first flowering, rather than fruiting, *Clematis connata* growing through *Rhododendron barbatum*. Camp, Simar Kharka (2812m), was in the forest on an old, re-vegetated landslip. It had been a major event when it had happened and must have blocked the Chamilaya Nadi for a time. The forest on the hillside above camp was full of dead trees. We initially thought that they had been burned possibly to open up the new grazing areas, but when we got up into that part of the forest the following day it became obvious that it was only the conifers that had been affected and was probably the result of insect damage.

Normally when our camp goes up most of the porters disappeared to the closest village for the night, but tonight as we were in the forest beyond the last village they camped with us. When we arrived they had raised the flag of the Democratic Congress Party, the main opposition party to the Maoists government, above their bivouac and were busy chanting political slogans. The cliffs above camp were home to large bees that visited camp, driving the Nepalese berserk. All very strange.



Figure 5 The dense riverine forest of the Chamilaya Nadi beyond Khayekot

### 13<sup>th</sup> July - Simar Kharka to Dhaulo Odar

Today I saw and collected some interesting plants; first was *Clematis barbellata* in fruit growing in riverine forest and nearby was a single *Codonopsis viridis* (Figure 6). *Vicia bakeri*, plus another two currently unidentified *Vicia* species, *Parochetus communis*, *Trigonella emodi*, *Piptanthus nepalensis*, *Anemone elongata*, *Ranunculus hirtellus*, *Thalictrum cultratum* and most excitingly, a *Corydalis* with distinctive leafy bracts identified by Magnus Lidén as an undescribed species.

The first part of the day was a steady but at times steep walk through changing forest. Initially it was a mix of broadleaved trees before becoming the *Quercus semecarpifolius* forest and on steep sections *Abies spectabilis*, *Tsuga dumosa* with patches of *Betula utilis*. In the *Abies-Tsuga* forest Colin collected *Athyrium acrostichoides* which is a new species record for Nepal. Eventually we came out into a wide u-shaped valley and the grazing zone. It was the first flat bit of the trail for days through. We walked through herb rich pasture, with *Morina longifolia* left well alone by the sheep, before going back into some very atmospheric *Quercus* forest. We passed a single *Meconopsis* series *Robustae* in bud and decided to bide our time in the hope that it would be in flower on the on the way back.

Camp that night was on the edge of a bog at Dhaulo Odor caves. In April and May, the Cordyceps collecting season, this area was described as being like a bazaar but was relatively quiet now with only a few headers with cattle and goats. From the remains and squalor of the Cordyceps camp, “take only pictures leave on foot prints” obviously doesn’t apply to locals.

All through the day as we walked up through the forest our Sherpas were harvesting fungi from the trunks of decaying trees. That evening we had huge portions of fungi with dinner and fried *Polygonatum* rhizome which was all very tasty. One of the DPR scientists told us that they had been working with some of the forest peoples in Nepal to commercialise forest products, like fungi, and said without any hint of irony “they have some good ideas, but unfortunately keep dying.”

### 14<sup>th</sup> July – Dhaulo Odar to Joge Tal

The short 3km walk between camps today took 4 hours because of the bewildering array of plants. Out of the forest on a steep, beautiful, herb rich river bank we collected: *Anemone obtusiloba*, *Anemone polyanthes*, *Corydalis pseudojuncea*, *C. calycina* and *Androsace globifera*. Slightly higher we found *Astragalus candolleanus*, a very robust *Vicia*, *Arisaema jacqumontii* and a single *Lilium oxypetalum*.

The pasture around our camp at Joge Tal (3800m) was incredible with the number of flowering plants. Colin commented that it was most herb rich pasture he had seen during extensive fieldwork in Nepal. The grazing regime was obviously at just the right level to prevent either shrubs or grasses becoming dominant. We had lunch, including garlic noodle soup, on a large boulder looking up to the terminal moraine the most easterly valley sitting on *Lloydia longiscapa* and a very fragrant *Elsholtzia eriostachya*. After lunch we headed west following the river. We collected a number of species from the sandy floodplain: *Crucihimalaya himalaica*, *Astragalus candolleanus* and an *Aster* sp. We also saw plenty of *Oxyria digyna*; it is always good to see a familiar Scottish plant.

After following the Chamilaya Nadi northwest from camp we headed up a north facing slope into small patch of *Betula utilis*, *Rhododendron arboreum*, *Sorbus thomsonii* forest at 3940m. The forest floor was littered

with *Allium prattii* and *Polystichum prescottianum*, a beautiful fern with a red midrib to the rachis.

Descending back down to camp we walked through a mix of *Juniperus* and *Rhododendron lepidotum* scrub





Figure 6 *Corydalis* sp. nov. (top), *Codonopsis viridis* (bottom left), *Morina longifolia* (bottom right)

and collected *Delphinium brunonianum*. It is interesting to note that the diverse shrub flora associated with this altitude at the east end of the Himalaya was all but absent.

### 15<sup>th</sup> July – Bobaye Glacier

The Japanese decided to have a rest day and stayed near to camp, but Colin, Ganga, our Sherpas and I headed up the Lamakhaya Gad to the easternmost corrie. We hoped to reach the terminal moraine of glacier that was coming down from Bobaye Chuli (6808m). It was a steady walk along a reasonable trail used by herders, but at times felt like a lot of effort for very little altitude gain. We stopped at about 4150m to catch breath and ended up collecting a good number of plants: *Corydalis cashmeriana*, *Pedicularis*, two crucifers growing in moss on boulders.

We left the track and headed up onto the lateral moraines where we found a good number of *Lilium nanum* var. *nanum* and collected *Cypripedium tibeticum*. As with all CITES listed plants we only took two voucher specimens one for the Nepalese National Herbarium at Godovari and one for Tribuvan University Herbarium.

We collected an *Anaphalis nepalensis*, *Leontopodium jacotianum*, two *Salix* species, the large flowered *Epilobium latifolium* ssp. *speciosum* and the much smaller flowered *Epilobium chitralense* (a new species record for Nepal if confirmed) on the lateral moraine. From there we walked out onto the glacier (Figure 7). Himalayan glaciers are not like the bonny blue ice glaciers of South America and New Zealand, but grey brown bleak Mordor looking landscapes covered in rock and debris. Other plants we found in this interesting little plant community in the debris on the glacier included *Juncus allioides*, *Carex nivalis*, *Saxifraga kumaunensis* and *Silene himalayensis*.

That evening at about 6pm the cloud lifted, the sun came out and we had clear views of the snowy peaks around us, with the slightly lower second peak of Api (7076m) looming over our camp. We took the opportunity to take some group photographs of our botanical family. I thought a good caption would be Apiaceae (get it?) but I think it was lost in translation.

### 16<sup>th</sup> July - Thadgadi Gad

Today half the group decided to head up the southern slopes of the same valley we had gone up yesterday, aiming to reach 4500m. On the walk up we found *Corydalis elegans* ssp. *elegans* and *Saussurea obvallata* (Figure 8). We could smell the intense soapy citrus scent of the *Saussurea* before seeing the beautiful plant with its red midrib to the leaves and bracts. A little higher after crossing a small snow field, we collected *Primula reptans* and *Primula elliptica*, another new species record for Nepal if confirmed (Figure 9).

