

## FERNS AND ALLIES ON THE ANNAPURNA BASE-CAMP TREK, C. NEPAL

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Namaste from Nepal. I was lucky enough to get away from the Kathmandu city last week (29<sup>th</sup> May 2012) as I'd long been wanting to make a little trek up to the Annapurna Himal to look again at a very interesting new *Polystichum* I found the last time I went up there in December 2006. I had named it *Polystichum centronepalense* Fraser-Jenk. & Tamang, *Taxonomic Revision of Three Hundred Indian Subcontinental Pteridophytes with a Revised Census-List*: 417 (2008). But the type has rather small and old fronds and I wanted to see more of it as it is an attractive species with densely pale-scaly rachis and costae and a few slightly darker scales often present at the stipe-base. It is intermediate between *P. sinense* (syn.: *P. wilsonii*) and *P. piceopaleaceum*. I later found out it was also named in S.W. China as *Polystichum kangingense* H.S.Kung & L.B.Zhang, validated by them in 2012 (see Fraser-Jenkins, Gandhi & Kholia, *An Annotated Checklist of Indian Pteridophytes* **2**: 315. 2018).

I also wanted to make a first Himalayan trek with my small 7-year old son, Jacob, as it is planned that I will be going to England, for me to work back at the Natural History Museum, London, and Edinburgh Botanic Garden later this year, and it is not so sure I will return the Himalaya. In fact I did until 2018, when my family and I finally moved from Nepal to Portugal and I left Nepal after 40 years pteridologising there, leaving my extensive fern-library, photos and papers as a gift to the main herbarium (KATH) at Godavary.

So our Annapurna excursion began on May 29<sup>th</sup>, my sister-in-law, Sagun Pariyar, Jacob and myself headed off by cramped public microvan to Pokhara, and the next morning up to the north towards the towering snow-peaks of the Annapurna Himal range in Kaski District, West Central Nepal, starting our 8-day walk at Naya Pul. The path follows the rushing Modi Khola river going up northwards from 1000 metres altitude to 4100 m. where it ends in a magnificent snowy cirque between Annapurna I (8090 metres), Hiunchuli, Annapurna III and Annapurna South (7220 m.). On the way one passes the incredibly sheer, craggy Matterhorn-like twin peak of Machapuchare, the Fish-tail mountain (at 6990 m.). It is very fine walking country, well provided with comfortable lodges at convenient distances along the way or at the Base Camp, and is of course incredibly fine fern-country - especially as the Pokhara area has an exceptionally heavy rainfall due to its lakes and the fact that Annapurna lies nearer to the plains, south of the main line of Himalayan ranges in other parts of Nepal, so catches much more rain. But this being shortly before the monsoon reaches here from the East allowed us some very fine views of the towering masses of gleaming, fresh-snowy peaks. At one very fine view as we came round a corner, I kidded Jacob that a large space-ship full of Vanilla ice-cream had crashed there years ago and Annapurna was actually a gigantic secret ice-cream supply - the real reason everyone likes to trek up there! Although

we met other trekkers every now and again *en route* and in the lodges it was not at all crowded due to recent strikes and political uncertainty in Kathmandu, thankfully over for now, but which reduced the numbers of visitors to Nepal. One also doesn't get queues of wannabee Everest bucket-listers over in Annapurna, as the legend is the mountain only allows certain special people to climb it and fortunately it is not quite the second highest world peak, which as all should know is none other than the 40,000½ feet Rum Doodle I, of literary fame.

Up to about half-way, at Sinuwa (2350 m.) is the buffer zone of Annapurna National Park, with small villages and fields on the slopes and patches of forest, but beyond that, real dense forest begins and leads on until one gets above the tree-line at Deurali (3200 m.). Nevertheless there are many interesting ferns in the lower zones as well, and I recorded over 120 species of pteridophytes there, including eight common *Selaginellas*, nine well known Polypodiaceous epiphytes, seven silver-ferns (*Aleuritopteris*) nicely layered in their respective altitude-zones, including the wrinkly little *A. formosana*, hairy *A. dubia* and rather to my surprise, *A. subdimorpha* in one place, usually more eastern in range, though known previously from above Kathmandu. I also spotted 16 species of *Pteris*, 15 *Thelypteris*, 11 athyrioids and half-a-dozen *Dryopteris* and *Polystichum* each - but the real "goodies" were further up in the rich flora of the Core region of the main reserve, with a further 120 species. Just above New Bridge (1500 m.) on the steep dripping north bank of a deep stream valley I looked at a population of a rather strange large *Tectaria* I found in 2006 and initially reported tentatively as possible *T. dubia*, a species described by the late Professor Ching from Lakhimpur in Assam. I then felt it must just be a more glabrous *T. coadunata* with fewer free veinlet tips in the areoles of its net-veining, but seeing it again I really didn't know what it is - and it was certainly dubious until published as a new species *T. morata*, the left-out fern! But *T. dubia* is so very little known, only the type is at Kew, and no more collections anywhere outside China, so it was initially hard to say until after the expert Professor Shi-Yong Dong, of Guangzhou, identified some of my very different Arunachal Pradesh collections as genuine *T. dubia* (see Fraser-Jenkins, Pteridophyt.es of Namdapha National Park, Arunachal Pradesh, N.E. India, *Indian J. Forestry* **45**(1): 41-64. 2022)

After New Bridge, a leg-jellifying steep step-climb of 500 metres goes straight up the west side of the Valley past Jhinu lodge, with its curious hot-spring (and pink toads, as Jacob discovered at night with a torch, while moth-spotting), up to the attractive main village of Chomrong, where welcome cold drinks with a fine Himalayan view refreshed us before going all the way down again to cross a side-stream coming down from Annapurna South. It was nice to find little *Asplenium laciniatum* subsp. *kukkonenii* growing in the stone walls at the top of the village, and among them also *A. khullarii*, with a slightly stiffer, darker frond and more pointed segments. Leaving Chomrong dale behind after the down-and-up plunge, one then climbs up to Sinuwa lodge (2350 m.), where, on day three of our trek, the core conservation area of the Park begins and with it the most superb mossy, dense mixed-forest imaginable. Who says ferns are no longer the dominant vegetation? - here they certainly are, as the path between the silent old twisted trees is lined with spectacular shuttlecocks of the big Dryopteridaceous ferns - the Polysticho-Dryopteridetum zone (for those who like such

