

The Altai

Central Asia's Golden Mountains

A Greentours Tour Report

27th June – 12th July 2004

Led by Vladimir Kolbintsev and Chris Gardner

Daily Reports by Chris Gardner

Day 1 June 27th UK to Almaty

Vladimir and I met the group at Almaty after a trouble free flight and journey through immigration and then we drove straight up to Chimbulak, a ski centre high in the Zalinsky Alatau range of the Tien Shan.

Day 2 June 28th Tjuksu Gate & Ust Kamenogorsk

A beautiful morning and startling clear mountain views saw us wandering slowly up towards Tjuksu Gate, the roadsides lined with an array of lovely mountain flowers including wine-red Columbine *Aquilegia atrovinosa*, blue Jacob's Ladder, *Polemonium caucasicum* and higher up a few magenta pink *Primula nivalis*. Both *Dracocephalum imberbe* and *Dracocephalum grandiflora* were in flower the latter a profound blue colour and in the cool shade of morning a grey and white *Coenympha sunbecca* clung to one flower waiting for the sun's warmth. Olga found a *Tulipa heterophylla* by the most recent snowmelt, a real goody at this time of year. Birds included Greenish Warblers, Black-throated Accentor and Rosefinch and there were several butterflies on the wing with *Parnassius apollonius*, *Erebia turanica*, *Clossiana erubescens*, Brimstone, Small Tortoiseshell and Queen of Spain Fritillary.

After an all-to-brief morning we had to return to the hotel to ready ourselves for the flight north to Ust-Kamenogorsk. The flight took us over the vast semi-desert steppes north of Almaty and on to the altogether greener, undulating landscape in this near-Siberian corner of Kazakstan.

Day 3 June 29th To Zaissan

A long drive lay ahead of us so we left at 0800 and were soon speeding over bumpy roads through the Siberian landscape and climbing up into the granitic Kalbinsky Hills. Across the hillsides were great swathes of Burning Bush *Dictamnus angustifolia* and there was a colony by our first stop. A short climb up and we also had our first look at pink *Paeonia anomala*, Turkscap Lily *Lilium martagon* and *Clematis integrifolia*. Blyth's Reed Warbler, Lesser Whitethroat and Quail called from the bushes and long grass and Olga spotted a Bobak Marmot

(a species Vladimir himself had never seen), whilst in a sheltered gully Ron found Scarce Coppers.

Carrying on past more and more *Dictamnus* we stopped again near an area of Scots Pine forest and meadows. In the meadows were several Idas Blues and Chestnut Heaths, while singing Tree Pipits parachuted down onto the treetops joined by a party of Willow Tits. Our next stop was by a wayside yurt, a sort of Kazak Little Chef where drinks and snacks could be had, but below ran a small stream and this combined with its dual use as a makeshift latrine proved irresistible for butterflies. There were dozens of Holly Blue and Idas Blues taking water and salts from the mud and the flowering *Angelica* was a magnet for three species of admiral with Hungarian Glider, *Limenitis sidyi* and *Limenitis helmanni*, plus Marsh and Glanville Fritillary. To polish it all off a truck driver had carefully caught a huge female Apollo *Parnassius apollinius*.

We descended towards the drier country around an artificial limb of the great Zaissan Lake a vast natural water body that has been enlarged through the damming of its outlets. So much so that it is necessary to take ferries across the lake. Shortly before the ferry terminal we stopped to watch some wonderful little reptiles, the endemic Zaissan Toad-headed Agama. These beautifully marked animals scurried about the sands, one male was displaying frequently by flicking and rolling his tail to deter other males and all were superbly camouflaged against the sand.

At the expansive ferry terminal – a café and a pier – we had lunch then walked to the ferry where Vladimir pointed out to some unbelievers the Swallows that nested on the ferry itself and so made the journey to and from the different ports several times a day feeding across the waters as they went back and forth to successfully raising their broods. They were not alone as Masked Wagtail and Tree Sparrow had also taken up residence. The ferry crossing was only half an hour and as we approached the other side we saw Common and Gull-billed Terns and Great Black-headed Gulls. The land was now much drier and we drove on past arid hills and steppe to a small spring where many thirsty people and birds stopped to drink. Quizzical Kazaks watched the strange foreign birdwatchers as they in turn watched Grey-necked Bunting, Tawny Pipit and Rock Thrush. Nearby was a large lagoon where there were Black-necked Stilt, Little Ringed Plover, Redshank and a Shelduck family.

The sealed roads were nonetheless bumpy and turning onto the dirt road to the Zaissan Desert seemed if anything an improvement. Steppe Eagle and Montagu's Harrier were seen and when we stopped to stretch our legs there were Black Lark and two Imperial Eagles, as well as seed heads of some of the many tulips that flowered during the spring. As we approached the lakeshore where our camp was hidden we entered an area of spectacular red, ochre and white cliffs, cut with many runnels and baked and cracked by the intense sun. As it bumped and rolled over the terrain down to the camp the first bus saw a big Saker Falcon. There was time for a walk and swim before dinner and around the strange formations flew Lesser Kestrel, Swifts, Long-legged Buzzard and Pied Wheatear whilst a Little Owl tried unsuccessfully to remain unnoticed by the smaller birds perched on the cliffs.

As dusk turned to night an extraordinary droning sound heralded the massed mating swarms of non-biting lake flies that whirled and whined about us unseen (and harmless). Vladimir took everyone out to look for the legendary tame Jerboas of Zaissan and although they flushed an Eagle Owl the full moon meant that sadly not a Jerboa was to be seen – and poor Vladimir was never to hear the end of it.

Day 4 June 30th Zaissan Desert

It was thankfully overcast, which moderated Zaissan's daytime temperature and made for a much more comfortable time in the desert. Driving out along the cliffs we saw a succession of fine raptors with two White-tailed Eagles, a Pallas Sea Eagle and several huge Upland Buzzards before down-sizing to Black Kites and Hobbies as we drew closer to the small fishing village on the lake shore. We stopped to view a number of rather distant Dalmatian Pelicans, Great Black-headed Gulls and Caspian Terns and decided to approach closer on foot flushing out a number of beautifully marked Steppe Runner lizards. Off-roading to a small spring we found two Demoiselle Cranes silhouetted against the skyline and around the marshy spring a number of Keeled Skimmers and Eastern Bath Whites braved the increasing winds. A lack of sandgrouse and an abundance of mosquitoes (Anne was in her full anti-mozzie outfit by now) saw us continue cross-country flushing out half a dozen rare White-winged Larks before reaching the spectacular Kiin Kerish Canyon an almost indescribable piece of fantasy geology. Peering over the edge of the canyon we looked down at a seemingly vast expanse of convoluted gullies and hills coloured ochre, red, grey and green it seemed at first that any descent would take some time – but this was an illusion created by the landforms themselves, which looked larger than they were due to a lack of vegetation. In fact it took only a few minutes to descend and enter this fascinating environment and we spent some time hunting around for artful photographs and bizarre patterns in the clays and soft sandstones.

Returning to the camp for a late lunch we disturbed the Saker Falcon once again and then during lunch a disoriented Mouse-eared Bat hummed past and landed on one of the cliffs allowing rare daylight views and if that wasn't enough a Dione Snake chose the same time to try and slide across the camp.

After lunch we ambled along the beach to search for birds finding Common, Little and White-winged Black Terns, Little Ringed Plovers and Redshank. Walking back over the dry hills Vladimir and I were searching for the superbly camouflaged Sun-watcher Toad-headed Agamas and found one just as a huge storm began growing in the distance. Huge dark clouds were now rearing up and moving quickly across the desert and we barely made it back to camp when the storm let rip, drenching the desert and turning the camp a sticky mess. Winds and intermittent storms carried on for a while, further cooling the desert and when the sun did break through again it illuminated an incredible golden-rimmed cloudscape replete with sunbursts and screaming flocks of Swifts tearing across the fiery sky.

The wailing flies started up again – they really were an impressive event, but further storms that night dampened their enthusiasm.

Day 5 July 1st To Markakol

It was still cloudy and showery this morning as we drove out across the desert seeing Pallas's Sea Eagle, White-tailed Eagle and three Demoiselle Cranes before stopping for a female Isabelline Shrike. Reaching tarmac again we moved on towards China stopping occasionally for Montagu's Harrier and Hoopoe, then two beautiful Rollers, Bee-eater and another much closer Demoiselle Crane. Huge sand dunes rose in the distance representing China, but there were no security checks as we drew ever closer (the army had been mobilised to the Uzbekistan border instead) and we stopped only briefly to make a call to Markakol to start up the sauna and for some intercultural exchange (taking photos of the locals with big moustaches). Climbing up to

the Marble Pass we stopped for lunch with expansive views of the great sand dunes in China below us and the warmth of sunshine above us. Veils of rain were lacing the landscape beyond so we made the most of the time searching for butterflies and flowers, as lunch was prepared. There were Apollos, Damon and Reverdin's Blues, a Montagu's Harrier and an Adder among the many deep blue Echiums and other steppe plants.

The rain returned with a vengeance and prevented any more stops as we now descended the muddy rutted road to Markakol. The beauty of the lake was not immediately apparent through the fogged windows but we could still make out Black Storks on our arrival. Hopefully things would improve tomorrow.

Day 6 July 2nd Markakol

We returned to the pass we had to miss out yesterday with a good deal more sunshine around and walked up to a viewpoint overlooking flower-filled meadows and larch forests that spread in every direction. The meadows were full of *Campanula glomerata*, the more delicate bells of *Campanula volgensis*, *Pedicularis amoena*, Vladimir managed to find a few *Iris ruthenica* tucked in the woods whilst Ron and I were starting to clock up a few butterflies as the day warmed with Small Pearl Bordered and Heath Fritillaries, *Melitaea latonigera* and Mazarine Blues.

