

283. Path alongside Modi Khola, with main avalanche ice-slope beyond us.
284. Thelypteris (Pseudophegopteris) levingei, thin creeping rhizome and narrow frond, a higher-altitude species, above Deurali, 3200 m.
285. Thelypteris levingei, close up underneath, showing white hairs looking like glass- spicules when seen under a lens.
286. Approaching the big avalanche ice-slope no. 2 above Deurali.
287. Starting the crossing, with hard ice in the morning, not so slippery, but still steep and a bit tricky.
288. Watch your step!
289. All across, just about...
290. White ground-orchid (?Cephalanthera?) beside the path.
291. Annapurna northern snow-peaks ahead and just another 4000 m above! On the far side of that to the north is the semi-arid, high-altitude rain shadow area of the Tibetan type in Mustang District, N. Nepal.
292. Polystichum prescottianum, a bit narrower than it can often be, pale, not mostly black scales in this clump, above Deurali, to Machapuchare Base Camp, c. 3500 m.
293. P. prescottianum, close-up of lower pinnae.
294. Polystichum prescottianum, lobe apices not terminating in a single pointed tooth.
295. Dryopteris komarovii, a lithophyte, with narrowly acute lamina- and pinna-apices, sticky-glandular, sweet-smelling fronds and distinct from the related D. barbiger.
296. Dryopteris komarovii, almost posing for its photograph, Deurali to Machapuchare Base Camp, 3500 m.
297. An old wall with Woodsia andersonii, Polystichum thomsonii etc., above Deurali, c. 3500 m.
298. The beautifully hairy, miniature Woodsia andersonii, how's this for a fern-gem?!
299. Another little gem of a fern, Woodsia lanosa; Dr. Naresh Thapa and I overlooked it while we were preparing his book on Nepal ferns (2002), near Machapuchare Base Camp, 3600 m.
300. A beautiful candelabra Primula, below Machapuchare Base Camp, 3500 m.
301. Fritillaria cirrhosa, a lot like European F. meleagris, but not it, M.B.C., 3500 m.
302. Inside flower of the Himalayan endemic Fritillaria cirrhosa.
303. Fritillary lilies, meadow below M.B.C.
304. Pteris dactylina, like a miniature and more radiate P. cretica, mossy rocks below M.B.C., 3500 m.
305. Pteris dactylina, below M.B.C.
306. Pteris dactylina, close up of toothed, radiate pinnae.
307. Cliffs above Machapuchare Base Camp, looking back on our path along the upper Modi khola river.
308. Path in white Meconopsis (Himalayan Poppies) meadow by small avalanche ice-patch, below M.B.C.
309. Woolly ?Meconopsis where ice has melted, below M.B.C.
310. Ah ha! - what have we here then? Asplenium viride? Oh, no, it's Polystichum lachenense - wonderful!
311. Polystichum lachenense, another fine little high-Himalayan gem, below M.B.C. 3600 m.
312. Polystichum lachenense, sori and few scales beneath.
313. P. lachenense, fully grown at c. 10 cm tall, below M.B.C., 3600 m.
314. P. lachenense, lower surface.
315. Polystichum lachenense, slightly larger and more lobed.
316. P. lachenense, sori, below Machapuchare Base Camp, 3600 m.
317. Cystopteris fragilis subsp. kansuana, I believe; a small, high-altitude taxon with fused apical pinna-lobes, making rectangular segments at the pinna-apex, small spiny spores of the subsp. fragilis spine-type, though not ripe in this specimen. Requires further study, bases of rocks below Machapuchare Base Camp, 3600 m.
318. Cystopteris fragilis subsp. kansuana, below M.B.C. I had noticed this for some years before concluding it must be the same as the Chinese subsp. kansuana.
319. C. fragilis subsp. kansuana, below M.B.C, 3600 m.
320. Cystopteris montana, a rare species, for long misreported in Nepal etc. in error for C. moupinensis, but this is the genuine article, below Machapuchare Base Camp, 3600 m.