terms). Huge baskets of *Dryopteris wallichiana* of all three main Nepalese subspecies, subsp. *convexa* (syn. *D. himalaica*), subsp. *nepalensis* and subsp. *wallichiana* - each more splendidly shaggy than the last - are interspersed with great glowing green shuttlecocks of *Polystichum longipaleatum*, with young fronds like hanging bunches of hairy caterpillars and the glossy mature fronds provided with long stiff hairs all over the pinnules. But also for the avid *Polystichum* specialist, the more subtle delights of black-scaled *P. piceopaleaceum*, and the more fibrillose and lobed *P. yunnanense*, wider fronded *P. mucronifolium* (syn.: *P. heteropaleaceum*, *P. tacticopterum*), with broad scales all up the rachis beneath, simple-pinna'd *P. nepalense* and its bipinnate relative *P. manmeiense*, both with tiny microscales all over the lower surfaces, also a few *P. annapurnicola*, a new species with narrower scales, very finely lobed pinnules and wide, flat indusia. The latter is a species more common on the south side of Machupuchare, which I unexpectedly discovered some 20 years ago when living in Pokhara. Further along, sticking out from the ferny path-side were the glossy stiff fronds of the very fine species, *P. neolobatum* (syn.: *P. garhwalicum*), with dense, broad, pinkish-yellow scales all up the stipe and rachis, and on rock surfaces and crevices, there were two delightful little species, *P. thomsonii*, like an elongated *Asplenium laciniatum*, and very variable in depth and crowding of lobes, and the fascinating miniature, glossy-leaved *P. stimulans*, so named because its sharp teeth can prick one like Holly - definitely stimulating if handled unsuspectingly! The trees themselves were festooned with epiphytes and the branches covered with dense masses of the filmy ferns, *Hymenophyllum exsertum* (with long hairs scattered beneath), *H. tenellum* ("*H. polyanthos*" of Asia), *Trichomanes latealatum* and occasional *T. campanulatum* (with short-hairy stipes etc.) and masses of hanging grass-like *Vittaria taeniophylla* (syn.: *V. himalayensis*) with superficial inframarginal sori with no inner ridge to them as occurs in *V. flexuosa*, both unnecessarily placed in a pseudogenus "*Haplopteris*" by N. American moleculologists of less than sensible taxonomic ability and a near religious misbelief that clades are taxa that must be recognised and named avoiding the universally common paraphyly. Also covering the branches were the entire-leaved polypodiaceous *Loxogramma involuta* and *L. cuspidata* (the latter with a creeping rhizome), hanging *Goniophlebium argutum*, masses of huge *Polypodiodes amoena*, among superbly flowering pink and white orchids, *Dendrobium* etc. Another rarity here is *Vittaria linearifolia*, with smaller, narrower fronds than the other *Vittarias* and yellow sori filling the space between the midrib and margin. On the darker mossy rocks, or on old moss-covered tree-trunks, tiny, dark-green *Asplenium capillipes* is pressed under small overhangs, and the two very characteristic little Grammitids occur, *Tomophyllum donianum* (widely mistakenly known in India as the Malesian *Ctenopteris subfalcata*) in 3-inch clumps on tree trunks, and the delightful *Micropolypodium sikkimense* (formerly misplaced in *Xiphopteris*, which Dr. Barbara Parris has found to be quite different genus). *M. sikkimense* has much narrower and longer fronds than *Tomophyllum*, with many longish, stiff, black hairs at the edges of its tiny lobes, and hangs off large boulders.

Fortunately from Sinuwa onwards there is less of the back-breaking abrupt climbing apart from a few ups and downs to cross streams or avoid cliffs, and the spectacular views of Machapuchare across the Valley to our right or of the great snow-peak summits looming sky-high ahead of us became more enjoyable with less exhaustion, and so did the ferns as the path gradually led us up to higher altitudes at the tops of the forest. It was also good that the

mornings were very bright and fresh, yet clouds built up by midday to shield us from the hot sun and only by late afternoon did thundery rain begin - just in time for us to reach the next lodge.

Day 4 saw us staying at 3200 metres at Deurali Lodge, passing Hinko cave, where the Buddhist sage and flying magician, Milarepa, meditated his way through the Himalaya several thousand years before, presumably enjoying the views as much as we did today. Deurali is at the top of the forest, where the open Himalayan scrub and rocky grassland begins and the whole area becomes a high-Himalayan fern paradise. In the rocks there and at the upper forest level, I at last found the main populations of the elusive *Polystichum centronepalense* - and what a distinctive and lovely species it is! The wide, pale scales are a bit like those of the beautiful Japanese species, *P. ovatopaleaceum*, but have remarkably lacinate-fimbriate edges, I have the impression that its intermediacy between *P. sinense* and *P. piceopaleaceum* suggests that it might be an allopolyploid, neo-endemic species, derived from the other two (similar to *Dryopteris filix-mas* of Europe and Kashmir being derived from *D. oreades* and *D. caucasica*). My great hope is that at some stage we might have a new fern-cytologist in our midst, and I hope he or she might be able to do a chromosome-count of it. Another proposed neoendemic new species, *P. annapurnicola*, turned out not to be a neoendemic at all, but an ancient diploid, in the very rare category of being known so far only as a Nepalese endemic. Dr. Sadamu Matsumoto, Tsukuba Botanical Garden, Japan, counted one of my plants of it in 2014 (Fraser-Jenkins & Matsumoto, New cytotaxonomic studies on some Indo-Himalayan ferns, *Indian Fern J.* **32**(1 & 2): 3679. 2015). Growing here and there amongst the high-Himalayan scrub-area were probable *Dryopteris costalisora*, wonderful plants of *Onoclea (Matteuccia) intermedia* (another to me unacceptable and unnecessary pseudogenus of molecular cladonmy, "*Paltonia*") showing the tapering sterile-frond bases and last year's fertile fronds with thick cylindrical fertile pinnae, masses of *Thelypteris mollissima* (Section *Stegnogramma/Leptogramma*), with fusing pinnae at the apex and creeping rhizomes, occasional stands of *T. (Cyclogramma) squamaestipes* in wet places, red-axis'ed, edible *Athyrium atkinsonii* with deltate fronds and cystopteroid indusia that completely demolish the imagined distinction of the new molecular pseudofamily, "Cystopteridaceae", occasional hairy-stiped *Nothoperanema squamiseta*, and masses of delicate triangular *Cystopteris moupinensis* on the semi-open forest floor. A delightful place, which reduced my speed of walking nearly to going backwards! In the meantime our Jacob was racing backward and forward with all the energy of a seven year old, looking at butterflies, the several different ladybird beetles, and seeking an elusive "rainbow bird", which both he and I reckon we saw - but both being different species of brightly coloured birds flying among the rhododendron and white-flowering *Cornus* bushes in the sun. On looking up my late fern-collecting friend's famous book, the Birds of Nepal, by Dr. Bob Fleming senior, I found mine was a lovely little ?sun-bird, with a long red tail, Jacob's "Rainbow Bird" was yet more colourful. The butterflies too were nice, Jezebels, Clouded Yellows, Indian Orange-tips, Himalayan Red-Admirals, various swallowtails and Pansys, stripey gliders flitting over the flowers and the lovely map butterfly that sits with its delicately indented wings open flat on the ground like an old 18<sup>th</sup> century map, with lines like rivers and mountain-ranges.