We began slowly walking back as Pine Buntings called and Spotted Flycatchers and Redstarts darted about the larches. There were great stands of greenish *Veratrum lobelianum* mixed with lilac to blue *Aconitum lycotum*, deep blue *Dracocephalum grandiflorum* and creamy *Pedicularis dolichorrhiza* while moist ditches held colonies of Common Spotted Orchid *Dactylorhiza fuchsii*. Willow Tit and Lesser Spotted Woodpecker fed in the larch as attractive *Erebia theano* butterflies drifted over Quail chirruping from the deep meadows. Further down Blyth's Reed Warbler called from a group of willows, a pale phase Booted Eagle coasted over the woods, a Red-backed Shrike perched on an isolated bush and there was even an Osprey flying up the valley as Ron and I rejoined the others who had made it further down seeing many pink *Allium hymenorrhizum*, *Papaver nudicaule* and *Geranium affine*.

Stopping at the lake on the way back we had outstanding views of three Black Storks feeding in the shallows of the beautiful Markakol Lake. The calm waters were hemmed in on all sides by forested hills as great billows of cloud spread out across the far north shore. Two male Redstarts were having a spat in the birch trees and around the village were flocks of Rosefinch, Linnet and Goldfinch fed on spilt seeds.

We enjoyed an alfresco lunch and then set off on a sunny walk on the lake's southern shore finding Red-breasted Merganser, Wigeon, Osprey and innumerable Black Kites. These raptors are remarkably common here and dozens are seen every day. There were Blyth's Reed Warblers and Red-backed Shrikes and Vlad and I carried on along the shore to flush out a group of Black Grouse chicks and their mother. Meanwhile Ron had found Scarce Copper and a possible Yellow-legged Tortoiseshell in the meadows. Storms swept dramatically across the north shore but never made it across as we returned for our customary evening sauna.

Day 7 July 3rd Cold Pass

A clear and sunny day meant a hot and humid climb up to Cold Pass, pausing to watch Long-tailed and Willow Tits, Rosefinch, Spotted Flycatcher and a Steppe Buzzard with its distinctive orange tail. There were soon many butterflies on the wing with Large Wall Brown and Marsh Fritillary and then a superb Apollo *Parnassius ariadne* and Geranium Argus. We climbed up through meadows full of now familiar flowers, but up at the pass we entered an area of spruce and larch with glades full of deep blue *Aquilegia glandulosa* and a few big pink *Paeonia anomala*. Arran Browns and Heath Fritillaries fluttered through the woods and pausing along the track Olga and I saw a female Siberian Rubythroat and a Black-throated Thrushes both with beakfuls of food intended for hidden nestlings somewhere in the spruce.

We enjoyed lunch laying in the shade and afterwards Olga, David, Vladimir and I headed out across the plateau towards the next pass. Crossing marshy areas we saw Water Pipits, many *Swertia obtusa*, louseworts and a few *Primula algida* before reaching the base of the slope swathed in meadows where the grasses and flowers were a metre high. However, by now a storm had arrived forcing us to shelter under the scattered larch trees. It passed quickly and after some perseverance through the rock filled meadows we crested the ridge to find great swathes of aquilegias stretching out towards the vast landscape beyond with the hills of Mongolia in the far distance. It was a wonderful vista as we stood surrounded by flowers, forests and mountains. On a rocky outcrop now forever known as 'Vlad's Castle' Vladimir found *Corydalis nobilis* and many *Iris ruthenica*.

The walk down saw little rain and passing back through the larch forests I saw a Wryneck and a male Siberian Rubythroat, whilst we all saw two Black Kites harassing a male Hen Harrier who eventually gave up his food to the two piratic kites. David saw a Grey-headed Woodpecker near the village and amongst Ron's finds for the day were *Mellicta centralasiae* and Small Blue.

Day 8 July 4th The Austrian Road

A lovely sunny day saw us first stopping to view the curious Mongolian Cemetery with grave sites fenced and topped by an open wooden or metal framework somewhat resembling a traditional yurt without the canvas. The scene was of expansive meadows and distant mountains and we stopped by the junction of the Austrian Road for a walk along a track flanked by flowers with big Hogweeds *Heracleum sibiricum*, giant knapweed-like *Rhaponticum carthamoides*, *Clematis integrifolia*, *Dianthus hoeltzeri*, fine Turksap Lilies *Lilium martagon* and High Brown Fritillaries and Small Tortoiseshells sunning themselves on the track.

Continuing along the Austrian Road we stopped for the big pink flowers of *Paeonia anomala* along with white *Anemone sibirica* and yellow *Iris bloudowii* all growing where a big snowpatch had lain until very recently. A sunny corner further on gave us *Parnassius apollonius* and Green Hairstreak and further still we found a pair of Wryneck nesting in a dead larch. A strangely marked Swallowtail confused us for a while as we lunched by a crag where there were Common Lizard and *Clematis sibirica*.

A male Hen Harrier flew past and I flushed a Swinhoe's Snipe from the meadow as we descended again still bathed in sunshine with fantastic views all around. There were many butterflies on the return walk including High Brown Fritillary, Osiris Blue, Mountain and Geranium Argus, Hungarian Glider, *Mellicta centralasiae*. A colony of *Parnassius ariadne*

glided up a down a slope feeding on *Nepeta pannonica* and there was a *Polyommatus erotides* and a Checkered Skipper. Flowers were plentiful with stands of *Pedicularis elata* and *Pedicularis probosideum*, delicate powder blue *Aquilegia brevicealcarata* tucked into shady spots, *Polemonium caeruleum*, *Iris ruthenica* and big stands of giant angelica *Angelica decurrens*. A Dipper was seen from the bridge near the junction before Ron and I caught up with group.

Day 9 July 5th To Burkhat Camp

Today was a complete contrast to yesterday's sunny pleasures as we slid to our mountain camp on a grey showery day. We stopped briefly to look for the Dipper again and instead flushed a crèche of Red-breasted Mergansers, one female urging the chicks to rush upstream while other adult birds flew overhead. More *Iris bloudowii* had opened at the old snowpatch site and the Wryneck were still in evidence around their tree at the pass. We descended through forests of spruce flushing a Mountain Hare and crossed bridges of varying states of repair until we reached our camp on the riverbank. The rain eased after lunch and we walked back to a big snow patch to find some good *Erythronium sibiricum* in flower along with *Trollius altaicus*. Ron and I had been stalking a juvenile Dipper and it's parent and we continued our walk for a mile or two finding Black-throated Accentor, Rosefinches, Sparrowhawk, Common Sandpiper and then on the return leg refound the adult Dipper, which later turned up next to the camp anyway.

Near to camp I found a Spotted Flycatcher nest complete with large chicks close to the road and there was a fleeting Three-toed Woodpecker and three Nuthatches. Along the road there were patches of *Moneses uniflora*, *Aquilegia brevicealcarata* and in the camp plenty of deep blue *Dracocephalum integrifolium*.

A big fire was built that evening to raise our spirits.

Day 10 July 6th Burkhat Pass

Cloud was hanging over the distant mountains and the river was still running high through all the rain but Andrei was optimistic that we could manage our stream crossings safely. We left at ten and went up to the pass, but here the mist was thick and cold as disoriented Twite flew on ahead of the van. We also had trouble finding our way as Vladimir tried to locate a big snow patch in ten-metre visibility. Eventually we found it just as the mists parted and cleared. Around the snow were very many big blue trumpets of *Gentiana grandiflora* and on nearby rocky crags white *Saxifraga sibirica*, *Anemone altaica*, *Dryas oxydonta* and *Ranunculus altaicus*. A male Bluethroat was tracked down feeding a chick in the dwarf birch and we got good views of this lovely bird. Elsewhere in the scattered trees were Lesser Whitethroat and a Dusky Warbler, but by now our feet were soaked through as we squelched back for lunch.

Andrie's solution to our wet-footed predicament was novel to say the least – he recommended 'Always' panty liners – and I have to say they worked quite well and certainly warmed my feet up. That was of course until I ploughed into the dwarf birch on the trail of another odd Snipe – possibly another Swinhoe's. We set off for another snow patch where we found *Erythronium sibiricum* and pretty pink *Cortusa altaica*, big patches of Wintergreen *Pyrola grandiflora* and Roseroot *Rhodiola rosea*. Descending a little way down the pass we discovered several more Bluethroats and Vladimir flushed a Ptarmigan before we decided to call

it a day and head back to warm up with hot drinks or in Olga's case by thrashing her wet socks on some rocks in an attempt to dry them (a New Zealand tradition perhaps?)

Day 11 July 7th To Rackmanovski

The night was cold, positively Siberian in fact and we awoke to a thick crust of hoar frost and a frozen camp. However, the sun was soon up and warming the air and our return to the pass was in complete contrast to yesterday. We stopped a little way from the top to watch a colony of engaging Altai Pikas scurrying about the screes. Up at the pass the gentians were opening and butterflies were out across the meadows including a superb *Parnassius ariadne* and *Triphysa dohrni*. We spent a little time here enjoying the sunny alpine scene and then we descended into the Bukhtarma Valley, a wide, flat-bottomed valley whose braided river meandered through expansive woods of poplar and birch. As we descended there were many poppies *Papaver nudicaule* and stopping by a drier meadow there were the deepest purple-black spires of *Veratrum nigrum*, sky-blue *Dracocephalum ruyschiana*, *Campanula sibirica* and a fine tall *Gentianella (atrata?)*. Vladimir caught a Green Lizard that posed well for close photographs after he set it free on the ground and as we wandered down past big clumps of blue *Nepeta sibirica* there were many Scarce Coppers, High Brown Fritillary, Ringlet and an Isabelline Shrike. Another High Brown Fritillary took a strong interest in the tomato salad at lunch, but when I pointed out their equal preference for dung it was discouraged from landing.