321. Cystopteris montana in its habitat, finely dissect, deltate-pentagonal frond, very thin, creeping rhizome, below M.B.C.
322. Gymnocarpium jessoense, appears to replace G. fedtschenkoanum from C. Nepal eastwards, but was generally overlooked due to its rarity, below Machapuchare Base Camp, 3600 m.
323. Gymnocarpium jessoense, segments smaller and less rectangular, slightly more rounded, and rhizome scales not so prominent as in G. fedtschenkoanum, below Machapuchare Base Camp.
324. G. jessoense, below M.B.C.
325. Young fronds of Athyrium mehrae (not "A. nephrodioides"), fronds very tapering below, pinna-lobes not lobed at sides, not deeply cut to their bases, below Machapuchare Base Camp, c. 3600 m.
326. A small, exposed Dryopteris zayuensis, below Machapuchare Base Camp.
327. Dryopteris zayuensis, makes perfect crown-shuttlecocks, below M.B.C.
328. Dryopteris zayuensis, showing dense and slightly wide black lower-rachis and stipe scales, many pale fibrils on pinna-costae.
329. Selaginella helvetica, like a small S. pallidissima at higher altitude, below M.B.C., 3600 m.
- m. It has recently been suggested by X.C. Zhang et al. in China from very doubtfully significant sequencing of unclear difference and adjacent position, to be a separate species, S. julongensis, but without testing Indo-Himalayan material. No significant morphological difference was shown at all and this appears merely to be over-zealous attribution of taxonomic importance to slight molecular variation in a widespread species. Lack of taxonomic knowledge outside China also led the authors to map the possible "species" ranges quite pointlessly from areas of Kashmir, Pakistan etc. where they do not occur, by guesswork, with a completely incorrect and much wider supposed distribution also for the related S. pallidissima and others, rather than learning the species and their precise distribution in India, Nepal etc. They also attempted to separate another actual synonym, S. laxistrobila, from Nepal. This sort of guesswork based on some uninformed sequencing is far too commonly substituted for genuine knowledge by taxonomically limited molecular biologists. S. julongensis and S. laxistrobila are both just S. helvetica.
330. Selaginella helvetica has long, tall erect fertile strobili later in the season, below M.B.C., c. 3600 m.
331. S. helvetica, close-up, not mentioned for Nepal by Thapa and I in his Nepalese fern book (2002), earth banks below M.B.C.
332. Pink-flowered shrub, below Machapuchare Base Camp, 3600 m.
333. Athyrium attenuatum, related to A. filix-femina of Europe, but dark scales and pinnules not so sloping and more sessile; pinnules become more lobed and toothed in larger specimens (forma dentigerum growth-form), below M.B.C.
334. Snow-patch waterfalls below Machapuchare across the Modi Khola valley to the south.
335. Approaching Machapuchare Base Camp lodge, where the route turns west up to the Annapurna cirque.
336. Thirsty? - a lovely ice-cold, clear trickle out of the ground, no houses above, so no problem below!
337. Crossing the side-stream from Annapurna cirque, Machapuchare Base Camp, 3700 m.
338. Hey, this ladybird is a different colour from the others!
339. The mysterious black spikes of an Arisaema, or Cobra Lily, "Lali", Machapuchare Base Camp, 3700 m.
340. Lali spikes seem to be emerging from some subterranean world.
341. The Lali then begins to burst into black leaves.
342. Lali leaves and flowers, the leaves are gathered in quantity as a spinach-vegetable, or sag.
343. I wonder if there's really a mouse inside that flower with its tail sticking out??
344. Porters with amazing strength and endurance overtake us easily, carrying heavy planks by head-band and neck-muscles all the way up to Annapurna Base Camp for building, at 2000 rupees (15 pounds sterling) for each 3-day trip.
345. Porter and 100 kilo load (or more) heading up into the clouds and a view up towards the Annapurna cirque; snow-leopard country above M.B.C. at 4000 m and up.