Above Deurali we were up in the Himalayan meadows, masses of blue and pink *Primulas*, a superb clump of the Yellow Lady's Slipper orchids, white *Habenarias* and carmine-red *Dactylorhizas*, tiny violets and blue pea-flowers, wild strawberries that soon became Jacob's main interest until we got into the zone of a different, completely tasteless species, pink *Roscoeas* and super-hairy clumps of blue or white Himalayan *Meconopsis* poppies, also the curious black leaves of the aroid, "*Lali*", *Arisaema*, eaten as a vegetable, and whose pointed sword-sheaths were emerging from the ground as if a menacing denizen from some lower kingdom beneath the surface, especially by the old snow-patches. Shaggy brown vernating fronds of *Dryopteris barbigera*, were also doing the same trick in patches where the old leaves had died away. The ferns up there were superb, sweet-smelling, scaly *Dryopteris komarovii* on the rocks, wonderful white-scaly masses of *Polystichum sinense*, all densely covered in white hairs and scales and fertile at any stage from 3 inches to nearly 3 feet, delightful little clumps of fresh green *P. lachenense*, taller and sclier *P. prescottianum* and *P. shensiense*, *Cystopteris fragilis* subsp. *dickieana*, and what I believe is a different tiny high-Himalayan subspecies of *C. fragilis*, with very small-sized, spiny spores, subsp. *kansuana*. I first noticed it from a collection from high up in Gorkha District, and then found it above Muktinath temple (north of the Annapurna range in Mustang - the "Tibetan" side of the Nepalese Himalaya), and later on the Chele La pass in west Bhutan - might it be one of the elusive "missing diploids" of the genus? Nobody knows as yet! Another most lovely fern there was the rare European element, *Cystopteris montana*, with delicate and finely dissected deltate-pentagonal fronds, growing at the bases of mossy boulders - which was not known so far east before. Also adjacent to it was *Gymnocarpium jessonense*, an "Oak fern" but not the same as the common W. Himalayan *G. fedtschenkoanum*, which has more rectangular segments - this one occurs further east in China etc., but I discovered it anew to the Indian subcontinent in Bhutan and Mustang a few years ago. Others in evidence here and there between the boulders were *Adiantum pedatum* (true *pedatum*, not *A. myriosorum*) and *A. wattii* (syn.: *A. refractum*), the latter a high-altitude, toothless *A. capillus-veneris*-like species. Two very interesting little *Woodias* were also there in rock-crevices, the very hairy *W. andersonii* and another, slightly less densely hairy one with a dark rachis (paler in young fronds) and square-lobed pinnae, which turned out to be the delightful *W. lanosa*. Over to the north at Muktinath, I was excited to find two rare, less hairy *Woodsia* species, *W. hancockii* and the very rare, narrow-fronded *W. glabella*, the latter not previously known in the Indo-Himalaya until I stumbled upon it.

After climbing across a slippery ice-slope plunging down to the turbulent river below we reached Machapuchare Base Camp lodge (3700 m.) on day 5, and Jacob and I took a little walk around above it in the rocks beneath the incredibly steep snowy crags, where I found lots of tiny *Cryptogramma stelleri* and beautiful spotted-green fritillary flowers, also an unexpected *Cystopteris fragilis* subsp. *diaphana* with densely short-spiny spores and teeth in tiny notches, which I had first found in Pakistan as new to the Himalaya - we could see up into the cirque near our final target, Annapurna Base Camp, before cold clouds rushed in as fast as a train, scattering the Alpine Choughs with a thunder-crash and started pelting us with hail-stones. But then trouble unexpectedly struck us, while Jacob and I were fine, Sagun suddenly developed a severe headache and vomiting, and could neither make sense talking, nor breathe deeply - almost not at all at one point. She had suddenly been struck by acute

altitude sickness, even though we had taken several days to ascend slowly! So at 5.00 in the afternoon we had no choice but to grab our rucksacks and race down back towards lower-altitude at Deurali, regardless of the hail. Luckily both the hail and her difficult breathing eased off after going down about 300 metres or so, but the light was fading when we reached the big snow and ice slide, which we now had to cross at the wrong time of day to get to the lodge that lay shortly on the other side. No path was cut across it by the Annapurna Committee controlling the lodges and trekking permits etc. (why on earth NOT, one should ask!?), but now, unlike when it was frozen solid that morning, it was slightly melted on the surface and slippery as hell - with the steep slope plunging down to what would probably be instant destruction in the tumultuous smashing waves and rocks of the ice-cold torrent below. To make it worse, the recent hail was like slippery ball-bearings all over the surface, but we had no choice but to go on, and no information had warned us one might need crampons for the treacherous afternoon crossing, or even that it existed. Our local Brahman porter, Sunil, rose magnificently to the challenge and managed to half-carry Jacob across, but Sagun couldn't make it with me and we had to sit separately on the ice-slope (having removed our slippery anoraks in case of sliding) until she slid her way back to the edge again to wait for help. I then slid my way across on frozen behind and thighs, but after crossing the first ridge of ice was most alarmed not to see any sign of Jacob and the porter, only the empty slope going down to the river. But on the second ridge what a relief to see the porter coming back out of the growing gloom to help and little Jacob calling "Daddy!" from among the safety of the boulders on the other side. I dug my frozen fingers into tiny crevices and tried to hang on, but even so I suddenly took a slide and only just managed to come to a stop above a safe rock - and then got across and went to meet Jacob, now pretty upset, but greatly relieved. After what seemed an age in the freezing cold and fading light, Sunil at last appeared over the ridge pushing and hanging onto Sagun, with many a slip, until they made it due to his considerable inborn Nepalese strength and experience. Thank goodness we were all safe, thanks to the magnificent efforts and courage of Sunil. But it is not a safe place at all due to their not cutting any path, and I have to wonder what the Committee and ACAP, the Annapurna Park authorities, think they are doing leaving things like that for hundreds of people to risk, if, like us in emergency, one has to cross it unexpectedly later in the day. From there on it was by torch-light just down the steps back to the comfort of Deurali Lodge, where we warmed up, changed our muddy clothes and recovered from the ordeal, thanking the Gods of all our religions (Jacob has a secret traditional Hindu name, but has also been granted a Tibetan Buddhist name by the Abbot of Karma Samtenling Monastery, and inducted into Buddha Dharma as Tashi Palden). Also thanks to chow-mien, a plate of chips and a hot chocolate with a nip of Roxshi spirit in it (at pretty steep prices up there!) and a comfy warm bed we shared under thick Tibetan blankets.