After lunch we walked down further seeing Green-underside and Common Blues in the meadows, while the riverine willows held Meadow Bunting, Ortolan and Willow Tit. Stopping in another area of mixed habitat a bizarre bright pink cicada buzzed past and Vlad's attempts at capture resulted in him landing on his backside cicadaless. A more sedate approach found a huge *Parnassius apollinus*, Large Blue, a Three-toed Woodpecker nest and then a Poplar Admiral flying among the Aspens (as it turned out, the only one of the trip).

In the next village we bought the largest loaf of bread I've ever seen and then continued through lovely birch wood scenery. A sudden stop had Vlad rushing from the bus and into the woods closely followed by the rest of us. His bus had flushed a family of Hazelhen from the road and after a bit of searching we located the female and then enjoyed close views of one of the chicks.

Andrei put the van into 4WD as we began the climb up to Rakhmanovski bouncing and rolling along the rough rocky track. A Booted Eagle soared overhead and a little further on we stopped by a rushing stream. On rocky islands grew a few flowering *Primula sibirica* and Olga soon pioneered a route across the stream to photograph them. A passing Policeman stopped to say hello and no doubt wonder why a group of tourists was balancing on rocks in the middle of a rushing stream.

The road smoothed out and soon we arrived at a viewpoint that revealed the Altai Mountains and the twin peaks of Belukha the highest peak that straddles Kazakstan, Russia and Mongolia. Unfortunately the peaks were obscured by high cloud but we did see our first Nutcrackers and descending to Rakhmanovski we passed mirror calm lakes dotted with Velvet Scoters and Goldeneyes.

Arriving at the former thriving spa resort we were assigned our cottage, which looked straight out of 'The Addams Family'. The question was which of us was cousin 'It'.

Day 12 July 8th Belukha Viewpoint

In was a beautifully clear morning and early birdwatching in the crisp air found two glorious male Siberian Rubythroats in open view and a number of Crossbills that seemed intent on eating the old buildings (for minerals), Willow Tits, Chiffchaff, Velvet Scoter and Nuthatch. After breakfast we set off for the hike up to the pass as a Siberian Chipmunk bounded around the timber stacks near our cottage. We climbed up through meadows seeing a pair of Wryneck then a Capercaillie flushed out by Sergei our driver who was on an altogether quicker ascent. Pushing on to the pass we were rewarded with magnificent crystal clear views of the mountains with Belukha's twin peaks taking centre stage (the left peak is the highest – just) and all around the short turf studded with deep blue *Gentiana grandiflora* and *Viola altaica*.

Nearby screes were home to many Altai Pikas and the odd Altai Accentor (CG) whilst Hodgson's Mountain Finches were more common and in the light scrub were Siberian Rubythroat. Four Pacific Swifts swept overhead and closer to the ground were Swallowtails and Green-veined Whites. We all enjoyed a leisurely few hours gazing at the wonderful scenery, sketching or pottering about the slopes before descending for lunch. Afterwards we took a walk along the lakeshore, at first along the antiquated boardwalk, but then after this had disintegrated we resorted to bridge building and a walk through the boggy forest. Relaxing on the lakeshore we watched two Velvet Scoters drift quite close then Olga and David headed back the same way while Ron chose a different route along which he found his butterfly of the trip a Northern Checkered Skipper. Vladimir, Anne and I carried on further seeing Siberian Chipmunks, pikas and two Pine Grosbeaks.

Day 13 July 9th To Maymir

In a fit of machismo I had vowed to beat Sergei's time for hiking to the pass (55 minutes) and having talked the talk at 5.30 this morning I had to walk the walk, despite the fact it was starting to rain. Suffice to say I clocked 48 minutes and saw two Capercaillies, Bluethroat, Wryneck and Nutcracker and was back down before breakfast, but that didn't stop me getting wet, which serves me right. Indeed the rain intensified as we left, but we still stopped by the lake to look at a couple of Velvet Scoter and then a Nuthatch feeding a chick and a Lesser Whitethroat doing the same (to it's chick not the Nuthatch's). Stopping again among some promising looking spruce forest we walked a mile or so seeing flocks of Willow Tits, *Clematis sibirica* and then just as the minibuses caught up with us we found a Red Squirrel.

As we descended the rain eased and we were able to look around the lower woods for Spotted Flycatchers, Chiffchaff and Greenish Warblers. Passing through muddy villages and along the near deserted roads of this remote area we stopped again by some wet meadows just as the clouds let rip again. Crowded in one bus we ate lunch and then once the rain had stopped enjoyed the meadow, full of Musk Orchid and the oddest gentian *Halenia corniculata* with yellowish strongly spurred flowers and there were many Silver-studded Blues, which started into action once things warmed up a bit.

The mountains decreased as we drove west before eventually turning towards a deep valley that cut into them. This was Maymir and our camp complete with two Kazak yurts, a converted caravan and what looked like a train carriage, but it was all comfortable enough, the sauna was soon on and Nina was cooking up her usual feast.

Day 14 July 10th Maymir

We spent the morning walking up the sunny valley through meadows and broken woodland of birch and spruce, surrounded by many familiar plants, but also enjoying fine stands of two-metre tall *Delphinium altaicum* mixed with Meadowsweet and Knapweeds. There were many butterflies including Scotch Argus, High Brown Fritillary, Large Heath, Orbed Red Underwing Skipper and best of all Ron found a Black Hairstreak. Unfortunately Andrei and I also had to try and find Ron who had taken a wrong turn and ended up on the wrong side of the river.

After lunch we visited the flower-filled drier meadows above Soldier's Town. These were brim full of Bugloss, Delphinium, Gypsophila, St John's Wort, Lavatera, Toadflax and Knapweed. We saw two Imperial Eagles wheeling into the sky and Quail called frequently as did the rest of us when we appeared to have lost Ron again. He eventually turned up having followed a group of villagers up the road thinking that they were us.

We stopped in the village, which seemed to have pretty girls and piglets in equal measure before returning for another sauna and in my case a nip too much wine.

Day 15 July 11th To Usk-Kamenogorsk and Almaty

The 8.30 start saw yours truly a little tender, but nothing a little fresh air wouldn't cure as we drove towards the drier hills around Lake Zaissan. We stopped for an impressive display of white Hollyhocks *Alcea nudiflora* and there were also some fine *Parnassius apollinus* floating across the grasslands. Olga insisted that Ron remained confined to barracks in case we lost him again – so no chasing butterflies for him. Another ferry across the lake and then onto the same wayside Yurt we stopped at before for lunch. There were plenty of Apollos around and also a Woodland Brown and in the poplars were Golden Oriole and Fieldfare.

Crossing the undulating landscape we reached Usk-Kamenogorsk and had a drink and snacks at Andrei's wife's café before catching our plane to Almaty where we had our last meal before a couple of hours sleep and a trouble free flight to the UK.

Day 16 July 12th Arrival in UK

PS Thanks to Anne for the sketch – a delightful way to record the trip.

Systematic List Number 1 Butterflies

AR = Austrian Road
 BP = Burkhat Pass
 Cim = Cim Bulak (Tien Shan)
 CP = Cold Pass
 RK = Rakmanovskie

Numbers denote days seen e.g. 3/14 = 3 days in 14

Papilionidae

Swallowtail	<i>Papilio machaon</i>	Scattered, several on the AR & also Beluka lookout 3/14
	<i>Parnassius ariadne</i>	A colony along the Austrian Road, also CP & BP 3/14
	<i>Parnassius apollonius</i>	Zaissan & Markakol area 2/14
	<i>Parnassius apollo alpherakyi</i>	A huge female at the Yurt stop plus en route to Rakmanovskie & Cim Bulak 3/14
Orange-Tip	<i>Anthocharis cardamines</i>	Widespread in low numbers 7/14
Black-veined White	<i>Aporia crataegi</i>	Widespread 7/14
Eastern Pale C'aded Y'low	<i>Colias erate</i>	Widespread. Other <i>Colias</i> species present 6/14
Brimstone	<i>Gonepteryx rhami</i>	Scattered 3/14
Wood White	<i>Leptidea sinapsis</i>	Markakol area & Maymir 4/14
	<i>Leptidea morsei</i>	Markakol area, uncommon in 2004 1/14
Large White	<i>Pieris brassicae</i>	Scarce 1/14
Green-veined White	<i>Pieris napi</i>	Widespread 6/14
Small White	<i>Pieris rapae</i>	Uncommon 2/14
Eastern Bath White	<i>Pontia edusa</i>	Widespread and common 5/14