It was here that I suddenly became very lethargic, found it increasingly difficult to walk and could not keep my eyes open. I checked my altimeter and we were at 4400m. I decided then and there it was time to go down. My Sherpa, Myce, suggested we drop a couple of hundred meters to see if I felt better before stopping for lunch. I had no appetite when we did stop. When we got going again I found it more and more difficult to focus and stay upright. I started feel very hot and had to stop to take off layers. Myce helped me down by picking out the best way through the *Rhododendron lepidotum*, because there was no trail and keeping me upright as I stumbled down the slope. It felt like a very long way back to camp and on reaching the last bridge before camp my knees gave up and I collapsed in a heap. Myce hauled me back to my feet and must have dragged me over that bridge because the next thing I clearly remember is being in my tent.





Figure 7 Dr Colin Pendry and Ganga Dutt collecting on the moraine(Top), *Epilobium latifolium* ssp. *speciosum* (Bottom Left), *Juncus allioides* (Bottom Right)





Figure 8 *Corydalis elegans* (top left), *Saussurea obvallata* (top right), bridge made from *Rhododendron* stems (bottom).



### 17<sup>th</sup> July – Joge Tal

I was confined to camp and was glad that we weren't moving, but before everyone else left camp that morning they were all around my tent with the Japanese were debating what to do with me. I was being offered everything from antibiotics to Tamiflu. Eventually after a while they left me a stash of Japanese rehydration packs because they were sure they would be more effective than the UK ones and some high energy snacks. The rest of the morning I had regular visits from the trek crew bringing me porridge and hot water as well as making me take my temperature. I remembered it was my birthday and opened the card I brought from Scotland from my partner Carolyn which made me feel better.

The general consensus later was that there was some kind of virus doing the rounds and hit me harder than everyone else. I got up at lunchtime and had some garlic soup and black tea in the mess tent with Colin and discussed the important matter of what our Desert Island Discs would be.

That evening at dinner, as it was my birthday, the Japanese insisted that I sit at the head of the mess tent in "the special place". They broke out some more whisky to celebrate but I left them to it. As well as the usual Daal Bat for dinner there was very fresh goat kebab and chips (I assume a Scottish inspired meal) and a huge birthday cake that everyone at camp had some of.

### 18<sup>th</sup> July – Joge Tal to Simar Kharka

I felt better in the morning which was good because it was time to head back down the valley the way we had come. I lost a "discussion" about how much equipment I was carrying and poor Myce ended up carrying almost all my gear, as well as his.

On our way back through the Cordyceps camp we found *Clematis montana* in fruit growing through a *Prunus* that was doing its best to look like a *Betula*. We quickly descended past the Dhauror Odar camp site.

On an open slope in riverine forest we collected what turned out to be *Meconopsis robusta* that had been in bud when we had past 5 days earlier. We only found and collected six plants. Interestingly, plants that were in direct sun had purple/black bases to the bristles on the leaves and stem whereas the plants in the shade did not. I mention this because the purple/black base to the bristles has been used as a distinguishing character between various taxa in the genus. The *Meconopsis* account in Volume 3 of the Flora of Nepal used this character in the Key to distinguish *M. gracilipes* from *M. dhwojii*.

We sent some dried leaf material off as soon as we got back to a PhD student in Texas to sample DNA and the results indicate that *Meconopsis robusta* is very closely related to *Meconopsis chankheliensis* – making them effectively little more than colour forms of one another.

### 19<sup>th</sup> July - Simar Kharka to Khayekot

After a short two and a half hour walk from camp we were back in Khayekot. We had planned to camp in the grounds of the school at Khayekot like before but because we reached the village by 10am school was still on so we camped a little way from the village. After a bit of sleep and lunch I went with Colin, Ganga and our Sherpas up a trail that has seen better days behind camp. We made some fern collections and a *Scurrula elata* in the forest on the way up the trail. Coming out of the forest we ended up in some abandoned terraced fields. Due to a general lack of enthusiasm we sat for an hour in the sun taking in the



Figure 9 *Primula reptans* (Top), *Primula munroi* (bottom left), *Primula elliptica* (bottom right)

view of the valley before collecting a *Chamabainia cuspidata*, a diminutive Urticaceae herb growing in the field margin, then headed back down to camp.

### **20<sup>th</sup> July – Khayekot to Lithi**

I found today hard going with still not being right. I was glad of the good track between Khayekot and our camp below Lithi. Colin obviously noticed I was struggling because he said we could distribute my gear around if I was. I shrugged it off but when we reached Ghunsa he pulled rank again and made me empty most of the gear from my pack. However, by the end of the day I was glad of it because, exhausted, I fell twice on the steep descent from Lithi to our camp.

### **21<sup>st</sup> July - Lithi to Okhal**

The plan now was to skip the camp at Makarigath and camp at Pari Bagar so we could get back to Kathmandu one day earlier than planned. Today was hot and I again found it very hard going again. Much of the day was spent on autopilot staring at the back of Colin's boots trying not to fall on the narrow slippery trail.

We camped near the village of Okhal on a bit of flat ground used as a volleyball pitch. News had come up the valley that the road was shut due to a landslide beyond where we had planned to get picked up. This potentially meant an extra two days walking to clear the blocked road.

### **22<sup>nd</sup> July - Okhal to Bitale**

It was another day of walking and not much else. The porters were eager to go early to walk in the cooler morning and avoid the intense sun and heat of the valley floor. When we arrived at the Bitale camp we had heard that the road was open again and things looked promising that we'd be able to get out by bus.

We sat under our umbrellas in the scorching sun for a couple of hours overlooking the construction site watching the goings on. It was the closest thing to mind numbing telly we'd had for two and a half weeks and almost everyone just sat watching for a while. Despite being so close to the hive of activity that was the construction site there still seemed to be plenty wildlife about. We watched an eagle perched on the cliff face above the river was being harassed by much smaller birds. Then later a couple of Nepal Gray Langur (*Semnopithecus schistaceus*) crossed the grassy slopes high above river on the other side from our camp; they watching us as for a while before disappearing into the forest.

### **23<sup>rd</sup> July – Bitale to Dhanghadi**

That night was one of the only nights of constant heavy and at times torrential rain. When having breakfast everyone was realistic about the possibility that the landslide had reactivated during the night with all the rain and the road would now be blocked again. We set off from the Bitale campsite fully expecting another two days walk to Gokuleshwar or further.

Luck was on our side and we only spent 45 minutes walking when we crossed a bridge into the village of Sotti to find that the porters and Sherpas loading all the gear onto three buses. The road was still open and we took the opportunity to get going. About an hour or so later we passed a road crew working on the road where the slip had happened with a large caterpillar digger. Fourteen long hours later, at 11pm, we arrived in Dhanghadi.



## 24<sup>th</sup> – 31<sup>st</sup> of July - Kathmandu

The remaining time was spent in Kathmandu. It took three days to sort the specimens and divide the duplicate sets for the different institutions. There was a trip to DPR to secure our export permits. A visit to Tribuvan University Botany Department where Dr Pendry and Professor Ikeda gave short seminars about the current progress of the Flora of Nepal and the Expedition to Api.