Next morning in the fresh bright sunshine we began our gentle 3-day return from the gleaming snow-peaks and enjoyed the trek back through the beautiful countryside - but could hardly be blamed for cheating a bit at Siwai (below New Bridge) and taking the Jeep back on the new road-track they have made down to Naya Pul. We got off a bit before Birethanti as there is a population of the *Pteris vittata* aggregate on the road-side banks there, with many short, narrow pinnae, a short apical segment and erect fronds - exactly as one would expect for the little-known diploid in the group, now a new species, *P. vermae*. Again this is a prime

candidate for chromosome-counting, as *P. vermae*, though seeming to occur commonly in Pithoragarh, Nepal, Bhutan and Arunachal Pradesh (in addition to China), has never yet been counted to confirm it from India, Nepal or Bhutan etc. apart from Prof. S.C. Verma's original 1950s count on the type material from below Nainital. After seeing and later tentatively confirming the identity of the *Pteris* - and taking refreshingly chilled local fruit lassee in a hut by the track, we leapt into a taxi at Naya Pul in an absolutely blindingly heavy rain-storm that followed us over the pass to Pokhara, whose streets were by then awash and nearly knee-deep in charging waters - but this was not the imminent monsoon we were so awaiting, that still hasn't broken as I write, but just the very heavy and famous Pokhara rainfall.

All in all it was a great trip that luckily ended well despite the unexpected difficulty and danger we had - but one day I wouldn't mind just seeing what else might grow that 400 metres and a mile or so higher up, at A.B.C. (Annapurna Base Camp), itself!

Chris Fraser-Jenkins, Naya Bazaar, Kathmandu.

15 June 2012. (chrisopteris@yahoo.co.uk)

The photographs I took of the trip are now presented with their titles in a series put together by Mons. Yves Philippot, St.-Jacut-les-Pins, Bretagne, France (yves@philippot.org).

#### **OUR ITINERARY**

- 29 May 2012: Microvan, Kathmandu - Mugling - Dumre - Damauli - Pokhara (Traveller's Guest House, opposite Royal Palace, Baidam, Pokhara) (with Jacob F.-J and Sagun Pariyar).
- 30 May 2012: Taxi, Pokhara - Kande - Lumle - Naya Pul; walking Naya Pul - Birethanti (1050 m.) - Syauli Bazaar (1200 m.) - Kliu (Kliu Guest House).
- 31 May 2012: Kliu - Siwai - Kyumi (1300 m.) - New Bridge (1500 m.) - Jhinu (1760 m.) (Tibet Guest House).
- 1 June 2012: Jhinu - Chomrong (2050 m.) - Sinuwa (2350 m.) - Bamboo (2200 m.) (Buddha Guest House).
- 2 June 2012: Bamboo - Dovan (2500 m.) - Himalaya (2900 m.) - Deurali (3200 m.) (Dream Lodge).
- 3 June 2012: Deurali - Machapuchare Base Camp (3700 m.) - Deurali (Dream Lodge).
- 4 June 2012: Deurali - Himalaya - Dovan - Bamboo (Buddha Guest House).
- 5 June 2012: Bamboo - Sinuwa - Chomrong - Jhinu (Tibet Guest House).
- 6 June 2012: Jhinu - New Bridge - Kyumi - Siwai, Jeep to Naya Pul; taxi to Pokhara (Traveller's Guest House, Baidam).
- 7 June 2012: Pokhara - Devi's Fall - Pokhara, microvan to Markichowk, Marsyangdi Dam; Sagun & Jacob to Kathmandu; CRFJ walked up to Komale, Deurali (in-law's village, or "*Maitigarh*") and down, and then bus to Mugling - Narayanghat road (to see *Selaginella* bryopteris), bus to Mugling - Kathmandu (116 Shahid Gangalal Marg, Naya Bazaar).

**244 Pteridophytes seen during trek from Naya Pul to Machapuchare Base Camp, N. of Pokhara, Kaski District, C. Nepal, 27.5-1.6.2012**

C.R. Fraser-Jenkins, with Sagun Pariyar, Jacob C.B. Fraser-Jenkins, and our porter (Sunil Brahman). We have not included other records given by Fraser-Jenkins, Kandel & Pariyar, Fraser-Jenkins & Kandel and Kandel & Fraser-Jenkins, *Ferns & Fern-Allies of Nepal 1-3* (2015, 2019, 2020) apart from for Manang.

**1. Naya Pul (700 m.) to Birethanthi - Syauli Bazar - Siwai - New Bridge - Jhinu - Chomrong - Lower Sinuwa (Buffer Zone).**

*Lycopodiaceae*

*Huperzia hamiltonii* f. *petiolata*. (seen in 2006).

*Huperzia squarrosa*.

*Lycopodiella cernua*.

*Selaginellaceae*

*Selaginella bisulcata*.

*Selaginella chrysorrhizos*. (mainly old, dead fronds).

*Selaginella involvens*.

*Selaginella monospora*. (stiff-fronded form).

*Selaginella pallida*.

*Selaginella pennata*. (seen in 2006).

*Selaginella subdiaphana*.

*Selaginella vaginata*.

*Equisetaceae*

*Equisetum arvense* subsp. *diffusum*.

*Equisetum ramosissimum*.

*Lygodiaceae*

*Lygodium flexuosum*.

*Lygodium japonicum*.

*Gleicheniaceae*

*Dicranopteris lanigera*.

*Dicranopteris taiwanensis*. (seen in 2006).

*Dennstaedtiaceae*

*Dennstaedtia zeylanica*. (seen in 2006).

*Hypolepis polypodioides*.

*Microlepidia firma*.

*Microlepidia platyphylla*.

*Microlepidia setosa*.

*Microlepidia speluncae*.

*Pteridium revolutum*.

*Lindsaeaceae*

*Odontosoria chinensis* subsp. *chinensis*.

*Pteridaceae*

*Adiantum capillus-veneris*.

*Adiantum incisum* subsp. *incisum*.

*Adiantum philippense* subsp. *philippense*.

*Adiantum philippense* subsp. *teestae*. (rare, Birethanthi, seen in 2006).

*Aleuritopteris anceps*. (seen in 2006).

*Aleuritopteris bicolor*.

*Aleuritopteris dealbata*. (New Bridge).