Lycaenidae

Black Hairstreak	<i>Nordmannia pruni</i>	Scarce only seen at Maymir 1/14
Scarce Copper	<i>Lycaena virgaureae</i>	Scattered, but common below Burkhat pass 3/14
Large Copper	<i>Lycaena dispar</i>	Scarce only near Markakol lake 1/14
Green Hairstreak	<i>Callophrys rubi borealis</i>	One seen along Austrian Road 1/14
Holly Blue	<i>Celastrina argiolus</i>	Scattered but very common at Yurt stop 2/14
Osiris Blue	<i>Cupido osiris</i>	Scarce only on Cold Pass 2002 1/14
Small Blue	<i>Cupido minimus</i>	Widespread at Markakol 4/14
Green-underside Blue	<i>Glaucopsyche alexis</i>	Below far side of Burkhat Pass 2/14
Large Blue	<i>Maculinea arion rueli</i>	One seen en route to RK 1/14
Reverdin's Blue	<i>Plebeius argyrognomom</i>	Marble Pass 1/14
Idas Blue	<i>Plebeius idas</i>	Scattered 2/14
Silver-studded Blue	<i>Plebeius argus</i>	Scattered. Very common at colony en route to Maymir 3/14
Mountain Argus	<i>Aricia artaxerxes strandi</i>	Seen on Cold Pass 1/14
Geranium Argus	<i>Eumedonia eumedon</i>	Markakol area 2/14
Mazarine Blue	<i>Cyaniris semiargus</i>	Common in Markakol area & RK 6/14
Damon Blue	<i>Agrodiaetus damon mongolicus</i>	Scarce, seen at Zaissan 1/14
	<i>Polyommatus erotides</i>	A lovely light blue species seen along the Austrian Road & at Maymir 2/14
Common Blue	<i>Polyommatus icarus</i>	Uncommon. Burkhat Pass 2/14

Nymphalidae

High Brown Fritillary	<i>Argynnis adippe</i>	Widespread & very common 6/14
Silver-washed Fritillary	<i>Argynnis paphia</i>	Scarce, seen at Maymir 1/14
	<i>Clossiana erubescens</i>	Cim Bulak 1/14
Small Pearl-bordered Fritillary	<i>Clossiana selene</i>	Widespread 4/14
Queen of Spain Fritillary	<i>Issoria lathonia</i>	Widespread 4/14

Glanville Fritillary	<i>Melitaea cinxia clarrisa</i>	Yurt stop en route to Zaissan 1/14
Spotted Fritillary	<i>Melitaea didyma neera</i>	Scattered 3/14
	<i>Melitaea latonigera</i>	Widespread 4/14
Heath Fritillary	<i>Mellicta athalia</i>	Markakol area 1/14
	<i>Mellicta centralasiae</i>	Cold Pass & Maymir 3/14
Marsh Fritillary	<i>Euphydryas aurinia</i>	Widespread. Yurt stop, Markakol & Maymir 4/14
Hungarian Glider	<i>Neptis rivularis</i>	Widespread and common at times 6/14
Poplar Admiral	<i>Limnitis populi</i>	Only seen en route to RK 1/14
	<i>Limnitis sidyi</i>	Yurt stop 1/14 one of three admirals seen together here
	<i>Limnitis helmanni</i>	Yurt stop 1/14
Yellow-legged Tortoiseshell	<i>Nymphalis xanthomelas</i>	Probably one seen around Markakol 1/14
Small Tortoiseshell	<i>Aglais urticae</i>	Common & widespread 6/14
Peacock	<i>Inachis io</i>	Only at Cim Bulak 1/14
Southern Comma	<i>Polygonia egea</i>	Scattered 3/14

Satyridae

Large Heath	<i>Coenonympha tullia subcaeca</i>	Kalbinsky Hills & Austrian Road 3/14
Chestnut Heath	<i>Coenonympha glycerion</i>	Pine forest in Kalbinsky Hills & Burkhat pass 2/14
	<i>Coenonympha sunbecca</i>	One above Cim Bulak resting on a <i>Dracocephalum</i> 1/14
Small Heath	<i>Coenonympha pamphilus</i>	Maymir 1/14
	<i>Coenonympha amaryllis</i>	Cold Pass 1/14
	<i>Triphysa dohrnii</i>	Two or three seen on Burkhat Pass 1/14
Arran Brown	<i>Erebia ligea</i>	Markakol 1/14
	<i>Erebia jeniseiensis</i>	Cold Pass 1/14
Scotch Argus	<i>Erebia aethiops</i>	Maymir 1/14
	<i>Erebia theano</i>	Widespread around Markakol 4/14
	<i>Erebia turanica</i>	Only above Cim Bulak 1/14
	<i>Aphantopus hyperantus</i>	Scattered, drier places below far side of Burkhat Pass & en route to Zaissan 2/14
Oriental Meadow Brown	<i>Hyponephele lupina</i>	Only at Maymir 1/14
	<i>Oeneis nanna</i>	Below far side of Burkhat Pass 1/14
Large Wall Brown	<i>Lasiommata maera</i>	A few seen in the Zaissan area 2/14
Northern Wall Brown	<i>Lasiommata petropolitana</i>	Seen in the Markakol area & at Maymir 3/14
Esper's Marbled White	<i>Melanargia russiae</i>	Drier areas, seen at Zaissan & on drier slopes near Maymir
Grayling	<i>Hipparchia semele</i>	Zaissan area 1/14

Hesperiidae

Chequered Skipper	<i>Carterocephalus palaemon</i>	Widespread at Markakol & RK 4/14
Northern Chequered Skipper	<i>Carterocephalus silvicolus</i>	One seen and photographed well by Ron at RK 1/14
Large Chequered Skipper	<i>Heteropterus morpheus</i>	Only seen at Cim Bulak 1/14
Orbed Red-underwing Skipper	<i>Spialia orbifer</i>	One seen at Maymir 1/14
Large Skipper	<i>Ochlodes venatus faunus</i>	Widespread, Cim Bulak & Markakol 4/14
	<i>Pyrgis sibirica</i>	Possibly this species at Marble Pass 1/14
Large Grizzled Skipper	<i>Pyrgus alveus</i>	Only seen at Marble Pass 1/14
Essex Skipper	<i>Thymelius lineola</i>	Markakol & Maymir 2/14

Moths

Broad-bordered Bee Hawkmoth	<i>Hemaris fuciformis</i>	Markakol & Maymir 2/14
Hummingbird Hawkmoth	<i>Macroglossum sp.</i>	Only at Maymir 1/14

Systematic List Number 2

Vascular Plants

The present list is highly provisional, and the plants included are categorised on the basis of the confidence with which they have been identified:

- [Species in square brackets have been distinguished, but were not identified with any certainty. In some cases the number of options may be limited, and these may be listed. Some notes are usually given to indicate the salient characteristics].
- ? For those species marked with a question mark, there is greater confidence and a provisional identification is given, though this awaits confirmation.
- Species with no annotation are certain (or highly likely) identifications.

Vernacular names are included in curly brackets *i.e.* { }. Families are arranged in a conventional taxonomic order, with species ordered alphabetically within the families.

Key species recorded this year are annotated 2004. Records for previous years but not seen in 2004 are in [brackets]

A. PTERIDOPHYTA Ferns and their allies

Lycopodiaceae

- Diphasiastrum complanatum* Spruce forest at Rakhmanovskie Klyuchi. {a clubmoss}. 2002
Huperzia selago Drier spruce forest: Rakhmanovskie Klyuchi. {Fir Clubmoss}. 2002
Lycopodium annotinum Frequent in spruce forest at Rakhmanovskie Klyuchi. {Interrupted Clubmoss}. 2002
Lycopodium clavatum Rare in spruce forest at Rakhmanovskie Klyuchi. {Stag's-horn Clubmoss}.

Equisetaceae

- Equisetum arvense* Flushes and all kinds of mossy wet sites at a full range of altitudes: Cim Bulak, south of Markakol and Rakhmanovskie Klyuchi spruce forest. {Common Horsetail}. 2002
Equisetum fluviatile Marshy woodland, wet depressions and pools: Markakol and north to Austrian Road, Bukhtarma valley. Maymir 2004 {Water Horsetail}
Equisetum hyemale Riverside willow-scrub by access track to Rakhmanovskie Klyuchi. {Rough Horsetail} 2002
Equisetum palustre Damp depressions by road south from Markakol. {Marsh Horsetail} 2002
Equisetum pratense Damp woodland margins at low-mid levels: Markakol and Rakhmanovskie Klyuchi. {Shady Horsetail} 2002
Equisetum ramosissimum Seasonally wet grassland in Bukhtarma valley {Branched Horsetail}
Equisetum sylvaticum Wooded banks of Bukhtarma river near Berel. {Wood Horsetail} 2002

Adiantaceae

- Adiantum sp.* Damp rocks at Maymir 2004

Aspleniaceae

- Asplenium trichomanes-ramosum* Rock crevices at high levels in Cim Bulak. {Green Spleenwort}.

Athyriaceae

- Cystopteris fragilis* Sheltered rocks at mid-high levels: Cim Bulak, Cold Pass and north part of Austrian Road. {Brittle Bladder-fern – other bladder-ferns may be present}. 2002

- Gymnocarpium dryopteris* Shaded rocks, spruce forest and scrub at low-mid levels: Kalbinskiy Hills, southern Austrian Road and by access track to Rakhmanovskie Klyuchi. {Oak Fern}. 2002
- Matteucia struthiopteris* Woodland by Bukhtarma River, near Berel. {Ostrich Fern}
[Woodsia #1 Rock crevices high on Burkhat Pass. {*W. acuminata*, *W. calcarea* or *W. ilvensis*}] 2002

Aspidiaceae

- Dryopteris dilatata* Woodland by Bukhtarma River. {Broad Buckler-fern}
Dryopteris filix-mas Woodland by Bukhtarma River. {Male Fern}

Polypodiaceae

- Polypodium vulgare* s.l. Rocks in pine woods in Kalbinskiy Hills. {Polypody}. 2004

Ophioglossaceae

- Botrychium lunaria* Turf at higher levels in Cim Bulak. {Moonwort}.