We spent a day at the National Herbarium at Godovari and with Colin's help I photographed 630 Clematis specimens. This was a useful exercise as there were many specimens, especially from localities in the mid-hills that do not have duplicate representation in UK herbaria. These will be databased into the Flora of Nepal database, georeferenced if possible and the specimen image linked.

All the plant data from this trek and previous expeditions are accessible through the Botanical Locator link on the Flora of Nepal website. This includes the specimen data, maps, field photographs and images of herbarium specimens.

[www.floraofnepal.org](http://www.floraofnepal.org)

I started a thread on the SRGC forum about the trip in *General Subjects - Travel/ Places to Visit* or enter *Darchula* in the search box to find additional information and images.

[www.srgc.net/forum](http://www.srgc.net/forum)

I'd like to sincerely thank the Scottish Rock Garden Club and the Davis Exploration fund for financially supporting my participation in this expedition.



Figure 10 The Botanist and Sherpa team at Joge Tal with Api in the background



## Appendix – Additional Information

### Expedition Participants

- Prof. Hiroshi Ikeda (leader), The University of Tokyo, Japan
- Dr. Shuichi Noshiro, Forestry and Forest Products Research Institute, Japan
- Dr. Koji Yonekura, Tohoku University, Japan
- Mr Kensei Akai, Fukui Prefectural University, Japan
- Dr. Okihito Yano, The University of Tokyo, Japan
- Dr. Nobuko Yamamoto, Okayama University of Science, Japan
- Dr. Colin A. Pendry, RBGE
- Mr Alan Elliott, University of Edinburgh and RBGE
- Mr Ganga Dutt, DPR
- Mr Mitra Pathak, DPR

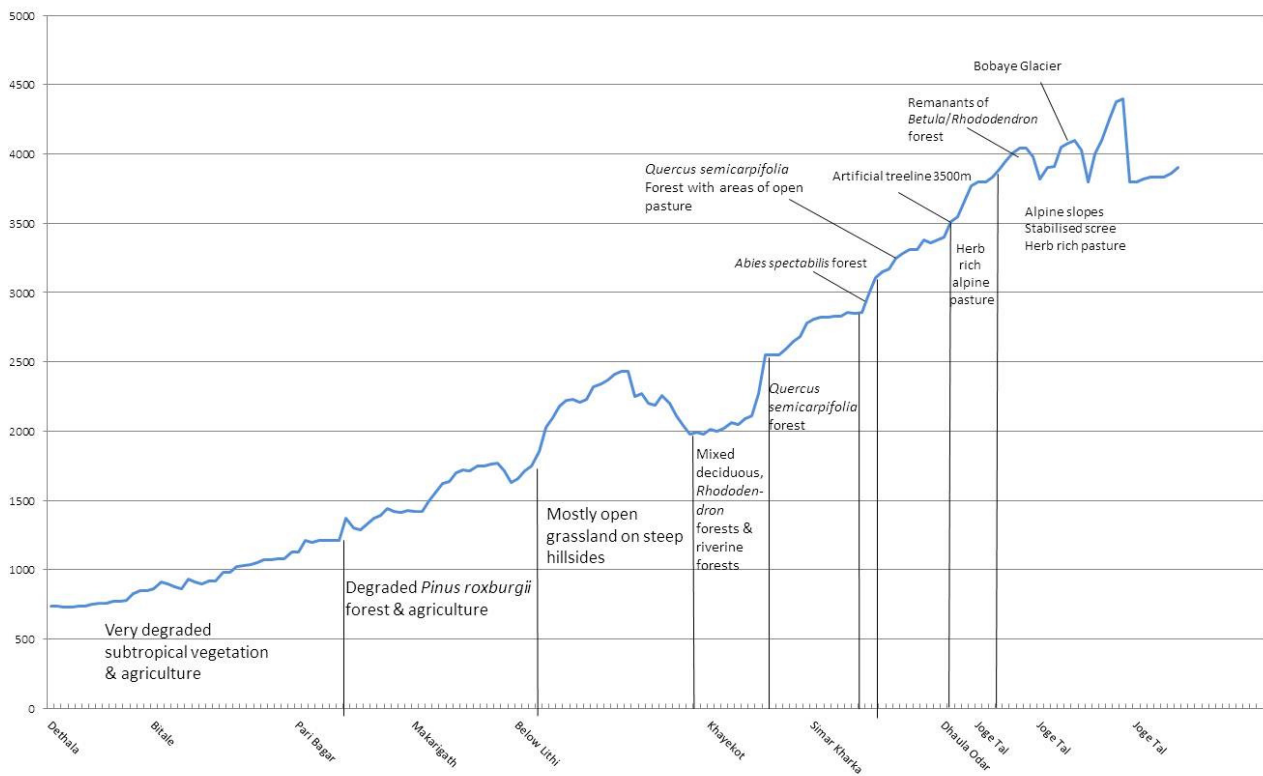


Figure 11: Vegetation by altitude

## Trek Statistics

In total 1181 collections were made. Although progress has been made in the identification of the collections many do not yet have their final identification.

The Darchula expedition collected: 383 genera for flowering plants and ferns. There are 129 collections only identified to Family and 52 collections with no identification, these are listed as “unknown” or “Fern”.

Table 1: 10 largest Families in terms of collections

Family	Number of Collections
Poaceae	80
Asteraceae	74
Cyperaceae	49
Rosaceae	69
Polygonaceae	41
Ranunculaceae	40
Orchidaceae	36
Ericaceae	37
Fabaceae	34
Saxifragaceae	26

Table 2: 10 largest genera in terms of Collections

Genus	Number of Collections
<i>Rhododendron</i>	30
<i>Carex</i>	27
<i>Potentilla</i>	19
<i>Salix</i>	18
<i>Rhodiola</i>	17
<i>Galium</i>	16
<i>Corydalis</i>	16
<i>Pedicularis</i>	15
<i>Alnus</i>	13
<i>Impatiens</i>	12

Below is the full list of collections. This is a provisional list and the collections were given at least a family identification if possible. The full information can be found on the Botanical Locator on the Flora of Nepal website by searching the collector’s number. This will give access to the field notes and images, which if not there at the moment will be added over time and the most up-to-date determinations.