*Aleuritopteris dubia*.

*Aleuritopteris formosana*.

*Aleuritopteris rufa*.

*Aleuritopteris subdimorpha*. (very restricted, New Bridge to Shyauli Bazaar).

*Oeosporangium tenuifolium*.

*Onychium cryptogrammoides* subsp. probably fragile. (a small, lower altitude plant similar to *O. cryptogrammoides* but less thin-herbaceous, which occurs also at Tatopani, Kavrepalanchok District, and elsewhere. Chomrong to Jhinu).

*Onychium lucidum*.

*Onychium siliculosum*.

\**Pityrogramma calomelanos*. (common adventive).

*Pteris arisanensis*.

*Pteris biaurita* subsp. *fornicata*. (rare, Birethanthi, seen in 2006).

*Pteris biaurita* subsp. *walkeriana*.

*Pteris cretica* subsp. *cretica*.

*Pteris cretica* subsp. *laeta*.

*Pteris dixitii*. (seen at New Bridge in 2006).

*Pteris emodi*.

*Pteris kathmanduensis*. (Chomrong).

*Pteris normalis*.

*Pteris spinescens*. (Chomrong).

*Pteris subquinata*. (on dry, slightly calcareous cliffs beneath overhangs, all the green form, none variegated).

*Pteris terminalis*. (Chomrong, also common further up).

*Pteris vermae*, presumptive. (common on the path-banks just above Birethanthi; short, narrow pinnae, short apex, erect fronds).

*Pteris vittata*. (seen in 2006).



*Pteris wallichiana*. (the form called "P. yunnanensis", stipes turn dark brown when mature, with a dense indument of short, stiff, brown hairs).

#### *Vittariaceae*

*Vittaria flexuosa*.

*Vittaria sikkimensis*. (seen in 2006).

#### *Aspleniaceae*

*Asplenium laciniatum* subsp. *laciniatum*.  
(syn.: *A. varians*; New Bridge).

*Asplenium laciniatum* subsp. *kukkonenii*.  
(upper Chomrong, walls).

*Asplenium yoshinagae* subsp. *indicum*.

*Thelypteridaceae* (with cryptic microgenera)

*Thelypteris* (*Christella*) *arida*.

*Thelypteris* (*Pseudocyclosorus*) *cana*.

*Thelypteris* (*Christella*) *dentata*.

*Thelypteris* (*Christella*) *oblancifolia*.

*Thelypteris* (*Glaphyopteridopsis*) *erubescens*.

*Thelypteris* (*Pseudocyclosorus*) *esquirolii*.  
(creeping rhizome; seen in 2006).

*Thelypteris* (*Abacopteris*) *nudata*.

*Thelypteris* (*Macrothelypteris*) *ornata*.

*Thelypteris* (*Christella*) *papilio*.

*Thelypteris* (*Mensiciopsis*) *penangiana*.

*Thelypteris* (*Christella*) *procera*.

*Thelypteris* (*Ampelopteris*) *prolifera*.

*Thelypteris* (*Pseudophegopteris*) *microstegia* subsp. *microstegia*.

*Thelypteris* (*Macrothelypteris*) *torresiana*.

*Thelypteris* (*Pseudocyclosorus*) *tylodes*.

#### *Woodsiaceae/Athyriaceae*

*Athyrium cuspidatum*. (Jhinu to New Bridge).

*Athyrium drepanopterum*.

*Athyrium foliolosum*. (Chomrong).

[*Athyrium x nepalense* (*A. drepanopterum* x *A. pectinatum*, seen in 2006).  
Hybrid].

*Athyrium pectinatum*.

*Deparia boryana*.

*Deparia petersenii* subsp. *petersenii*.

*Diplazium esculentum*.

*Diplazium laxifrons*.

*Diplazium maximum*.

*Diplazium sikkimense*. (Birethanti, seen in 2006)

*Diplazium spectabile*.

#### *Blechnaceae*

*Blechnum orientale*. (Birethanti to Syauli Bazaar).

*Woodwardia unigemmata*. (beautiful pink young fronds hanging down off cliffs and tall path-banks).

#### *Dryopteridaceae*

*Arachniodes coniiifolia*.

*Cyrtomium caryotideum*.

*Dryopteris carolihopei*.

*Dryopteris cochleata*.

*Dryopteris juxtaposita*. (also common further up).

*Dryopteris sparsa* subsp. *sparsa*. (seen in 2006).

*Dryopteris sparsa* subsp. *rectipinnula*.

*Dryopteris woodsiiisora*. (dead fronds hanging down on cliffs).

*Hypodematium crenatum* subsp. *loyalii*.

*Polystichum annapurnicola*. (rare, New Bridge, seen in 2002).

*Polystichum discretum*.

*Polystichum lentum*.

*Polystichum obliquum*. (under rocks).

*Polystichum semifertile*. (uncommon, New Bridge).

*Polystichum squarrosom*.

*Tectaria coadunata*.

*Tectaria morata*.

#### *Nephrolepidaceae*

*Nephrolepis cordifolia*.

#### *Oleandraceae*

*Oleandra wallichii*. (Chomrong and also common further up above Sinuwa).

#### *Lomariopsidaceae*

*Bolbitis major*.

#### *Davalliaceae*

*Davallia bullata*.

*Davallodes membranulosa*. (hairy axes, growing on large boulders in moss; also further up).

*Katoella squamata*.

*Leucostegia truncata*.

#### *Polypodiaceae*

*Drynaria propinqua*.

*Lepisorus contortus*.

*Microsorium cuspidatum* subsp. *cuspidatum*.

*Microsorium membranaceum*.

*Polypodiodes fieldingiana*.

*Polypodiodes lachnopus*.

Pyrrosia costata.  
Pyrrosia flocculosa.

Pyrrosia porosa.

(123 taxa).

## 2. Sinuwa - Bamboo - Dovan - Himalaya - Deurali - Machapuchare Base Camp and near Annapurna Base Camp (Core area).

### *Lycopodiaceae*

*Huperzia hamiltonii*. (and ones with narrower leaves, seeming to have some kind of relationship with *H. pulcherrima*).

*Huperzia pulcherrima*. (shortish epiphytic plants, but probably the *subulifolia* form).

### *Selaginellaceae*

*Selaginella chrysocaulos*.

*Selaginella helvetica*.

### *Ophioglossaceae*

*Botrychium lanuginosum*.

### *Hymenophyllaceae*

*Hymenophyllum exsertum*.

*Hymenophyllum tenellum*.

*Trichomanes campanulatum*.

*Trichomanes latealatum*.

### *Cyatheaceae*

*Cyathea* (*Alsophila*) *spinulosa*. (also cult. at Birethanti).