346. Cryptogramma stelleri, with Polystichum lachenense, above Machapuchare Base Camp, 3900 m
347. Cryptogramma stelleri, sterile and fertile fronds above M.B.C.
348. Cryptogramma stelleri, sterile fronds, close up.
349. Jacob and remarkable croziers of Dryopteris barbiger having a look around after their Winter-sleep, the large, bright-green adult leaves in a few weeks' time have an abrupt, blunt to subtruncate frond-apex and pinna-apices and a densely with russet-scaly stipe and rachis, by path above M.B.C. to Annapurna Base Camp, 4000 m. Lali growing behind.
350. They'll soon be as tall as Jacob (was)! Adult fronds with blunt to subtruncate frond- apices, stickily glandular and orange-scented.
351. Russet-scaled croziers and old dead fronds of stands of Dryopteris barbiger, in open meadows and grassy slopes, above Machapuchare Base Camp, 3800 m.
352. View down from above Machapuchare Base Camp, 3800 m.
353. Cliffs looking back down upper Modi khola valley and hail-storm blowing up from Machapuchare Base Camp.
354. View north into northern Annapurna peaks and clouds.
355. Another small, very fibrillose Polystichum, P. shensiense, pinnule-apices are single- toothed points, among rocks above M.B.C., 3900 m.
356. Cystopteris fragilis subsp. diaphana, with many veins terminating in notches and others in flat lobe-tips, densely blunt-spinulose spores (on the one ripe frond found), above Machapuchare Base Camp, c. 3800 m.
357. Cystopteris fragilis subsp. diaphana, not previously known as far east as Nepal, though present in Pakistan and Kashmir.
358. Inside the great cirque at Annapurna Base Camp in the morning, 4100 m, the view we missed due to the clouds and altitude-sickness; photo by Courtesy of Summit Treks and Adventures, Chhetrapati, Kathmandu (Statreks@wlink.com.np)
359. Annapurna Base Camp with Machapuchare peak behind across the valley, showing the north ridge climbed by Wilfred Noyce to about 50 m below the deliberately unclimbed sacred summit. It looks cold in A.B.C.! Photo by Summit Treks.
360. View down across the snowfield in the great Annapurna cirque in Winter, to Machapuchare. Dig-site for ferns? I bet they are interesting, though under the snow then! Photo by Summit Treks.
361. Ancient ??Sedum plants above Machapuchare Base camp.
362. Cliffs on the way back down to Deurali Lodge, a place for an invigorating cold-shower, anybody? But with the occasional stone....
363. After Sagun recovered on coming down to lower altitude, Deurali Lodge and trekkers at table - at least we could afford the local tomato-ketchup, if not a lot else!

364. A tiny white flower of elaborate beauty. Any ideas what it might be? Forest near Bamboo Lodge, 4 June 2012.
365. Dryopteris conjugata, half way between the simply pinnate D. hirtipes (and D. atrata) group and the pinnate D. wallichiana complex; Professor Mary Gibby (1985) found it to be a diploid apomict, but no-one knows the origins and what are the original sexual diploids from these two sections, Hirtipedes and Fibrillosae. So much to research still in Asian ferns - and so few really doing so properly.
366. Dryopteris conjugata, dense, very narrow, black scales and pinnae lobed to half their depth, Bamboo Lodge down to Sinuwa, 5 June 2012.
367. White ?Habenaria ground-orchid and old leaf of Dryopteris wallichiana.
368. Young plants of the abundant annual Selaginella chrysocaulos, growing again from tiny bulbils produced at the tips of dying old lower branches that become the basal bulbil of the next year's plant, near Sinuwa, 2300 m.
369. Polystichum neolobatum, beautiful dense russet scales on the young frond stipes.
370. Aleuritopteris albomarginata, the commonest rather higher-altitude Silver Fern, basal late Autumn-grown fronds are smaller and with white farina beneath, but the large Summer monsoonal fronds usually have almost no farina, but scales beneath the pinna-costae distinguish it.