Table 3: Full list of Collections and Field/Current Determinations in alphabetical order

Collector Number	Determination	Collector Number	Determination
1212071	<i>Abies densa</i>	1211135	Lloidea
1213255	<i>Acanthospermum hispidum</i>	1212023	Lonicera
1212069	<i>Acer campbellii</i>	1212065	Lonicera
1212109	<i>Acer oblongum</i>	1212081	Lonicera
1212055	<i>Acer sterculiaceum</i>	1212089	Lonicera
1213237	<i>Achyranthes bidentata</i>	1213070	Lonicera
1213161	<i>Aconogonon rumicifolium</i>	1213124	Lonicera
1216079	<i>Aconogonon rumicifolium</i>	1214110	Lonicera
1211152	Actaea	1216010	Loxogramme
1219002	Actinidiaceae	1215030	Luzura
1216012	<i>Adiantum</i>	1214170	Luzura
1216002	<i>Adiantum capillis-veneris</i>	1216006	Lygodium
1219060	<i>Adiantum capillis-veneris</i>	1212090	Lyonia
1213039	<i>Adiantum caudatum</i>	1211019	Lysimachia
1212007	Aesandra	1211040	Lysimachia
1212045	<i>Aesculus indica</i>	1214123	Lysimachia

1214086	Ageratm	1214142	Lysimachia
1214087	Ageratm	1214290	Lysimachia
1211035	Agrimonia	1212009	Macaranga?
1211058	Agrimonia	1218028	Maesa indica
1213199	Agrostis	1213125	Maianthemum
1214171	Agrostis	1212016	Mallotus philippensis
1211107	Aletris	1213040	Mallotus philippensis
1219054	Aletris pauciflora	1211011	Malotus
1215039	Allium	1215009	Mariscus
1212097	Alnus nepalensis	1214122	Mazus
1212098	Alnus nepalensis	1214134	Mazus
1212099	Alnus nepalensis	1213019	Mecardonia proumbens
1212101	Alnus nepalensis	1217058	Meconopsis robusta
1212102	Alnus nepalensis	1217007	Meizotropis buteiformis
1212103	Alnus nepalensis	1213224	Melica
1212104	Alnus nepalensis	1216008	Mentha spicata
1212105	Alnus nepalensis	1213010	Micromeria biflora
1212106	Alnus nepalensis	1216003	Micromeria biflora
1212110	Alnus nepalensis	1216037	Micromeria biflora
1212111	Alnus nepalensis	1214079	Mollugo
1212112	Alnus nepalensis	1213014	Mollugo stricta
1212117	Alnus nepalensis	1214311	Monochoria vaginalis
1213069	Amaranthus blitum	1214200	Morina longifolia
1213001	Amaranthus spinosus	1213221	Muhlenbergia
1218076	Ampelocissus	1219042	Myricaria
1218078	Ampelocissus	1219043	Myricaria
1218077	Ampelocissus divaricata	1218068	Nardostachys
1213143	Anaphalis nepalensis	1216048	Neolitsea pallens
1216092	Anaphalis nepalensis	1218067	Neopicrorhiza
1211099	Androsace	1216069	Nepeta
1211102	Androsace	1213024	Nicandra physalodes
1211158	Androsace	1214136	Oenothera
1219010	Androsace	1211043	Ophiopogon
1219011	Androsace	1213089	Ophiopogon
1219047	Androsace	1211014	Orchidaceae
1219048	Androsace	1211020	Orchidaceae
1211081	Anemone	1211054	Orchidaceae
1214224	Anemone	1211082	Orchidaceae
1217037	Anemone elongata	1211083	Orchidaceae
1217041	Anemone obtusiloba	1211112	Orchidaceae
1217042	Anemone polyanthes	1211184	Orchidaceae
1217021	Anemone rivularis	1218006	Orchidaceae
1217025	Anemone vitifolia	1218007	Orchidaceae
1213150	Anthoxanthum	1218013	Orchidaceae
1213223	Anthoxanthum	1218014	Orchidaceae
1212120	Antidesma	1218016	Orchidaceae

1212008	Apocynaceae	1218017	Orchidaceae
1211023	Apoxis	1218018	Orchidaceae
1213075	Arenaria	1218022	Orchidaceae
1213116	Arenaria	1218023	Orchidaceae
1213165	Arenaria	1218024	Orchidaceae
1214249	Arenaria	1218042	Orchidaceae
1213229	Arenaria serpyllifolia	1218045	Orchidaceae
1218038	Argyrea	1218046	Orchidaceae
1211042	Arisaema	1218057	Orchidaceae
1211055	Arisaema	1218058	Orchidaceae
1211087	Arisaema	1218059	Orchidaceae
1211090	Arisaema	1218060	Orchidaceae
1211075	Arisaema consanguineum	1218061	Orchidaceae
1215020	Arisaema flavum	1218062	Orchidaceae
1217004	Arisaema tortuosum	1218074	Orchidaceae
1214309	Artemisia	1218075	Orchidaceae
1211178	Asclepiadaceae	1219015	Orchidaceae
1218030	Asclepiadaceae	1219018	Orchidaceae
1218050	Asclepiadaceae	1213055	Oreocnide frutescens
1213030	Asclepias curassavica	1213031	Oxalis
1218020	Asclepias curassavica	1214095	Oxalis
1211029	Asparagus	1213027	Oxalis corniculata
1219061	Aspleniaceae	1211145	Oxygraphis
1219062	Aspleniaceae	1213118	Oxyria digyna
1216024	Asplenium	1216095	Oxyria digyna
1213227	Asplenium varians	1219036	Oxyria digyna
1214160	Aster	1211052	Paeonia emodi
1214208	Aster	1213128	Parietaria micrantha
1214257	Aster	1219044	Parnassia
1214141	Asteraceae	1211125	Parnassia
1214154	Asteraceae	1213145	Parnassia
1214159	Asteraceae	1216080	Parnassia kumaonica
1214161	Asteraceae	1217024	Parochetus communis
1214169	Asteraceae	1217034	Parochetus communis
1214184	Asteraceae	1218021	Parthenocissus
1214192	Asteraceae	1218051	Parthenocissus
1214195	Asteraceae	1213013	Paspalidium
1214198	Asteraceae	1213251	Paspalum scrobiculatum
1214207	Asteraceae	1211109	Pedicularis
1214209	Asteraceae	1211119	Pedicularis
1214210	Asteraceae	1211129	Pedicularis
1214211	Asteraceae	1211144	Pedicularis
1214238	Asteraceae	1214232	Pedicularis
1214258	Asteraceae	1214239	Pedicularis
1214274	Asteraceae	1214222	Pedicularis heteroglossa
1214279	Asteraceae	1216084	Pedicularis heteroglossa