### *Dennstaedtiaceae*

*Dennstaedtia appendiculata*.

### *Pteridaceae*

*Adiantum edgeworthii*. (seen in 2006, Sinuwa).

*Adiantum pedatum* subsp. *pedatum*.

*Adiantum tibeticum*. (seen in 2006).

*Adiantum wattii*.

*Aleuritopteris albomarginata*.

*Aleuritopteris grisea*.

*Aleuritopteris leptolepis*.

*Coniogramme intermedia*.

*Coniogramme procera*.

*Coniogramme pubescens*.

*Coniogramme serrulata*.

*Cryptogramma stelleri*.

*Onychium cryptogrammoides* subsp. *cryptogrammoides*.

*Pteris aspericaulis*. (also common further down near New Bridge and upwards).

*Pteris cretica* subsp. *cretica*.

*Pteris dactylina*.

### *Vittariaceae*

*Vittaria linearifolia*. (Bamboo to Himalaya lodges, seen in 2006).

*Vittaria taeniophylla*.

### *Aspleniaceae*

*Asplenium amoenum*.

*Asplenium capillipes* subsp. *capillipes*. (forest from Dovan to Himalaya, mossy rock overhangs).

[*Asplenium* x *capillipoides* (*A. capillipes* x *A. khullarii*), seen in 2006, above Dovan. Hybrid]

*Asplenium ensiforme*.

*Asplenium khullarii*. (also further down in upper Chomrong).

*Asplenium laciniatum* subsp. *tenuicaule*. (seen in 2006).

*Asplenium tenuifolium*.

*Thelypteridaceae* (with cryptic microgenera).

*Thelypteris* (*Cyclogramma*) *auriculata*. (seen in 2006).

*Thelypteris* (*Pseudophegopteris*) *levingei*.

*Thelypteris* (*Pseudophegopteris*) *microstegia* probably subsp. *hirtirhachis*.

*Thelypteris* (*Stegnogramma*/  
*Leptogramma*) *mollissima*.  
*Thelypteris* (*Pseudocyclosorus*) *ornatipes*.  
 (Bamboo lodge, seen in 2006).  
*Thelypteris* (*Cyclogramma*)  
*squamaestipes*. (Bamboo lodge).  
*Woodsiaceae/Athyriaceae*  
*Athyrium atkinsonii*.  
*Athyrium attenuatum*. (characteristic dark  
 scales on stipe and rachis in the  
 young fronds).  
*Athyrium contingens*.  
*Athyrium distans*. (seen in 2006).  
*Athyrium fimbriatum*.  
*Athyrium mengtzeense*. (cave below  
 Bamboo lodge. Very rare Chinese  
 species, known only from this  
 locality and above Palmajua near  
 Darjeeling (CRFJ)).  
*Athyrium rupicola*.  
*Athyrium schimperi* subsp. *biserrulatum*.  
*Athyrium setiferum*.  
*Cornopteris badia*.  
*Cornopteris banajaoensis*.  
*Cystopteris fragilis* subsp. *diaphana*.  
*Cystopteris fragilis* subsp. *dickieana*.  
*Cystopteris fragilis* subsp. *fragilis*.  
*Cystopteris fragilis* subsp. *kansuana*.  
*Cystopteris montana*.  
*Cystopteris moupinensis*.  
*Deparia allantodioides*.  
*Deparia subsimilis*.  
*Diplazium succulentum*. (seen in 2006;  
 Bamboo to Dovan; its furthest west  
 known locality).  
*Gymnocarpium jessoense*.  
*Woodsia andersonii*.  
*Woodsia* sp. ?*lanosa* or ?*rosthorniana*.  
*Onocleaceae*  
*Onoclea intermedia*.  
*Dryopteridaceae*  
*Cyrtomium anomophyllum*.  
*Dryopsis apiciflora*.  
*Dryopteris acutodentata*.

*Dryopteris barbiger*.  
*Dryopteris chrysocoma*.  
*Dryopteris conjugata*.  
 ?*Dryopteris costalisora*. (if not, *D. panda*).  
*Dryopteris gamblei*.  
*Dryopteris komarovii*.  
*Dryopteris lepidopoda*. (Dovan,  
 uncommon, pinkish yellow young  
 fronds).  
*Dryopteris nigropaleacea*.  
*Dryopteris panda*. (dead fronds seen in  
 2006)  
*Dryopteris subimpressa*. (seen in 2006;  
 Bamboo to Dovan, rare).  
*Dryopteris sublacera*.  
*Dryopteris wallichiana* subsp. *wallichiana*.  
*Dryopteris wallichiana* subsp. *convexa*.  
 (syn. subsp. *himalaica*, very common  
 and characteristic in dense forest  
 from Sinuwa to Bamboo)  
*Dryopteris wallichiana* subsp. *nepalensis*.  
*Dryopteris zayuensis*. (rare, Deurali).  
*Nothoperanema squamiseta*. (rare,  
 Bamboo lodge).  
*Peranema cyatheoides*. (seen in 2006).  
*Polystichum centronepalense* (dense wide  
 pale scales, segments like *P.*  
*piceopaleaceum*, some with  
 somewhat darker basal scales, forest  
 Dovan to Deurali; rocks at Deurali).  
*Polystichum hookerianum*.  
*Polystichum lachenense*.  
*Polystichum longipaleatum*. (superb  
 shuttlecocks and hairy young fronds  
 in dense forest, Sinuwa to Dovan).  
*Polystichum manmeiense*. (uncommon,  
 Sinuwa to Bamboo).  
*Polystichum mucronifolium*. (rare,  
 Sinuwa).  
*Polystichum neolobatum*. (Bamboo lodge  
 to Dovan).  
*Polystichum nepalense*. (often very large  
 and lowest pinnae becoming a little

lobed at their acroscopic bases, then slightly towards *P. manmeiense*).

*Polystichum piceopaleaceum*.

*Polystichum prescottianum*. (rare, Deurali to Machapuchare Base Camp, all pale-scaled, with slightly shortish pinnae).

*Polystichum shensiense*. (rare, Deurali to Machapuchare Base Camp).

*Polystichum sinense*. (common, Dovan to Machapuchare Base Camp, varying in size, superbly densely pale-hairy and with many narrowish white scales densely clothing the stipe, rhachis and costae; pinnules narrow, without much of a basal lobe).

*Polystichum stimulans*. (below small cliffs in forest).

*Polystichum thomsonii*. (varying considerably developmentally in size and depth and crowdedness of lobing).

*Polystichum yunnanense*. (well lobed pinnules and densely hairy and scaly rachis; Sinuwa).