B. CONIFEROPSIDA Conifer trees and their allies

Pinaceae

- Larix sibirica* Mountain forests up to the tree line: Cim Bulak, around and above Markakol, and near Rakhmanovskie Klyuchi. {Siberian Larch}. 2004
- Picea obovata* Forests my lakes and in the mountain forests nearly to tree-line: around and above Markakol, thence north along the Austrian Road, and near Rakhmanovskie Klyuchi. {Siberian Spruce} 2004
- Picea tianshanica* Mountain forests up to the tree line: Cim Bulak. {Tien Shan Spruce} 2004
- Picea schrenkiana* Mountain forest around Cim Bulak 2004
- Pinus sibirica* Often dominant in higher-level forest from the Burkhat Pass (where it also occurs as odd trees on the pass proper) north and around Rakhmanovskie Klyuchi. {Siberian Pine} 2004
- Pinus sylvestris* Locally dominant in central Kalbinskiy Hills. {Scots Pine}. 2004

Cupressaceae

- Juniperus pseudosabina* Drier slopes at all levels: Cold Pass, 10km north of Markakol, Burkhat Pass and Rakhmanovskie Klyuchi forest. {a juniper} 2004
- Juniperus sabina* Rocky slopes at mid-high levels: Marble Pass, north of Markakol to Southern Austrian Road, campsite near Kamenka and at 2200m above Rakhmanovskie Klyuchi. {a juniper}. 2004
- Juniperus sibirica?* Rocky slopes at Cim Bulak {a juniper} 2004

Ephedraceae

- [Ephedra sp.* Arid slopes: Kiin Kerish and Marble Pass. {low greyish bushy joint-pine, probably either *E. dahurica* or *E. equisetina*}] 2004

C. MONOCOTYLEDONES “Monocot” flowering plants

Typhaceae

Typha laxmannii Wet depressions: Kuchun. {a reedmace}. 2004

Potamogetonaceae

Potamogeton alpinus? Runnels in marsh at Rakhmanovskie Klyuchi. {Red Pondweed – plant had the jizz of Bog Pondweed, but appears to be a dwarfed form of this plant – or possibly *P. macrocarpus* or *P. pamiriae?*} 2002. Zaisan area 2004

Juncaginaceae

Triglochin maritimum Spring-fed saltmarsh in Zaysan depression. {Sea Arrowgrass}. 2004
Triglochin palustre Seasonally wet grassland in Bukhtarma valley, and marsh at Rakhmanovskie Klyuchi. {Marsh Arrowgrass}.

Lemnaceae

Lemna minor Shallow water in mossy flushes at Markakol. {Common Duckweed} 2002

Poaceae

Agrostis stolonifera Seasonally wet grassland in Bukhtarma valley. {Creeping Bent}

Alopecurus arundinaceus Damp grassland at lower levels: Markakol. {a foxtail}

Alopecurus pratensis Coarser grassland at low-mid levels: Markakol. {Meadow Foxtail} 2002

Anisantha tectorum Disturbed sand by the Zaysan campsite. {Drooping Brome}. 2002

Anthoxanthum odoratum Moister grasslands at all levels: around and above Markakol. {Sweet Vernal-grass} 2002

Arrhenatherum elatius Roadsides and meadows up to mid-levels: above Almaty. {False Oat-grass}.

Bromopsis inermis Roadsides and disturbed steppe: Ust-Kamenogorsk, Bukhtarma valley and west of Zaysan north ferry. {Hungarian Brome}.

Bromus japonicus? Roadsides in Ust-Kamenogorsk. {Thunberg’s Brome}.

Calamagrostis arundinacea Moist shores and streamsides: Zaysan campsite and north of Markakol. {a small-reed}. 2002

Dactylis glomerata Roadsides, meadows and disturbed steppe above Almaty and Ust-Kamenogorsk. {Cock’s-foot}. July also at Markakol. 2002

Deschampsia cespitosa Mossy flushes: southern Austrian Road. {Tufted Hair-grass} 2002

Eremopyron triticeum? Arid slopes at Kiin Kerish and by spring-fed saltmarsh. {short annual like a two-ranked barley} 2002

Festuca kryloviana Steppe grassland, light shade and drier sites generally: Kalbinskiy Hills and Cold Pass. {a “sheep’s-fescue” – other species probably present e.g. *F. sulcata*}. 2002

Helictotrichon schellianum? Grassland at mid-high levels: near Cold and Burkhat Passes. {a meadow-oat}

Hierochloë odorata Mire and marshy lake-shore: Rakhmanovskie Klyuchi. {Holy Grass}

Hierochloë sibirica? Damp margins of track on Burkhat Pass. {a holy-grass}

Leymus angustus? Scattered in sandy semi-desert in Zaysan depression, including campsite. {Very robust “lyme-grass” with spikes some 20cm long and >3cm thick}. 2002

Milium effusum Shaded grounds of Rakhmanovskie Klyuchi. {Wood Millet} 2002

Phleum alpinum Grassland and flushes at mid-higher levels: Cold Pass, southern Austrian Road and Rakhmanovskie Klyuchi. {Alpine Cat’s-tail} 2002

<i>Phleum phleoides</i>	Steppe west from Zaysan north ferry – probably overlooked elsewhere. {Purple-stemmed Cat's-tail} 2002
<i>Phragmites australis</i>	Narrow beds around shore of Zaysan lake and in spring-fed saltmarsh. {Reed}. 2002
<i>Poa annua</i>	Nutrient-rich turf near houses: Markakol. {Annual Meadow-grass} 2002
<i>Poa trivialis</i>	Wayside grassland in villages: Urunkhayka. {Rough Meadow-grass}
<i>Puccinellia</i> sp.	Spring-fed saltmarsh in Zaysan semi-desert. {Saltmarsh-grass} 2002
[<i>Stipa</i> spp.]	Prominent and often co-dominant in steppe grassland, occurring in the montane zone especially on south-facing slopes: Kalbinskiy Hills, Marble Pass, north of Markakol and west from Zaysan north ferry. {Steppe-grasses, no attempt made to distinguish species, though <i>S. pennata</i> probably the main species in the southern Altai}. 2002

Cyperaceae

<i>Blasmus rufus</i>	Spring-fed saltmarsh in Zaysan semi-desert. {Saltmarsh Flat-sedge}
<i>Bolboschoenus maritimus</i>	Wet depressions by road in Zaysan semi-desert. {Sea Club-rush} 2002
<i>Carex acuta?</i>	Dominant in ground layer of swamp birch woodland at Markakol. {More resembles <i>C. elata</i> , which apparently is not a Kazak species}
[<i>Carex bigelowii?</i>	Margins of Austrian road on Burkhat pass. {laxer than this species}
<i>Carex canescens?</i>	Marsh at Rakhmanovskie Klyuchi. {a grey sedge}
<i>Carex diandra</i>	Swamp woodland at Markakol. {Lesser Tussock-sedge} 2002
<i>Carex disticha</i>	Mossy flushes and seasonally wet grassland: southern Austrian Road and Bukhtarma valley. {Brown Sedge} 2002
<i>Carex divisa</i>	Moist saline sites by Zaysan lake, and spring-fed marsh. {Divided Sedge}.
[<i>Carex "filiformis"</i>	Spring-fed saltmarsh in Zaysan semi-desert. {Resembles both the European sedges <i>C. filiformis</i> and <i>C. flacca</i> }].
<i>Carex flava</i> s.l.	Flushes at mid-levels: Cim Bulak. {Yellow Sedge}.
<i>Carex melanantha</i>	Flushes and streambanks at mid-high levels: Cim Bulak and Cold Pass. {Resembles an erect Jet Sedge, <i>C. atrata</i> or <i>C. aterrima</i> }. 2002
<i>Carex norvegica?</i>	Damp rocks on Burkhat Pass. {Close-headed Alpine-sedge} 2002
<i>Carex pallescens</i>	Wet grassland, marshes and flushes at all levels: Cim Bulak, above Markakol and to north, Rakhmanovskie Klyuchi. {Pale Sedge}. 2002
[<i>Carex "panicea"</i>	Flushes at mid-levels: Cim Bulak. {Closely resembles the European Carnation Sedge}].
<i>Carex rostrata</i>	Lakeshore below Burkhat Pass and mire pools near Rakhmanovskie Klyuchi. {Bottle Sedge} 2002
[<i>Carex "spicata"</i>	Flushes and moist grassland at mid-level: Cim Bulak and southern Austrian road. {Closely resembles west European Spiked Sedge}]. 2002
<i>Carex sylvatica</i>	Pine forest north from Burkhat Pass. {Wood Sedge}
<i>Carex vesicaria</i>	Marshes and wet depressions, often in shade: around and above Markakol, also on southern Austrian Road. {Bladder Sedge} 2002
<i>Eleocharis palustris</i>	Wet grassland and flushes, mainly at lower altitudes: Markakol and Rakhmanovskie Klyuchi. . {Common Spike-rush} 2002
<i>Eleocharis uniglumis</i>	Spring-fed saltmarsh in Zaysan semi-desert and seasonally-wet grassland in Bukhtarma valley. {Slender Spike-rush}
<i>Eriophorum polystachyum?</i>	Mossy marshes and flushes at mid-levels: above Markakol, and near Rakhmanovskie Klyuchi. {a cotton-grass like <i>E. latifolium</i> } 2002
<i>Eriophorum russeolum</i>	Boggy flats on Burkhat Pass. {a creeping cottongrass – 1-spiked} 2002
[<i>Isoplepis/Scirpus</i> #1	Seasonally-wet grassland in Bukhtarma valley. {Like <i>I. setacea</i> but taller and even more slender}]
[<i>Schoenoplectus</i> #1	Pool margins by seasonally wet grassland in Bukhtarma valley. {a clubrush resembling dwarf <i>S. tabernaemontani</i> – is it <i>S. hippolyti?</i> }]