1214281	Asteraceae	1214174	Pedicularis hoffmeisteri
1214286	Asteraceae	1214270	Pedicularis hoffmeisteri
1214297	Asteraceae	1211124	Pedicularis heteroglossa
1214304	Asteraceae	1213162	Pedicularis heteroglossa
1214308	Asteraceae	1211076	Pedicularis hoffmeisteri
1214315	Asteraceae	1211101	Pedicularis klotzschii
1211179	Astilbe rivularis	1213133	Pedicularis siphonantha
1217017	Astragalus	1213050	Pennisetum
1217046	Astragalus candolleanus	1213083	Pennisetum
1217052	Astragalus candolleanus	1217002	Pentasachme wallichii
1216043	Athyrium	1213056	Peperomia
1216076	Athyrium	1213017	Persicaria barbata
1216061	Athyrium acrostichoides	1213043	Persicaria capitata
1216107	Athyrium wallichianum	1213097	Persicaria chinensis
1211070	Balanophora	1213178	Persicaria glacialis
1218001	Bauhinia	1213096	Persicaria nepalensis
1219008	Benthamidia capitata	1213032	Persicaria posumbu
1216040	Berberis aristata	1214100	Phenix
1216027	Berberis asiatica	1216050	Philadelphus tomentosus
1216131	Berberis asiatica	1211170	Philipendula
1216117	Berberis thomsoniana	1213141	Phleum alpinum
1212044	Betula alnoides	1216070	Phlomis bracteosa
1212084	Betula utilis	1216054	Phlomis macrophylla
1214097	Bidens	1218015	Pholidota
1213041	Bidens pilosa	1213226	Phryma leptostachya
1213156	Bistorta affinis	1213005	Phyla nodiflora
1213191	Bistorta affinis	1211037	Phyllanthus
1213102	Bistorta amplexicaulis	1212011	Phyllanthus
1216108	Bistorta perpusilla	1212121	Phyllanthus
1211147	Bistorta vivipara	1213008	Phyllanthus
1211148	Bistorta vivipara	1213038	Phyllanthus
1213134	Bistorta vivipara	1213057	Phyllanthus
1213148	Bistorta vivipara	1213016	Physalis
1215040	Blysmus compressus	1213023	Physalis
1213053	Boehmeria ternifolia	1216129	Phytolacca acinosa
1211034	Boenninghausenia albiflora	1213157	Picrorhiza scrophulariiflora
1211180	Boenninghausenia albiflora	1213103	Pilea
1211157	Boraginaceae	1213246	Pilea
1214107	Boraginaceae	1213215	Pilea racemosa
1214120	Boraginaceae	1213092	Pilea scripta
1213105	Borinda	1213100	Pilea umbrosa
1216073	Botrychium	1214225	Pinguila aipina
1213206	Brachypodium sylvaticum	1217032	Piptanthus nepalensis
1213213	Bromus	1212087	Pipthanthus
1213088	Bupleurum	1211128	Pitentilla argyrophylla
1216071	Bupleurum	1217006	Plantago

1212039	Buxus
1211160	Cacalia
1212026	Caesalpinia
1213209	Calamagrostis
1213231	Calamagrostis
1213220	Calamagrostis
1212003	Callicarpa
1213025	Callicarpa
1214259	Callitriche
1216083	Campanula aristata
1214146	Campanulaceae
1214206	Campanulaceae
1214276	Campanulaceae
1217005	Cannabis
1214188	Capsella bursa-pastoris
1214264	Capsella bursa-pastoris
1219050	Cardamine
1216068	Cardamine
1216074	Cardamine
1214181	Cardamine
1216049	Cardamine flexuosa
1216056	Cardamine flexuosa
1216110	Cardamine loxostemonoides
1211069	Cardiocrinum giganteum
1215012	Carex
1215018	Carex
1215026	Carex
1215028	Carex
1215029	Carex
1215031	Carex
1215033	Carex
1215034	Carex
1215036	Carex
1215037	Carex
1215042	Carex
1215046	Carex
1215047	Carex
1215050	Carex
1215051	Carex
1215052	Carex
1215062	Carex
1215063	Carex
1216098	Carex
1214140	Carex
1215064	Carex
1215022	Carex filicina

1213036	Plantago erosa
1216115	Pleurospermum
1213112	Poa
1213114	Poa
1213135	Poa
1213136	Poa
1213140	Poa
1213167	Poa
1213196	Poa
1213212	Poa
1214121	Poa
1214265	Poa
1216035	Polygala abyssinica
1216038	Polygala crotalarioides
1211016	Polygonaceae
1218049	Polygonaceae
1214173	Polygonaceae
1214196	Polygonaceae
1211017	Polygonatum
1211085	Polygonatum
1211091	Polygonatum
1213045	Polygonatum
1214092	Polygonum
1213253	Polygonum recumbens
1213234	Polypodium
1216045	Polypodium
1213137	Polystichum
1216028	Polystichum
1216029	Polystichum
1216067	Polystichum prescottianum
1216078	Polystichum prescottianum
1213021	Portulaca oleracea
1211126	Potentilla tristis
1219013	Potentilla
1219033	Potentilla
1214213	Potentilla
1214214	Potentilla
1214220	Potentilla
1214234	Potentilla
1211078	Potentilla argyrophylla
1211096	Potentilla argyrophylla
1211113	Potentilla argyrophylla
1211132	Potentilla argyrophylla
1216104	Potentilla argyrophylla
1211138	Potentilla commutata
1211103	Potentilla cuneata



1215038	Carex microgrochin	1211007	Potentilla indica
1215056	Carex nivalis	1211072	Potentilla joseohiana
1215019	Carex nubigena	1211188	Potentilla kleiniana
1215058	Carex nubigena	1211133	Potentilla microphylla
1215024	Carex setigera	1216105	Potentilla microphylla
1211131	Cartha palustris	1211149	Potentilla polyphylla
1214114	Caryophyllaceae	1213241	Pouzolzia hirta
1214133	Caryophyllaceae	1213260	Pouzolzia zeylanica
1214178	Caryophyllaceae	1211146	Primula elliptica
1214179	Caryophyllaceae	1216102	Primula elliptica
1214287	Caryophyllaceae	1214236	Primula elliptica
1216014	Caryopteris bicolor	1217003	Primula floribunda
1214093	Cassia obtusifolia	1214237	Primula macrophylla
1218065	Cassiope fastigiata	1216113	Primula macrophylla
1219026	Cassiope fastigiata	1219052	Primula macrophylla
1212051	Celtis	1214250	Primula munroi
1213068	Cerastium fontanum	1219049	Primula munroi
1213146	Cerastium fontanum	1216103	Primula reptans
1213090	Chamabainia cuspidata	1214099	Primulaceae
1216128	Chamabainia cuspidata	1216030	Prunella vulgaris
1213006	Chamaesyce	1211025	Prunus
1213004	Chamaesyce hirta	1211032	Prunus
1213003	Chamaesyce prostrata	1212075	Prunus
1213026	Cheilanthes	1212107	Prunus
1213073	Cheilanthes	1212035	Prunus cornuta
1213216	Cheilanthes	1211026	Prunus persica
1213245	Cheilanthes	1216123	Pteridium
1213037	Cheilanthes rufa	1216021	Pteris
1216001	Chelianthes	1216039	Pteris
1214083	Chenopodium	1216127	Pteris
1214089	Chenopodium	1216007	Pteris vittata
1213018	Chenopodium album	1216126	Pteris wallichiana
1213082	Chrysopogon	1215008	Pycneus
1216013	Cinnamomum tamala	1215017	Pycneus
1212001	Cippadessa	1211140	Pycrorhiza
1211067	Circaea	1211008	Pyracantha crenata
1211154	Circaea	1216009	Pyrrosia
1211173	Circaea	1211027	Pyrus
1218004	Cissampelos pareira	1211001	Pyrus pashia
1218012	Cissus	1211031	Pyrus pashia
1218026	Cissus	1211171	Quercus semecarpifolia
1217031	Clematis barbellata	1212085	Quercus semecarpifolia
1217010	Clematis buchananiana	1216118	Quercus semecarpifolia
1211168	Clematis connata	1216122	Quercus semecarpifolia
1217026	Clematis connata	1214215	Ranunculaceae
1217027	Clematis connata	1214240	Ranunculaceae