#### *Elaphoglossaceae*

*Elaphoglossum marginatum*. (seen in 2006).

#### *Davalliaceae*

*Katoella beddomei*. (Sinuwa to Dovan, seen in 2006).

(124 taxa).

*Katoella pulchra*. (also common further down).

#### *Polypodiaceae*

*Arthromeris wallichiana*.

*Goniophlebium argutum*.

*Lepisorus clathratus*.

*Lepisorus loriformis*.

*Lepisorus mehrae*.

*Lepisorus morrisonensis*.

*Lepisorus nudus*.

*Lepisorus scolopendrium*.

*Lepisorus thunbergianus*. (seen in 2006, above Dovan).

*Loxogramma involuta*.

*Neocheiropteris normalis*. (seen in 2006; Sinuwa).

*Pichisermollodes ebenipes*.

*Pichisermollodes malacodon*.

*Pichisermollodes nepalensis*. (seen in 2006).

*Pichisermollodes nigrovenia*.

*Pichisermollodes quasidivariata*. (seen in 2006).

*Pichisermollodes stewartii*.

*Polypodiodes amoena*.

*Selliguea oxyloba*.

#### *Grammitidaceae*

*Micropolypodium sikkimense*.

*Tomophyllum donianum*.

### **A selection of species seen by CRFJ on other sides of Annapurna Himal:**

### **3. South-West Annapurna - Ulleri, Tatopani, Ghorepani, Poon Hill (Sept. 2001; June 2010).**

#### *Selaginellaceae*

*Selaginella bisulcata*

*Selaginella pallida*

*Selaginella subdiaphana*

#### *Hymenophyllaceae*

*Hymenophyllum badium*

*Hymenophyllum exsertum*

*Hymenophyllum tenellum*

*Trichomanes campanulatum*

*Trichomanes latealatum*

#### *Pteridaceae*

*Adiantum incisum* subsp. *incisum*  
*Aleuritopteris leptolepis*  
*Coniogramme intermedia*  
*Pteris aspericaulis*  
*Pteris normalis*  
*Pteris puberula*  
*Pteris terminalis*  
*Vittariaceae*  
*Vittaria flexuosa*  
*Vittaria taeniophylla*  
*Aspleniaceae*  
*Asplenium amoenum*  
*Asplenium dalhousiae*  
*Asplenium ensiforme*  
*Asplenium khullarii*  
*Asplenium laciniatum* subsp. *kukkonenii*  
*Asplenium punjabense* subsp. *birii*  
*Asplenium tenuifolium*  
*Asplenium yoshinagae* subsp. *indicum*  
*Thelypteridaceae*  
*Thelypteris microstegia* subsp. *laterepens*  
*Thelypteris microstegia* subsp. probably *hirtirhachis*  
*Woodsiaceae/Athyriaceae*  
*Athyrium atkinsonii*  
*Athyrium contingens*  
*Athyrium fangii*  
*Athyrium fimbriatum*  
*Athyrium foliolosum*  
*Athyrium schimperi* subsp. *biserrulatum*  
*Athyrium setiferum*  
*Dryopteridaceae*  
*Arachniodes foeniculacea*  
*Dryopteris gamblei*  
*Dryopteris redactopinata*

*Dryopteris sinonepalensis*  
*Dryopteris wallichiana* subsp. *convexa*  
*Dryopteris wallichiana* subsp. *nepalensis*  
*Dryopteris wallichiana* subsp. nr. *wallichiana*? or near *neorsthornii*? (small plant, square segments bit wider at top, jet black scales, some slightly wideish).  
**RECHECK in Herb. Index**  
*Dryopteris wallichiana* subsp. *wallichiana*  
*Polystichum levingei*  
*Polystichum manmeiense*  
*Polystichum mucronifolium*  
*Polystichum nepalense*  
*Polystichum piceopaleaceum*  
*Polystichum stimulans*  
*Polystichum thomsonii*  
*Davalliaceae*  
*Katoella beddomei*  
*Polypodiaceae*  
*Goniophlebium argutum*  
*Lepisorus contortus*  
*Lepisorus loriformis*  
*Lepisorus mehrae*  
*Lepisorus morrisonensis*  
*Lepisorus scolopendrium*  
*Loxogramma cuspidata*  
*Pichisermollodes ebenipes*  
*Pichisermollodes nepalensis*  
*Pichisermollodes stewartii*  
*Polypodiodes amoena* subsp. *amoena*  
*Polypodiodes fieldingiana*  
*Grammitidaceae*  
*Tomophyllum donianum*

#### 4. North-West Annapurna - Jomsom, Marpha, Tukuche, Phangde Darrah, Marte Darrah (July 2003; June 2004).

*Selaginellaceae*  
*Selaginella pallidissima*  
*Equisetaceae*  
*Equisetum arvense* subsp. *arvense*  
*Dennstaedtiaceae*  
*Dennstaedtia appendiculata*

*Pteridium revolutum*  
*Pteridaceae*  
*Adiantum capillus-veneris*  
*Adiantum tibeticum*  
*Aleuritopteris albomarginata*  
*Aleuritopteris leptolepis*

Aleuritopteris stenochlamys  
 Aleuritopteris argentea (new to Nepal and extremely rare in the Indo-Himalaya).  
 Notholaena himalaica  
 Onychium cryptogrammoides subsp. cryptogrammoides  
 Pteris dactylina  
*Aspleniaceae*  
 Asplenium atuntzeense  
 Asplenium daghestanicum subsp. aitchisonii  
 Asplenium daghestanicum subsp. aitchisonii x A. laciniatum subsp.? tenuicaule (spores abortive) Hybrid.  
 Asplenium laciniatum subsp. tenuicaule  
 Asplenium nesii  
 Asplenium ruta-muraria subsp. ruta-muraria  
*Thelypteridaceae*  
 Thelypteris levingei  
*Woodsiaceae/Athyriaceae*  
 Athyrium rupicola  
 Athyrium schimperi subsp. biserrulatum  
 Cystopteris moupinensis  
 Deparia allantodioides  
 Deparia subsimilis  
 Gymnocarpium jessoense  
*Dryopteridaceae*  
 Dryopteris blanfordii subsp. blanfordii (but slightly towards subsp. nigrosquamosa)  
 Dryopteris edwardsii  
 Dryopteris juxtaposita (large, well lobed plants; spores good, large).  
 Dryopteris komarovii  
 Dryopteris nigropaleacea (spores good, small).  
 Dryopteris pauliae  
 Dryopteris redactopinnata  
 Dryopteris sublacera  
 Dryopteris wallichiana subsp. wallichiana  
 Dryopteris xanthomelas  
 Dryopteris zayuensis