371. Aleuritopteris albomarginata, with its characteristic costal scales, though often only present very sparsely in the powder-less Summer fronds.
372. The rare little Pichisermolodes nigrovenia, darkened veins on the underside, short, non-acuminate marginal teeth and a thin rhizome with darkish brown scales, rather higher- altitude, from Bamboo Lodge down to Sinuwa, c. 2500 m.
373. Pichisermolodes nigrovenia and its darkened veins.
374. P. nigrovenia rhizome and scales.
375. P. nigrovenia, short marginal teeth unlike the rather similar P. malacodon.
376. P. nigrovenia close-up, characteristic veins and small teeth.
377. Pichisermolodes quasidivariata (syn. Crypsinus stracheyi), near Sinuwa. It has a thin rhizome with brown scales and the acute-pointed lowest and uppermost pinnae point back and forward, respectively.
378. Pichisermolodes ebenipes on old tree, has a thick rhizome covered in glossy black scales.
379. Botrychium lanuginosum, fertile spike arises between the first and second pair of pinnae, lowest pinnae deltate, unlike the oblanceolate ones of the very rare B. virginianum. Unnecessarily treated in Japan in an over-split cladogenus, Botrypus (or Japonobotrychium).
380. Botrychium lanuginosum, here and there on path-banks, and not uncommonly as an epiphyte on moss-laden tree-branches.
381. Shallow cave by path below and near Bamboo Lodge, the only site so far in Nepal for the newly found Athyrium mengtzeense, also discovered by CRFJ above Dohray, Darjeeling, otherwise only in China and not known in Tibet.
382. Athyrium mengtzeense, one of only three plants seen, Sinuwa to Bamboo Lodge.
383. Athyrium mengtzeense, related to A. roseum, but densely glandular axial junctions and less lobed segments, stipe-base scales black. Spores good, not abortive, so not a hybrid despite the reddish-brown sori, which sometimes suggest possible hybridity in Asplenium etc.
384. Athyrium fimbriatum, reddish axes, often mistakenly called A. foliosum in the past, including by Hope, as one of his "red-footed" (stiped) ferns, thick horizontal rhizome with fronds at apex.
385. Athyrium fimbriatum, asymmetrical pinnules (longer acroscopic lobes than basicopic ones), unlike the higher-altitude A. atkinsonii.
386. Attractive geometrically patterned leaves of an unidentified low-growing pathside weed.
387. Sunil, our hero Brahman porter, on steps down to the bridge that got washed away two or three days later by a heavy pre-monsoon storm, with Chomrong on the opposite slope, as we leave Annapurna Conservation Area core-zone.
388. Dryopteris chrysocoma, fronds more erect than the related D. woodsiiisora, scales all pale, sori more numerous, taller and more crowded and higher-altitude, above Chomrong, c. 2000 m.
389. D. chrysocoma, stipe with broad, pale scales.
390. Dryopteris chrysocoma, many button-like sori, with thick surrounding indusia (similar to those of D. cochleata, but fronds quite different).
391. Dryopteris chrysocoma sori, they will turn grey, then brown on maturity and do not shrivel up, even when the frond has died and turned brown.
392. The Treble Silverstipe butterfly, with help to identify it from Dr. Colin Smith's Nepalese butterfly books and his comprehensive butterfly collection at Pokhara Museum.
393. The Treble Silverstipe obligingly opening its wings for a portrait.
394. A beautiful iridescent Lycaenid butterfly, a rather common little "Blue", males with blue-mirror effects, females drab as they forgot to bring their make-up kits when they changed!
395. A very common intense-blue, pathside pea-flower.
396. Pteris kathmanduensis, non-apiculate segment-apices, free veins, more than one developed pinnate basisopic pinnules on lowest pinna, glossy stipe and rachis.