Scirpus sylvaticus Wet depressions along southern Austrian Road and in Bukhtarma valley. {Wood Club-rush} 2002

Juncaceae

Juncus articulatus Marshy lakeshore at Rakhmanovskie Klyuchi. {Jointed Rush} 2002

Juncus filiformis Mossy flushes by southern Austrian Road. {Thread Rush} 2002

Juncus gerardii Seasonally damp or spring-fed saline sites in semi-desert: Zaysan depression, including spring-fed saltmarsh and Bukhtarma valley. {Saltmarsh Rush}. 2002

Luzula multiflora Drier grassland at all levels: Cold Pass. {Heath Woodrush} 2002

Luzula pallidula Damp-wet ground, often in shade and mossy: Markakol, and north to southern Austrian Road. {Pale Woodrush}

Luzula parviflora? Conifer forest at mid-levels: Austrian Road in Bukhtarma valley and Rakhmanovskie Klyuchi. {woodrush with small pendulous flowers} 2002

Liliaceae

Asparagus neglectus? Lush vegetation above spring-fed saltmarsh in Zaysan semi-desert. {soft pale-berried asparagus}. 2004

Eremurus altaicus Dry grassland and steppe in south Altai: Kalbinskiy Hills, Marble Pass and west from Zaysan north ferry. {a foxtail-lily}. In seed 2004.

Erythronium sibiricum Grassland and forest at mid-high levels, flowering by snow-patches along Austrian Road (common on Burkhat pass) and above Burkhat Pass. {a dog's-tooth-violet} a few in good flower by late snow patches 2004

[*Gagea* #1] Irrigated fine scree in upper parts of Cim Bulak. {Low *Gagea* with several flowers in a sub-umbellate cluster – a similar species seen at Markakol}].

[*Gagea* #2] Woodland margins and moist ground at mid-high levels: at and around Markakol, and on Burkhat Pass. {Large-flowered *Gagea* with fistulose leaves – probably *fistulosa?*}]

Lilium martagon Low scrub, woodland margins and lush grassland: Kalbinskiy Hills, Marble Pass, around and above Markakol, by Austrian Road in Bukhtarma valley, and by Bukhtarma River. {Turk's-cap Lily}. 2004 July gone over.

Lloydia serotina Rocks and damp fine scree, mid-high levels: Cim Bulak 2004 [by Austrian Road in Bukhtarma valley and on Burkhat Pass 2002] {Snowdon Lily}

Tulipa altaica? Semi-desert and steppe: Zaysan depression, including Kiin Kerish and by spring-fed saltmarsh; probably also near Markakol. {tall tulip – identity to be confirmed, *T. kolpakowskiana* suggested}. In seed 2004

Tulipa biflora? Arid slopes at Kiin Kerish and adjacent to spring-fed saltmarsh; probably also near Markakol. {a short tulip}. 2002. In seed 2004

[*Tulipa dasystemon* Recent snowmelt at high levels in Cim Bulak 2002 {a tulip}.]

[*Tulipa heteropetala?* Stony south-facing slope: Marble Pass and near Markakol (especially to north). 2002 In seed {a tulip}.]

Tulipa heterophylla Flushed rocky ground at high levels: one found in flower at Cim Bulak 2004 in seed on Cold Pass {a tulip}

[*Tulipa patens?* Stony south-facing slope: Marble Pass and near Markakol. {a tulip} 2002.]

Veratrum lobelianum Often co-dominant in moister grasslands at all levels, sparser in light shade: around and above Markakol, and Rakhmanovskie Klyuchi. {a false-helleborine} 2004

Veratrum nigrum Low scrub at mid-levels: toward north end of Austrian Road. {Black False-Helleborine}. 2004

Alliaceae

- Allium altaicum?* Coarse flush vegetation above Rakhmanovskie Klyuchi. {Very tall fistulose onion with whitish globular head} Markakol passes 2004
- Allium atrosanguineum* Moist rocky slopes in upper Cim Bulak. {a garlic}. 2004
- [Allium caesium* Low scrub margins on Marble Pass. 2002]
- Allium hymenorrhizum* Drier grasslands at all levels: Cim Bulak and between Zaysan lake and Ust-Kamenogorsk. 2002 Markakol area 2004
- [Allium ledebourianum?* Streamsides and marshy sites mainly at mid-levels: above and around Markakol. {Large fistulose onion} 2002]
- [Allium polyphyllum* Stony slopes at high levels in Cim Bulak. {a garlic}. 2002]
- [Allium rubens?* Drier grassland north of Markakol. {a slender garlic with dense nodding head enclosed in a spathe}]
- Allium senescens?* Drier grassland north of Markakol. {a garlic with flattened winged stems and nodding spherical head of pale whitish flowers} Possibly this species near Maymir 2004
- [Allium spp.* a) Large fruiting on arid slopes at Kiin Kerish.; b) small pink by spring-fed saltmarsh in Zaysan depression; c) white flowered species on rocks by northern Austrian Road]

Amaryllidaceae

- [Ixiolirion tataricum* Steppe grassland above spring-fed saltmarsh in Zaysan semi-desert. {no common name} July in seed. 2002]

Iridaceae

- Iris bloudowii* Only in late snow patch along Austrian Road. {short pale yellow iris}. 2004
- Iris ruthenica* Grassland and more open forest, mainly at mid-levels: around and above Markakol (including Cold Pass), Burkhat Pass {a blue iris}. 2004
- [Iris scariosa?* One plant at foot of south-facing slope on north side of Markakol. {small lilac iris, broad blunt falls and glaucous leaves}]
- [Iris tigridia* South-facing grassy slope on Marble Pass. {iris of *pogon* group}]
- [Iris #1* Lush vegetation above spring-fed saltmarsh in Zaysan semi-desert. {large fruiting iris with foetid leaves like the British Gladdon}].

Orchidaceae

- [Coeloglossum viride* Grassland at mid-high levels: Cim Bulak, north of Markakol, and Burkhat Pass. {Frog Orchid – plants in steppe-like grassland north of Markakol strongly resembled subsp. *longibracteata*}. 2002]
- Dactylorhiza fuchsii* Moist grassland, marshes and light shade: around and above Markakol, southern Austrian Road, Rakhmanovskie Klyuchi and riverside willows by access to latter. {Common Spotted-orchid} July widespread. 2004
- [Dactylorhiza incarnata* Marshes and wet depressions: above Markakol (including hybrids with the latter), Austrian Road and Karakaba river. {Early Marsh-orchid}.]
- Dactylorhiza umbrosa* Wet flushes in the mountains and marshy grassland at lower altitudes: Cim Bulak, Kalbinsky Hills and Rakhmanovskie {a marsh-orchid} 2004
- [Dactylorhiza #1* Seasonally wet grassland in Bukhtarma valley. {closest to latter, but with twisted ovary, spur longer than ovary, swept-back sepals, little-marked lip, other perianth segments forming a galea – options include *D. knorringiana*, *D. salina* or a form of *D. traunsteineri*}]
- [Goodyera repens* Mossy ground in mixed conifer forest by Austrian Road north of Burkhat Pass. {Creeping Lady's-tresses} 2002]
- Herminium monorchis* Abundant (patches of >> 50/m²) in seasonally wet grassland in Bukhtarma valley. {Musk Orchid} 2004
- [Gymnadenia conopsea* Rakhmanovskie Kluchi 2002. Fragrant Orchid]

D.**DICOTYLEDONES****‘DICOT’ flowering plants****Salicaceae***Populus laurifolia*

Along rivers and in floodplain forest: near south end of Austrian Road, and by Bukhtarma river near campsite. {a poplar} 2004

Populus nigra s.l.

Along rivers in steppe areas: Kalbinskiy Hills. {Black Poplar}. 2004

Populus tremula

Woodland at low-mid levels, especially near water: above Almaty, Kalbinskiy Hills, and southern Austrian Road. {Aspen}. 2004

Salix caprea

Damp scrub at low-mid levels: Markakol. {Goat Willow} 2004

Salix cinerea s.l.

Roadside scrub north of Markakol. {Grey Willow} 2002

Salix kokiana?

Streamside below spruce forest south of Markakol, and by Karakaba river. (a willow) 2002

Salix pentandra

By rivers at low-mid levels: Markakol. {Bay Willow} 2002

Salix purpurea

Scrub by Karakaba river. {Purple Willow} 2002

Salix viminalis

Floodplain forest: near south of Austrian Road. {Osier} 2002

[*Salix* #1By rivers at low-mid levels: Markakol and near south end of Austrian Road. {willow, oval leaves, glaucous beneath – *S. caesia/rorida?*} 2002[*Salix* #2Dwarf birch scrub at high levels: Burkhat Pass. {Dwarf willow with leaves like *S. phylicifolia* and glaucous beneath}] 2002*Salix herbacea*

Grass/sedge/lichen community by road on Burkhat Pass. {Prostrate with tiny oval leaves 7mm across}] 2004. Widespread in cold climates.