1217028	Clematis connata	1211077	Ranunculus
1217029	Clematis montana	1217048	Ranunculus
1217057	Clematis montana	1217014	Ranunculus diffusus
1216004	Clinopodium umbrosum	1217040	Ranunculus hirtellus
1216031	Clinopodium umbrosum	1211024	Ranunculus lactus
1211169	Clintonia udensis	1217013	Ranunculus laetus
1212010	Cocculus laurifolius	1213170	Ranunculus munroanus
1218009	Cocculus laurifolius	1212034	Rhamnus
1213091	Colquhounia coccinea	1212093	Rhamnus
1216130	Colquhounia coccinea	1212118	Rhamnus nepalensis
1213080	Commelina	1213205	Rheum australe
1215023	Commelina	1213154	Rheum moorcroftianum
1214081	Commelina	1219017	Rhodiola
1214162	Commelina	1211093	Rhodiola
1214163	Commelina	1211094	Rhodiola
1219014	Compositae	1211114	Rhodiola
1219039	Compositae	1211115	Rhodiola
1219051	Compositae	1211118	Rhodiola
1216060	Coniogramme	1211123	Rhodiola
1212043	Coriaria nepalense	1211142	Rhodiola
1211111	Cortea depressa	1213153	Rhodiola
1219045	Corydalis	1213120	Rhodiola bupleuroides
1211048	Corydalis	1213121	Rhodiola bupleuroides
1217039	Corydalis	1216119	Rhodiola bupleuroides
1219056	Corydalis	1216120	Rhodiola bupleuroides
1219057	Corydalis	1211163	Rhodiola chrysanthemifolia
1214233	Corydalis	1213169	Rhodiola coccinea
1214253	Corydalis	1216108	Rhodiola coccinea
1217045	Corydalis calycina	1216101	Rhodiola wallichiana
1217051	Corydalis cashmeriana	1214235	Rhododendron
1217053	Corydalis cashmeriana	1212077	Rhododendron anthopogon
1217018	Corydalis cornuta	1219021	Rhododendron anthopogon
1213175	Corydalis elegans	1212019	Rhododendron arboreum
1217056	Corydalis elegans	1212020	Rhododendron arboreum
1216114	Corydalis meifolia	1212021	Rhododendron arboreum
1217043	Corydalis pseudojuncea	1212036	Rhododendron arboreum
1217044	Corydalis pseudojuncea	1212037	Rhododendron arboreum
1211086	Cotoneaster	1212047	Rhododendron arboreum
1211156	Cotoneaster	1212048	Rhododendron arboreum
1212033	Cotoneaster	1212049	Rhododendron arboreum
1212057	Cotoneaster	1212053	Rhododendron arboreum
1212068	Cotoneaster	1212054	Rhododendron arboreum
1211105	Cotoneaster microphyllus	1212058	Rhododendron arboreum
1213015	Crassocephalum crepidioides	1212059	Rhododendron arboreum
1211116	Cremanthodium ellisii	1212060	Rhododendron arboreum
1216082	Cruciferae	1212072	Rhododendron arboreum

1219037	Cruciferae	1212073	Rhododendron arboreum
1214147	Cruciferae	1212074	Rhododendron arboreum
1214152	Cruciferae	1212091	Rhododendron arboreum
1214191	Cruciferae	1212092	Rhododendron arboreum
1214252	Cruciferae	1212094	Rhododendron arboreum
1214261	Cruciferae	1212108	Rhododendron arboreum
1214267	Cruciferae	1212113	Rhododendron arboreum
1214294	Cruciferae	1212114	Rhododendron arboreum
1216075	Crucihimalaya himalaica	1212064	Rhododendron barbatum
1216066	Crucihimalaya lasiocarpa	1212070	Rhododendron
1216036	Crucihimalaya stricta	1212079	Rhododendron
1213197	Cryptogramma brunoniana	1212078	Rhododendron lepidotum
1218005	Cryptolepis buchananii	1219022	Rhododendron lepidotum
1218019	Cucurbitaceae	1212042	Rhus
1218035	Cucurbitaceae	1212022	Rhus wallichiana
1218036	Cucurbitaceae	1216053	Ribes acuminatum
1218037	Cucurbitaceae	1216059	Ribes glaciale
1218071	Cucurbitaceae	1216062	Ribes luridum
1218069	Cuscuta	1216121	Ribes luridum
1213218	Cyathula capitata	1213033	Rorippa indica
1213239	Cyathula tomentosa	1211039	Rosa
1216005	Cyclosorus	1211174	Rosa
1216025	Cyclosorus	1211073	Rosa macrophylla
1213029	Cymbopogon	1211089	Rosa sericea
1213054	Cymbopogon	1211061	Roscoea
1213060	Cymbopogon	1211053	Roscoea purpurea
1213236	Cymbopogon	1211183	Roscoea purpurea
1213002	Cynodon dactylon	1211041	Rubia
1213117	Cynoglossum	1214082	Rubiaceae
1215003	Cyperus	1211045	Rubus
1215010	Cyperus nivalis	1211050	Rubus
1218064	Cypripedium	1211051	Rubus
1213180	Cystopteris filix-fragilis	1211063	Rubus
1213235	Dactylis glomerata	1211079	Rubus
1218063	Dactylorhiza	1211088	Rubus
1212012	Dalbergia	1216132	Rubus
1213020	Datura stramonium	1214124	Rumex
1213093	Debregeasia saeneb	1213131	Rumex acetosa
1213193	Delphinium	1213132	Rumex acetosa
1217050	Delphinium brunonianum	1213201	Rumex acetosa
1216026	Dennstaedtia appendiculata	1213202	Rumex acetosa
1213181	Deschampsia cespitosa	1213051	Rumex hastatus
1212028	Desmodium	1213052	Rumex nepalensis
1217015	Desmodium	1213009	Saccharum
1217012	Desmodium elegans	1212080	Salix
1212046	Deutzia	1212082	Salix