397. Pteris kathmanduensis, rounded, non-apiculate (non-muricate) segment-apices and usually no setae above segment-midrib (top surface), above Chomrong, 2070 m.
398. Serene Machapuchare peak in a cloudless sky from Chomrong; Sinuwa Lodge just visible at bottom of picture.
399. Steps down to Khyumrung khola stream, where the Tectaria morata grows, 6 June 2012.
400. Onychium lucidum, often misidentified as "O. japonicum", showing its well separated fertile ultimate segments and stiff frond. It is hexaploid, unlike O. japonicum (not present in India) and O. vermae, which are both tetraploid.
401. Please mind the ferns during kick-boxing practice! - though it's only a colony of the ubiquitous lower-mid altitude Thelypteris (Christella) procera.
402. Thelypteris (Christella) procera (syn. C. appendiculata, T. appendiculoides), the most common of the creeping rhizome'd species in Nepal and the Indo-Himalaya, all with only one pair of veinlets anastomosing below each interpinular sinus, confused badly in northern India with T. parasitica (South India), but lowest pair of pinnae not the widest part of the frond, and hairs longer and thicker. Birethanti roadside, 1000 m, 6 June 2012.
403. Thelypteris (Christella) procera, somewhat narrow lamina-base, narrow and deeply cut pinna-lobes with obviously longer pale hairs beneath than in other species, forms large colonies in more open, often secondary places, Birethanti.
404. Thelypteris procera, long white hairs occur on all veins and midribs beneath the lamina; reknowned in Nepal as causing soreness or redness of softer areas of skin in some people; is also a clothes-moth repellent if dried fronds are placed beneath clothes in drawers.
405. Thelypteris procera, with slightly darker scales at stipe-base.
406. Real Thelypteris (Christella) parasitica for comparison (far N.E. India (only one collection), Bangladesh and South India), from Khao Yai Hill, Nakhon Nayak, C. Thailand, cult. outside in Kathmandu by CRFJ.
407. Real T. parasitica, Thailand, cult. in Kathmandu, creeping rhizome, long lowest pinnae, hairs beneath lamina not as long and softer than in T. procera and minute orange glands present on veins.
408. Thelypteris (Christella) clarkei, Deurali, Gorkha, Nepal, on way back to Kathmandu; also confused with T. parastica, but narrower bases to the lower pinnae, very short insignificant hairs beneath and thicker, short horizontal rhizome.
409. Thelypteris clarkei, Gorkha.
410. Dryopteris woodsiiisora in full growth, a lithophyte, though small cliffs, smaller and more delicate, pendent fronds than D. chrysocoma and has a number of small, linear black scales on upper stipe and rachis, though these are often deciduous, New Bridge.
411. Dryopteris woodsiiisora, showing flatter sori and narrower scales. A lower-mid altitude species, unlike D. chrysocoma.
412. Dryopteris woodsiiisora stipe with many dark, pale scales.
413. Dryopteris woodsiiisora unlike D. chrysocoma dying off first thing in the dry Winter period and dead fronds typically hang from the rock-surface, near New Bridge, 1500 m, photographed in dead state, November 2006.
414. The Dark Blue Tiger butterfly, identified from Colin Smith's books.
415. I think this rather large moth is one of the Owl Moths (?Cometaster sp.), c. 7 cm across.
416. Trichomanes (Crepidomanes) campanulatum (syn. T. insigne), another fairly common species, usually smaller than T. latealatum, and with small dark hairs on the stipe-wing, near New Bridge, 1600 m.
417. The rare (in Nepal, abundant in the Khosi Hills, Meghalaya, N.E. India) Aleuritopteris subdimorpha, thick, black stipe with concolorous, reddish scales and a shorter, widely deltate lamina, near New Bridge, 1600 m.
418. Aleuritopteris subdimorpha, reddish white farina beneath, New Bridge.
419. A. subdimorpha, concolorous reddish stipe-base scales, sometimes apices may be darker, but no dark centre in the scales, except right at the stipe-base, by the rhizome.