[*Salix* #4

Moist low vegetation on Burkhat Pass. {Prostrate/ascending with green leaves like small sallow, silky catkins and red anthers}] 2002

[*Salix* #5

Upper levels of conifer woodland and rocks/cols above tree-line: around and above Rakhmanovskie Klyuchi. {1m tall willow with very grey leaves like a small sallow, whitish beneath, revolute edge}] 2002

Betulaceae*Betula pendula*

Woodland at all levels, often near water: above Almaty, Kalbinskiy Hills; around and above Markakol. {Silver Birch}. 2004

Betula rotundifolia

Dense 1m tall thickets under conifers and above tree line: Cold Pass, valley of Karakaba, Burkhat Pass and around Rakhmanovskie Klyuchi. {a dwarf birch} 2004

[*Betula* #1

Conifer forest below and north of Burkhat Pass. {tree birch with bronze bark}]

[*Betula* #2Upper conifer woodland approaching Rakhmanovskie Klyuchi. [2-3m tall shrub with small narrow-cordate leaves – *B. microphylla?*}]**Ulmaceae***Ulmus androsowii*

Shelterbelts along roads at low levels, often the only tree in steppe areas: very widespread and also planted in urban areas. {an elm, with narrow leaves}. 2002

Ulmus minor

Woodland at low levels above Almaty. {Common Elm}.

Cannabaceae*Cannabis sativa*

Waste places and arable fields (where either cultivated or a weed): Ust-Kamenogorsk and campsites at Zaysan and Kamenka apiary. {Hemp}. 2004

Humulus lupulus

Scrub margins above Almaty and poplar gallery woodland in Kalbinskiy Hills. {Hop}. 2004

Urticaceae

- Urtica cannabina* Roadsides and fallow/waste ground: apiary campsite near Keramka and by Uryl checkpoint. {a nettle with 5-lobed leaves} Maymir 2004
- Urtica dioica* Shady and nutrient-rich sites at low-mid levels: above Almaty and at Markakol. {Stinging Nettle – some plants are almost stingless and with narrow leaves, resembling *U. galeopsifolia*} Kalbinsky Hills 2004

Santalaceae

- Thesium refractum?* Drier grassland and rocks at mid-high levels: around Markakol, picnic spot on south Austrian Road, and Burkhat Pass. {a bastard-toadflax}
- Thesium repens?* Forming patches in light shade: south end of Austrian Road and Rakhmanovskie Klyuchi. {a bastard-toadflax}

Polygonaceae

- Persicaria bistorta* Montane grassland at mid-high levels: Cim Bulak and Burkhat Pass. {Bistort}. 2002
- Persicaria vivipara* Montane grassland at mid-high levels: Cim Bulak and Bukharma Valley (including by northern Austrian Road).. {Alpine Bistort}. July abundant on Burkhat Pass. 2004
- Polygonum alpinum* Abundant in hill and mountain grasslands: Cim Bulak and Kalbinskiy Hills. {Alpine Knotweed}. 2004
- Polygonum aviculare* s.l. Roadsides and disturbed ground: Ust-Kamenogorsk and Markakol. {Knotgrass}. 2004
- Polygonum undulatum* Rocky grassland at upper levels: Cim Bulak and Burkhat Pass. {a knotweed}. Markakol area 2004
- [*Polygonum* sp?] Arid badland hummocks at Kiin Kerish. {Presumably this genus, a low subshrub with narrow lanceolate leaves and herbaceous branches bearing delicate nodding 3-part flowers, white edged in pink}. 2002
- Rheum altaicum?* Drier south-facing grass slopes Kablinsky Hills 2004 (Markakol. 2002)
- Rheum wittroekii* Moist grassland at mid-levels: Cim Bulak. {a rhubarb}. July gone over. 2004
- Rheum nanum?* Arid slopes: Kiin Kerish, and north of Markakol. {a small rhubarb} in seed 2004
- Rumex acetosa* Grassland (except arid) at all levels: Markakol, southern Austrian Road, and Burkhat Pass. {Common Sorrel} 2004
- Rumex tianshanicus* Grasslands at low-mid levels: Cim Bulak. {a dock}. 2004

Chenopodiaceae

- Arthrophyton haloxylon* Saline semi-desert, locally common: Zaysan depression. {Saxual} 2002
- Chenopodium suecicum?* Ruderal habitats in villages: Urunkhayka. {a goosefoot}
- Chenopodium urbicum?* Disturbed ground, especially in arid places: Ust-Kamenogorsk and Kiin Kerish (elsewhere in Zaysan depression). {Upright Goosefoot}. 2002
- Halimione verrucifera?* Salt-steppe in the Zaysan depression, notably by spring-fed marsh {a “sea-purslane”} 2002
- Halocnemum strobilaceum?* Low-lying saline areas of semi-desert where water stood late: Zaysan depression. {a perennial glasswort}. 2002
- [*Kochia* sp.?] Dry and saline semi-desert at Kiin Kerish and by salt-spring. {Mats of needle like leaves, and erect flowering stems}
- Nanophyton erinaceum* Saline arid badlands at Kiin Kerish. {no common name}. 2004
- Salsola kali* Arid cliff top at Kiin Kerish. {Spineless Saltwort, subsp. *ruthenica*} 2002
- [*Salsola* spp.] Gravel ridges by saltmarsh below spring in Zaysan semi-desert. {*S. collina*, *S. nitraria* or *S. soda* are possibilities}

[*Suaeda* spp. Saline steppe: Zaysan depression *e.g.* by spring-fed saltmarsh. {*S. acuminata*, *S. heterophylla* and *S. microphylla* are possibilities}] 2002

Amaranthaceae

Amaranthus retroflexus Weed in Panfilov Park, Almaty {Common Amaranth}

Portulacaceae

Claytonia joanneana Gaps in dwarf birch scrub and grassland above, at high levels on Burkhat Pass. {a spring-beauty} 2002

Caryophyllaceae

Acanthophyllum pungens Arid cliff-top and slopes at Kiin Kerish. {no common name} 2004.
Cerastium cerastioides Grasslands and rocks at mid-high levels, often common: Cim Bulak, around/above Markakol, and Burkhat Pass. {Starwort Mouse-ear}. 2004
Cerastium dahuricum Disturbed ground at low-mid altitudes: Cim Bulak, Kalbinskiy Hills, and Markakol. {a mouse-ear}. 2004
[*Cerastium fontanum* Grasslands at low-mid levels: Cim Bulak and Markakol. {Common Mouse-ear}. 2002]
[*Cerastium* #1 Mossy flushes by southern Austrian Road. {linear-leaved mouse-ear with large flowers}]
Dianthus hoeltzeri Drier grassy bluffs in the Kalbinskiy Hills, Austrian Road . {a pink}. 2004
[*Dianthus superbus* Drier grassland north of Markakol. {a pink} 2002]
Dianthus versicolor? Dry south-facing grassland on Burkhat Pass. {a pink} 2004
[*Dianthus deltooides* Near Uryl. 2002. Maiden Pink]
[*Dianthus* #1 Dry steppe grassland at Alekseyevka. {a slender white pink}].
[*Dianthus* #2 Stony ridges in wet grassland in Bukhtarma valley. {a lacinate pink-flowered pink}]
Eremogone longifolia? Steep south-facing steppe slope at Marble Pass. {resembles a tall erect long linear-leaved sandwort}
Gypsophila cephalota? Possibly this species on the dry slopes near Maymir 2004
[*Gypsophila paniculata* Dry, often sandy ground in steppe and semi-desert, including stony verges: Zaysan campsite and west from north ferry. {a gypsophila}. 2002]
[*Gypsophila* #1 Stony ridges in wet grassland, Bukhtarma valley. {tall glaucous gypsophila, leaves mostly basal/lower stem, quite dense clusters of large white flowers in distant widely branched raceme – maybe *G. capituliflora* or *G. diffusa?*}]
[*Gypsophila* #2 Stony slope near lower Rakhmanovskie lake. {a prostrate gypsophila, resembling *G. glandulosa* of section *Heterochroa* – which is endemic to Turkey}]
[*Herniaria glabra* Dry stony slope 10km north of Markakol. {Smooth Rupturewort} 2002]
Minuartia biflora? Sedge/grass/lichen vegetation: near road on Burkhat Pass and above Rakhmanovskie Klyuchi. {Northern Sandwort} 2004
Minuartia verna Grassy dry bluffs at high levels on Burkhat Pass. Spring Sandwort} 2004
Moehringia umbrosa Mossy ground in spruce forests, less often in sheltered rock crevices: Cold Pass, all along Austrian Road and Rakhmanovskie Klyuchi. {a sandwort} 2004
Sagina procumbens Wet mossy turf at all levels: Markakol. {Mossy Pearlwort} 2004
[*Sagina saginoides?* Mossy flushes by southern Austrian Road. {Alpine Pearlwort – may be a related species} 2002]
Silene adenopetala Rocks at high levels in Cim Bulak. {Low campion with few nodding flowers, each with an inflated sticky calyx almost concealing petals}
Silene otites Steppe west of Zaysan north ferry. {Spanish Catchfly}

<i>Silene vulgaris</i>	Scrub and meadows at low-mid levels: Cim Bulak. {Bladder Campion – locally known as <i>S. wallichiana</i> }. July at Markakol. 2004
<i>Silene latifolia</i> [<i>Silene</i> #1	Widespread. 2004. White Campion. Open dry pine wood in Kalbinskiy Hills. {Like a white campion with long very sticky inflorescence, with flowers apparently arranged in branched whorls}].
[<i>Silene</i> #2	Rock crevices by southern Austrian Road. {intermediate in appearance between <i>S. nutans</i> and <i>S. otites</i> – tiny white flowers on one-sided inflorescence, very sticky stem}]
<i>Stellaria graminea</i>	Grassland at low-mid levels: Cim Bulak. {Lesser Stitchwort}. 2002
<i>Stellaria media</i>	Widespread. 2002. Common Chickweed.
<i>Tunica stricta</i>	Drier grassland at low-mid levels: Cim Bulak, Kalbinskiy Hills, and north of Markakol. {no common name}. 2002

Paeoniaceae

<i>Paeonia anomala</i>	Low scrub and forest margins at low-mid levels: Kalbinskiy Hills, locally abundant around Markakol but in seed. Good flowers by late snow patch on south end of Austrian Road {a large pink peony}. 2004
<i>Paeonia intermedia (hybrida)</i>	Steep stony south-facing slope on Marble Pass and at Maymir 2004 in seed only (verges west from Zaysan north ferry 2002). {a peony}.