1211167	<i>Deutzia compacta</i>	1213211	<i>Salix</i>
1213249	<i>Digitaria</i>	1216088	<i>Salix</i>
1213257	<i>Digitaria</i>	1216089	<i>Salix</i>
1213022	<i>Digitaria</i>	1216093	<i>Salix</i>
1211030	<i>Dioscorea</i>	1219025	<i>Salix</i>
1218029	<i>Dioscorea</i>	1213115	<i>Salix denticulata</i>
1218043	<i>Dioscorea</i>	1213071	<i>Salix disperma</i>
1218052	<i>Dioscorea</i>	1213159	<i>Salix hylematica</i>
1218080	<i>Dioscorea</i>	1213189	<i>Salix hylematica</i>
1216032	<i>Diplazium</i>	1213190	<i>Salix hylematica</i>
1216125	<i>Diplazium</i>	1213195	<i>Salix hylematica</i>
1216081	<i>Draba lichiangensis</i>	1213194	<i>Salix karelinii</i>
1211130	<i>Dracocephalum</i>	1213151	<i>Salix lindleyana</i>
1213072	<i>Drepanostachyum</i>	1213152	<i>Salix lindleyana</i>
1216023	<i>Drynaria</i>	1213173	<i>Salix ovatomicrophylla</i>
1213126	<i>Dryopteris</i>	1213174	<i>Salix ovatomicrophylla</i>
1213127	<i>Dryopteris</i>	1216047	<i>Sanicula</i>
1216064	<i>Dryopteris</i>	1212002	<i>Sapindus mukorossi</i>
1213155	<i>Dryopteris barbigera</i>	1212029	<i>Sarcococca</i>
1215007	<i>Echinochloa</i>	1213064	<i>Sarcococca</i>
1212116	<i>Ehretia</i>	1219034	<i>Saussurea</i>
1211028	<i>Elaeagnus</i>	1211143	<i>Saussurea graminifolia</i>
1212031	<i>Elaeagnus</i>	1216100	<i>Saussurea obvallata</i>
1213066	<i>Elatostema cyrtandrifolium</i>	1211092	<i>Saxifraga</i>
1213244	<i>Elatostema cyrtandrifolium</i>	1213122	<i>Saxifraga</i>
1213087	<i>Elatostema monandrum</i>	1213139	<i>Saxifraga</i>
1213035	<i>Elatostema punctatum</i>	1213144	<i>Saxifraga</i>
1215059	<i>Eleocharis palustris</i>	1213200	<i>Saxifraga</i>
1213247	<i>Eleusine indica</i>	1216086	<i>Saxifraga</i>
1215006	<i>Eleusine indica</i>	1216094	<i>Saxifraga</i>
1219059	<i>Elsholtzia</i>	1216112	<i>Saxifraga</i>
1216116	<i>Elsholtzia eriostachya</i>	1214194	<i>Saxifraga</i>
1213085	<i>Elymus</i>	1213123	<i>Schenodorus giganteus</i>
1213149	<i>Elymus</i>	1215065	<i>Schoenoplectus juncpides</i>
1213214	<i>Elymus</i>	1215066	<i>Schoenoplectus macronatus</i>
1219041	<i>Epilobium</i>	1213078	<i>Scorzonera</i>
1211068	<i>Epilobium</i>	1211120	<i>Scrophularia</i>
1213158	<i>Epilobium</i>	1211166	<i>Scrophularia</i>
1213187	<i>Epilobium</i>	1213094	<i>Scrophularia</i>
1216091	<i>Epilobium chitralense</i>	1213129	<i>Scrophularia</i>
1213185	<i>Epilobium latifolium</i>	1213240	<i>Scrophularia</i>
1216087	<i>Epilobium latifolium</i>	1216124	<i>Scurrula elata</i>
1219038	<i>Epilobium latifolium</i>	1211141	<i>Sedum</i>
1213012	<i>Eragrostis</i>	1213048	<i>Selaginella</i>
1213063	<i>Eragrostis</i>	1216019	<i>Selaginella</i>
1213222	<i>Eragrostis</i>	1216020	<i>Selaginella</i>

1213258	Eragrostis	1216022	Selaginella
1214226	Ericaceae	1216057	Selliguea
1214229	Ericaceae	1216058	Selliguea
1214231	Ericaceae	1211155	Senecio
1214077	Erigeron	1214128	Senecio
1214306	Erigeron	1214185	Senecio
1214307	Erigeron	1214199	Senecio
1214091	Erigeron karvinskianus	1214201	Senecio
1215001	Erioscirtus comosus	1214203	Senecio
1212050	Euonymus	1214255	Senecio
1212061	Euonymus porphyreus	1214260	Senecio
1211110	Euphorbia	1214263	Senecio
1211121	Euphorbia	1215004	Setalia
1213232	Euphorbia	1215005	Setalia
1213233	Euphorbia	1219032	Sibbaldia
1214094	Euphorbia	1211100	Sibbaldia cuneata
1214080	Euphorbia hirta	1211117	Sibbaldia cuneata
1214108	Euphorbia royleana	1211134	Sibbaldia cuneata
1213168	Euphorbia stracheyi	1211098	Sibbaldia micropetala
1214223	Euphorbiaceae	1211122	Sibbaldia purpurea
1214289	Euphorbiaceae	1211136	Sibbaldia purpurea
1216017	Excoecaria acerifolia	1211137	Sibbaldia purpurea
1213067	Fagopyrum dibotrys	1216106	Sibbaldia purpurea
1219028	Fern	1213243	Sigesbeckia orientalis
1219031	Fern	1213108	Silene
1213147	Festuca	1213130	Silene
1213164	Festuca	1213204	Silene
1213186	Festuca	1216099	Silene himalayensis
1213217	Festuca	1211012	Smilax
1213110	Festuca leptopogon	1211022	Smilax
1212004	Ficus	1211057	Smilax
1212025	Ficus	1218044	Smilax
1212052	Ficus	1218048	Smilax
1219001	Ficus	1214295	Smilax
1219003	Ficus	1211186	Smilax aspera
1215011	Fimbristylis	1218008	Smilax aspera
1215021	Fimbristylis	1211153	Smlacina
1215002	Fimbristylis	1211059	Solanaceae
1211080	Fragaria nubicola	1214076	Solanaceae
1211151	Fragaria nubicola	1214088	Solanaceae
1212100	Fraxinus	1214102	Solanaceae
1214090	Galinsoga parviflora	1214296	Solanaceae
1213034	Galinsoga quadriradiata	1213084	Solanum
1213104	Galium	1213081	Solena heterophylla
1214153	Galium	1213238	Solena heterophylla
1214155	Galium	1213049	Sonchus wightianus

1214177	Galium	1212066	Sorbus
1214242	Galium	1212076	Sorbus
1214271	Galium	1212062	Sorbus cuspidata
1214272	Galium	1214190	Spergula
1214278	Galium	1211049	Spiraea
1214280	Galium	1211150	Spiraea
1214283	Galium	1211159	Spiraea
1214291	Galium	1213242	Sporobolus
1214303	Galium	1213248	Sporobolus diander
1213106	Galium asperuloides	1213252	Sporobolus piliferus
1213074	Galium elegans	1216051	Stachys melissaefolia
1213198	Galium paradoxum	1213062	Stellaria
1214301	Galium sp	1213113	Stellaria
1213046	Gamochaeta pensylvanica	1213184	Stellaria
1213177	Gaultheria trichophylla	1213188	Stellaria
1214227	Gentiana	1213210	Stellaria monosperma
1214230	Gentiana	1218003	Stephania
1214247	Gentiana	1218011	Stephania
1219053	Gentianaceae	1218032	Stephania
1214193	Gentianaceae	1218039	Stephania
1219012	Geranium	1218053	Stephania
1213160	Geranium	1218070	Stephania
1214175	Geranium	1218072	Stephania
1215015	Geranium nepalense	1213171	Stipa
1211176	Gesneriaceae	1213183	Stipa
1211187	Gesneriaceae	1211162	Streptopus
1217001	Gesneriaceae	1219058	Swertia
1211065	Geum	1212017	Swida macrophylla
1211104	Geum elatum	1212115	Symplocos cochinchinensis
1213225	Girardinia diversifolia	1212067	Syringa emodi
1212119	Glochidion	1212013	Syzygium
1213203	Glyceria tongluensis	1214244	Tamaricaceae
1214096	Gramineae	1211161	Taraxacum
1214109	Gramineae	1214148	Taraxacum
1214125	Gramineae	1214241	Taraxacum
1214127	Gramineae	1214292	Taraxacum
1214129	Gramineae	1212088	Taxus wallichiana
1214135	Gramineae	1212006	Terminalia tomentosa
1214138	Gramineae	1218031	Tetrastigma
1214145	Gramineae	1218027	Tetrastigma obtectum
1214156	Gramineae	1218034	Tetrastigma serrulatum
1214218	Gramineae	1219030	Thalictrum
1214282	Gramineae	1211046	Thalictrum
1214314	Gramineae	1211108	Thalictrum
1211002	Grewia	1211172	Thalictrum
1211006	Grewia	1211181	Thalictrum