420. Polystichum annapurnicola, another new species, discovered by CRFJ in a few places in C. Nepal; above New Bridge, plant cultivated for several years in Kathmandu by CRFJ, and now chromosome-counted by Dr. Sadamu Matsumoto, Tsukuba, and found to be diploid, endemic to Nepal, as so far known - a rare category indeed - and one of only two ferns endemic to the country. But I expect it will turn out to be a "temporarily endemic" that could perhaps turn up from Tibet to Myanmar.
421. Pteris kathmanduensis, a new species near to P. aspericaulis discovered by CRFJ in Kathmandu valley, but now known to extend from Uttarakhand to N.E. India, large, subapiculate to non-apiculate segments, smooth stipe, no setae above segments, Khyumrung khola to New Bridge, 1600 m.
422. Pteris kathmanduensis, close up of lower pinnae.
423. Pteris kathmanduensis, non-apiculate to subapiculate segment-apices; in the complex Pteris aspericaulis aggregate with some tendency towards the P. biaurita group.
424. Chestnut Tiger butterflies congregating to take salt from a urine patch (Not Guilty, M'lud! T'was but a passing buffalo...).
425. Jacob's Chestnut Tiger, picked up by hand from the feeding flock and temporarily held to behold the wonder of the butterfly's, then set free.
426. The less common Himalayan Map butterfly, settled for only a moment after much stalking - no wonder Jacob got a bit lost after Chomrong with charts like those!
427. The Indian Fritillary butterfly, on the invasive American Bidens pilosa plant (Nepali: kuro, whose seeds hook on everywhere); below, Kyumi, 1300 m.
428. Jacob and Sunil at Siwai, loading our rucksacks for an easy (if bumpy) ride down to the main road.
429. CRFJ photographing a big Pteris vermae again (same plant as photo 7), near Birethanti village; the poisonous Thelypteris (Christella) arida also present in a wetter area on the right of the photograph.
430. Sagun crossing the last bridge at Birethanti, where the Ghorepani trek heads off westwards towards Dhulagiri Himal, nearly reached the main Pokhara road at Naya Pul.
431. CRFJ at the end of the trek Birethanti.
432. The small delicate Oeosporangium ("Cheilanthes") tenuifolium, grows on open, dry compact-earth slopes, very difficult to transplant and grow and may perhaps have a mycorrhizal association, Birethanti.
433. Oeosporangium tenuifolium, early Summer growth.
434. Rocks dried up until the monsoon below a seasonal waterfall at Komale, below Deurali, Gorkha, diverting off the way back from Pokhara to Kathmandu, 7 June 2012. Apart from the simple-fronded Leptochilus decurrens subsp, decurrens in the middle, where is the other fern visible here?
435. All over the rock-surface! The tiny Trichomanes (Gonocollum) parvifolium, the site of its first discovery in Nepal or India (only because of unwittingly sitting on it while cooling off under the small waterfall in the Summer monsoon).
436. Trichomanes parvifolium, c. 5-6 mm tall, with sori at some of the apices, is not a liverwort, Deurali, Gorkha, 700 m
437. Selaginella bryopteris, in dried pre-monsoon condition, all along steep rock and earth banks beside the main road in gorge south of Mugling, from Narayanghat, way back from Annapurna, 7 June 2012.
438. Selaginella bryopteris, on a plate in dried-fried state from the hot sun.
439. S. bryopteris. Add water, wave a magic wand and wait for it - and back to life it comes. A "resurrection plant" - Now that's what I call magic!
440. A splendid "super-butterfly", the Blue Pansy, to welcome us to Kathmandu in our little front-garden.
441. CRFJ, Jacob and Sagun in the cold-desert rain-shadow zone just north of the Annapurna massif, in Mustang District, by the northern border of Nepal. Only high-altitude ferns occur here, but often very interesting and rare species.