Polystichum neolobatum  
 Polystichum piceopaleaceum  
 Polystichum sinense  
 Polystichum x pseudobraunii (P. piceopaleacum x P. sinense)  
*Davalliaceae*  
 Araiostegiella hookeri (syn.: A. clarkei)  
 Katoella beddomei  
 Katoella pulchra  
*Polypodiaceae*  
 Drynaria mollis  
 Lepisorus clathratus  
 Lepisorus mehrae  
 Lepisorus ?oligolepidus (fronds long, mostly narrow, some a bit wider, stiff, thick, somewhat succulent and very slow-drying, glaucous beneath, with dark-green midrib, and narrow, pale cartilaginous edge, nude apart from a few narrow-tipped, wide-based scales near base of midrib beneath and a few rounded-peltate scales with small acute tips distally among the sori; sori medial, yellow-brown, thick, with many circular peltate brown paraphysis-scales with pale edges covering them when youngish; rhizome long, fronds arising separately; rhizome scales long and very narrow, markedly toothed with small teeth, dark blackish-grey, with a darker central band visible in the basal half, which has wider, browner basal auricles; laminar-texture like L. loriformis, scales like L. thunbergianus; epiphyte on tree-trunks. CRFJ 30525). **check TAIIF image.**  
 Lepisorus jakonensis ("L. pseudonudus" sensu Fraser-Jenkins (1997, 2008)).  
 Lepisorus scolopendrium  
 Pichisermollodes ebenipes  
 Pichisermollodes quasidivariata  
 Pichisermollodes stewartii

## 5. North Annapurna (Muktinath; June 2011).

*Selaginellaceae*

Selaginella helvetica

*Equisetaceae*

Equisetum arvense subsp. arvense

*Pteridaceae*

Adiantum wattii

Aleuritopteris grisea

Cryptogramma stelleri

Notholaena delavayi forma intermedia

Notholaena delavayi forma delavayi

*Aspleniaceae*

Asplenium daghestanicum subsp.

aitchisonii

Asplenium nesii

Asplenium ruta-muraria subsp. ruta-muraria

Asplenium viride

*Woodsiaceae/Athyriaceae*

Athyrium rupicola

Cystopteris fragilis subsp. dickieana

Woodsia andersonii

Woodsia glabella

*Dryopteridaceae*

Dryopteris komarovii

*Polypodiaceae*

Lepisorus clathratus

**6. The N.E. side, Manang area.**

Not visited by CRFJ, but may be quite species-rich, despite being a rain-shadow area even at mid-altitude, but is much under-collected.

The following is a list of Manang pteridophytes extracted from Fraser-Jenkins, Kandel & Pariyar, Fraser-Jenkins & Kandel and Kandel & Fraser-Jenkins, *Ferns & Fern-Allies of Nepal 1-3* (2015, 2019, 2020). All are based on actual specimens seen and identified by CRFJ, mostly in KATH or TI, rather than using any literature-records. But many more would be found by systematic collection in the area instead of listing the few random collections in herbaria.

*Lycopodiaceae*

Huperzia hamiltonii

Huperzia pulcherrima

*Selaginellaceae*

Selaginella bisulcata

Selaginella subdiaphana

*Equisetaceae*

Equisetum arvense subsp. arvense

Equisetum arvense subsp. diffusum

*Ophioglossaceae*

Botrychium lanuginosum

*Gleicheniaceae*

Dicranopteris lanigera

*Cyatheaceae*

Cyathea spinulosa

*Dennstaedtiaceae*

Dennstaedtia appendiculata

Microlepidia setosa

Microlepidia speluncae

Pteridium revolutum

*Lindsaeaceae*

Odontosoria chinensis subsp. chinensis

*Pteridaceae*

Adiantum capillus-veneris

Adiantum tibeticum

Adiantum venustum

Aleuritopteris bicolor

Aleuritopteris leptolepis

Aleuritopteris rufa

Aleuritopteris tamburii

Coniogramme affinis

Cryptogramma stelleri

Notholaena borealisinensis

Notholaena delavayi

Notholaena himalaica

Oeosporangium tenuifolium

Onychium cryptogrammoides subsp.

cryptogrammoides

Onychium siliculosum

\*Pityrogramma calomelanos  
 Pteris cretica subsp. cretica  
 Pteris cretica subsp. laeta  
 Pteris emodi  
*Aspleniaceae*  
 Asplenium ensiforme  
 Asplenium exiguum subsp. yunnanense  
 Asplenium khullarii  
 Asplenium laciniatum subsp. tenuicaule  
 Asplenium nesii  
 Asplenium ruta-muraria subsp. ruta-muraria  
 Asplenium trichomanes subsp. trichomanes  
 Asplenium viride  
 Asplenium yoshinagae subsp. indicum  
*Thelypteridaceae*  
 Thelypteris (Pseudophegopteris) levingei  
 Thelypteris (Pseudophegopteris) microstegia subsp. laterepens  
*Woodsiaceae/Athyriaceae*  
 Athyrium cuspidatum  
 Athyrium pectinatum  
 Athyrium schizochlamys  
 Cystopteris montana  
 Gymnocarpium jessoense  
 Woodsia cycloloba  
 Woodsia glabella  
 Woodsia lanosa  
*Onocleaceae*  
 Onoclea intermedia  
*Blechnaceae*  
 Woodwardia unigemmata  
  
*Dryopteridaceae*  
 Cyrtomium anomophyllum  
 Dryopteris basisora  
 Dryopteris fructuosa  
 Dryopteris juxtaposita  
 Dryopteris komarovii  
 Dryopteris nigropaleacea  
 Dryopteris wallichiana subsp. wallichiana  
 Polystichum duthiei  
 Polystichum lachenense  
 Polystichum lentum  
 Polystichum nepalense  
 Polystichum obliquum  
 Polystichum piceopaleaceum  
 Polystichum stimulans  
 Polystichum thomsonii  
*Nephrolepidaceae*  
 Nephrolepis cordifolia  
*Davalliaceae*  
 Katoella beddomei  
*Polypodiaceae*  
 Drynaria mollis  
 Drynaria propinqua  
 Lepisorus clathratus  
 Lepisorus jakonensis  
 Lepisorus loriformis  
 Lepisorus mehrae  
 Lepisorus morrisonensis  
 Lepisorus scolopendrium  
 Microsorium membranaceum  
 Pichisermollodes nepalensis  
 Pichisermollodes quasidivaricata  
 Polypodiodea amoena subsp. amoena  
 Polypodiodes fieldingiana  
 Polypodiodes lachnopus  
 Pyrrosia costata  
 Pyrrosia glabra