1212005	Grewia	1211182	Thalictrum
1213058	Grewia	1211185	Thalictrum
1218047	Habenaria	1217038	Thalictrum cultratum
1211018	Hedychium ellipticum	1217008	Thalictrum foliolosum
1213166	Helictotrichon	1217022	Thalictrum foliolosum
1213011	Heliotropium strigosum	1217016	Thalictrum sp. nov.
1216011	Helixanthera ligustrina	1213065	Thelypteris erubescens
1218056	Helleborine	1213077	Themeda
1213207	Hemiphragma heterophyllum	1217009	Theropogon pallidus
1216052	Heracleum	1216072	Thymus linearis
1218010	Hoya	1213228	Tillaea
1218025	Hoya	1212032	Toona serrata
1218054	Hydrangea anomala	1212024	Toricellia tillifolia
1216055	Hydrangea heteromalla	1211009	Trachelospermum
1213095	Hypericum	1213182	Triglochin palustris
1213107	Hypericum	1217020	Trigonella emodi
1216015	Hypericum oblongifolium	1217035	Trigonella emodi
1213254	Hypodematium	1213142	Trigonotis
1213079	Hypoxis aurea	1216111	Trigonotis
1213111	Hystrix duthiei	1213163	Trisetum
1211010	Impatiens	1213179	Trisetum
1211015	Impatiens	1213208	Trisetum
1211033	Impatiens	1212095	Tsuga dumosa
1211060	Impatiens	1213044	Tylophora
1211062	Impatiens	1212096	Ulmus
1211064	Impatiens	1216044	Umbelliferae
1211071	Impatiens	1216065	Umbelliferae
1211097	Impatiens	1216085	Umbelliferae
1211175	Impatiens	1214165	Umbelliferae
1211190	Impatiens	1214172	Umbelliferae
1213028	Impatiens	1214269	Umbelliferae
1213138	Impatiens	1212014	unknown
1214119	Imperata	1212018	unknown
1213047	Imperata cylindrica	1214078	Unknown
1213230	Incarvillea	1214101	Unknown
1212040	Indigofera	1214103	Unknown
1213059	Indigofera	1214104	Unknown
1213061	Indigofera	1214111	Unknown
1217023	Indigofera hebepetala	1214112	Unknown
1217011	Indigofera heterantha	1214113	Unknown
1215014	Iphigenia indica	1214115	Unknown
1218040	Ipomoea	1214117	Unknown
1218079	Ipomoea	1214118	Unknown
1215060	Isolepis setacea	1214131	Unknown
1214085	Ixeris	1214132	Unknown
1214137	Ixeris	1214143	Unknown

1216033	Jasminum dispernum	1214151	Unknown
1216042	Jasminum grandiflorum	1214166	Unknown
1216016	Jasminum humile	1214167	Unknown
1216034	Jasminum humile	1214168	Unknown
1212056	Juglans	1214176	Unknown
1216097	Juncaceae	1214202	Unknown
1215025	Juncus	1214205	Unknown
1215027	Juncus	1214217	Unknown
1215035	Juncus	1214219	Unknown
1215041	Juncus	1214228	Unknown
1215057	Juncus	1214243	Unknown
1215061	Juncus	1214248	Unknown
1216096	Juncus	1214256	Unknown
1214245	Juncus	1214268	Unknown
1214254	Juncus	1214277	Unknown
1219046	Juncus bengalensis	1214284	Unknown
1212083	Juniperus	1214285	Unknown
1215032	Kobresia	1214288	Unknown
1215043	Kobresia	1214293	Unknown
1215048	Kobresia	1214298	Unknown
1215049	Kobresia	1214299	Unknown
1215053	Kobresia	1214302	Unknown
1215055	Kobresia duthiei	1214305	Unknown
1215044	Kobresia esenbeckii	1214312	Unknown
1215045	Kobresia nepalensis	1214313	Unknown
1213176	Koenigia delicatula	1214316	Unknown
1213109	Koenigia nepalensis	1214317	Unknown
1215016	Kyllingia	1218033	unknown
1214098	Labiatae	1219004	unknown
1214197	Labiatae	1219016	unknown
1214262	Labiatae	1219020	unknown
1211164	Lamium album	1219023	unknown
1213086	Lamium album	1219024	unknown
1213042	Lantana camara	1219029	unknown
1213007	Launaea	1219060	unknown
1213099	Lecanthus peduncularis	1213250	Urochloa
1214144	Legminosae	1213259	Urochloa
1214275	Legminosae	1213101	Urtica ardens
1215013	Leguminosae	1211177	Urticaceae
1217054	Leguminosae	1213192	Valeriana
1217055	Leguminosae	1211165	Valeriana hardwickii
1219035	Leguminosae	1213172	Valeriana jatamansi
1219040	Leguminosae	1214126	Verbascum thapsus
1219055	Leguminosae	1213119	Veronica
1211106	Leontopodium	1214310	Veronica
1214246	Leontopodium himalayanum	1216077	Veronica cephaloides



1216090	Leontopodium jacotianum
1216041	Leonurus cardiaca
1216046	Lepisorus
1216063	Lepisorus
1211013	leptodermis
1211021	Leptodermis
1211036	Leptodermis
1211084	Leptodermis
1216018	Leptodermis stapfiana
1212086	Leyscheria
1211095	Ligularia fischeri
1211139	Ligunariella
1212041	Ligustrum
1211047	Liliaceae
1211189	Liliaceae
1214150	Liliaceae
1214212	Liliaceae
1214216	Liliaceae
1215054	Lilium flavum
1219027	Lilium nanum
1211044	Lilium nepalense
1213076	Lindenbergia muraria

1212038	Viburnum
1212063	Viburnum
1217033	Vicia
1217036	Vicia
1217047	Vicia
1217049	Vicia
1217030	Vicia bakeri
1212027	Villeburnia
1211038	Viola
1213098	Viola
1219019	Viola
1214180	Viola
1214221	Viola
1211074	Viola biflora
1211127	Viola biflora
1218002	Vitis
1218041	Vitis
1218073	Vitis flexuosa
1213219	Wikstroemia
1212015	Xylosma
1212030	Zanthoxylum
1211056	Zingiberaceae
1213256	Ziziphus mauritiana