Ranunculaceae

<i>Aconitum baicalense</i>	Mossy damp willow scrub in Markakol. {a monk's-hood} 2004
<i>Aconitum leucostomum</i>	Mountain meadows, flushed slopes and open woodland: above Almaty, Kalbinskiy Hills, around and above Markakol, south end of Austrian Road, Burkhat Pass and Rakhmanovskie Klyuchi. {a monk's-hood}. 2004
[<i>Aconitum songoricum</i>	Woodland margins at low-mid levels above Almaty. (a monk's-hood}]
<i>Actaea racemosa?</i>	Probably this species in the Maymir Valley 2004
<i>Anemone altaica</i>	Woodland at low-mid levels, sometimes moist: Southern end of Austrian Road near late snow 2004 {an anemone – closely related to <i>A. nemorosa</i> }
<i>Anemone crinita?</i>	Open dry grassland at high levels: Burkhat Pass. {anemone of the <i>A. narcissiflora</i> group – but (unlike next) grey-hairy}. July 2004 in seed.
<i>Anemone protracta</i>	Grassland at mid-high levels: Cim Bulak. {anemone of <i>A. narcissiflora</i> group} 2004
[<i>Anemone</i> #1	Grassy bluffs in the Kalbinskiy hills. {white slender anemone – “ <i>lisnaie</i> ” in Russian}].
<i>Aquilegia atrovinosa</i>	Mountain meadows at mid levels: Cim Bulak. {a columbine} 2004
<i>Aquilegia brevicarata</i>	Rocky ground in shade of spruce: all along Austrian Road at mid-levels, and by track to Rakhmanovskie Klyuchi. {a columbine} 2004.
<i>Aquilegia glandulosa</i>	Mountain meadows at all levels, and also in shade: around and above Markakol (including Cold Pass where expansive displays at pass overlooking Mongolia) and along entire length of Austrian Road, Burkhat Pass, and Rakhmanovskie Klyuchi 2004
<i>Atragene sibirica</i>	Rocks and scrub at mid-high levels: Cim Bulak, around and above Markakol, and all along Austrian Road. {a white clematis} July 2004 in seed.
<i>Callianthemum alatavicum</i>	Fine scree <i>etc</i> soil at high levels in Cim Bulak. {no common name} 2004.
<i>Callianthemum angustifolium</i>	Edge of snow-patches, moist stony grassland at mid-upper levels: Cold Pass and Burkhat Pass where in flower 2004.
<i>Caltha palustris</i>	Streamsides and marshy sites, often dominant along streams at mid-high levels: common in Markakol area, south end of Austrian End., Burkhat Pass and Rakhmanovskie Klyuchi. {Marsh-marigold}. 2004

<i>Clematis integrifolia</i>	Dry grassland, open low scrub <i>etc</i> at low-mid levels: Kalbinskiy Hills, Marble Pass, and abundant north of Markakol. {a scrambling clematis} 2004
<i>Consolida orientalis</i>	Fields and disturbed ground from Bukhtarma valley to Zaysan lake. {Eastern Larkspur}
<i>Delphinium altaicum</i>	Low scrub at low-mid altitudes: Marble Pass and drier slope near Maymir 2004. Unclear as whether the two delphiniums at Maymir are one and the same, but are growing in different habitat.
<i>Delphinium elatum</i>	Mountain meadows: above Almaty and Markakol and impressive stands in Maymir's valley. {a delphinium}. 2004
[<i>Delphinium spp.</i>	a) Stony gorge by Kamenka apiary campsite; and b) a branched bright blue plant in steppe west from the Zaysan north ferry. {delphiniums}]
[<i>Isopyrum isopyroides</i>	Sheltered rocks and shade at mid-high levels: Cim Bulak. {no common name}.]
<i>Paraquilegia anemonoides</i>	Cliff crevices in upper Cim Bulak. {no common name} 2004.
<i>Pulsatilla patens</i>	Drier grassland at all levels: Kalbinskiy Hills and north of Markakol 2004. {a pasque-flower}.
<i>Ranunculus altaicus</i>	Margins of snow patches, mainly at high levels: Burkhat Pass and Rakhmanovskie Klyuchi. {a buttercup} 2004
[<i>Ranunculus auricomus</i> s.s.	Woodland at low-mid levels: Markakol and southern Austrian Road. {Goldilocks Buttercup} 2002]
<i>Ranunculus grandiflorus</i>	Cim Bulak a tall species 2004
[<i>Ranunculus polyanthemos</i>	Taller grassland at low-mid levels: at and above Markakol. (a buttercup} 2002]
<i>Ranunculus repens</i>	Nutrient-rich grassland by houses and streamsides: around Markakol. {Creeping Buttercup} 2004
[<i>Ranunculus #1</i>	Margins of late snow patches on the Kalbinskiy Hills. {Low yellow buttercup with flowers in a subumbellate cluster}].
<i>Thalictrum alpinum</i>	Mossy/lichen dominated vegetation amongst dwarf birch on Burkhat Pass. {Alpine meadow-rue} 2004
<i>Thalictrum collinum</i>	Grasslands at low-mid levels: Cim Bulak, Marble Pass and Markakol. {a meadow-rue}. 2004
[<i>Thalictrum minus</i>	Riverine scrub/woodland: south end of Austrian Road, by R. Karakaba and Rakhmanovskie Klyuchi forest. {Lesser Meadow-rue – subsp. <i>majus</i> } 2002]
<i>Thalictrum simplex?</i>	Grasslands at mid-levels: Cold Pass. {a meadow-pass}
<i>Trollius altaicus</i>	Grassland and open woodland, especially at mid-levels: largely over in 2004 but some in Kalbinskiy Hills and above Markakol (+ Cold Pass) {a globe-flower} 2004
[<i>Trollius dshungarius</i>	Moist grasslands at mid-levels: Cim Bulak. {a globe-flower}. 2004]
<i>Trollius songorica</i>	Cim Bulak 2004
[<i>Trollius lilacinus</i>	Stony slopes recently covered in snow at high altitudes in Cim Bulak. {a globe-flower}.]

Berberidaceae

[<i>Gymnospermium altaicum</i>	Stony moist slopes with incomplete vegetation cover: near Cold Pass, and north of Markakol to southern Austrian Road {no common name – related to <i>Leontice</i> } 2002]
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Nymphaeaceae

[<i>Nuphar lutea</i>	Zaysan Lake. Yellow Water Lily. 2002]
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Papaveraceae

<i>Chelidonium majus</i>	Fine scree and rocky edges at low-mid levels: Maymir 2004 {Greater Celandine – Altai populations are much bigger-flowered than those of Europe}.
<i>Corydalis nobilis</i>	Woodland margins and shady rocks all levels: Markakol (including Cold Pass) and Austrian Road north of Burkhat Pass. {a corydalis} 2004
[<i>Corydalis pauciflora?</i>	Under willow bushes near National Park HQ, Markakol. {Small creamy white corydalis}.]
<i>Fumaria vaillantii</i>	Apiary campsite near Maymir 2004 {Few-flowered Fumitory}
<i>Hypericum lactiflorum?</i>	Gravel spit at Zaysan campsite. {a whitish <i>Hypericum</i> }.
<i>Papaver croceum</i>	Meadows and rocks at mid-high levels: Cim Bulak. {a yellow poppy}.2004
<i>Papaver nudicaule</i>	Roadsides, drier grasslands mainly at mid-levels: above Marble Pass, Cold Pass, south end of Austrian Road, by Karakaba river, Burkhat Pass (and below to north – where present in huge range of colours from white to dark orange). {a pale yellow poppy}2004
[<i>Papaver tianshanicum</i>	Rocky ground at high levels in Cim Bulak. {an orange poppy}.]

Brassicaceae

<i>Alyssum lenense?</i>	Rocky outcrop by picnic spot on south Austrian Road. {short silvery perennial Alison – possibly <i>A. turkestanicum</i> }
[<i>Alyssum</i> #1	Dry stony ridges in wet grassland in Bukhtarma valley. {a white-hairy Alison – <i>A. campestre?</i> Possibly this species also in sandy semi-desert between Zaysan lake and Ust-Kamenogorsk}]
<i>Arabidopsis thaliana</i>	Stony ground by Karakaba river. {Thale Cress}
<i>Arabis glabra</i>	Drier grasslands at low-mid levels: Cim Bulak and Rakhmanovskie Klyuchi. {Tower Mustard}. 2002
<i>Barbarea vulgaris</i>	Open ground and moist sites at all levels: Cim Bulak, Markakol and Rakhmanovskie Klyuchi. {Common Winter-cress – subsp. <i>arcuata</i> }
<i>Berteroa incana</i>	Roadsides and dry grassland, notably in steppe: Ust-Kamenogorsk, Marble Pass and Bukhtarma valley. {Hoary Alison}. 2002
[<i>Bunias orientalis</i>	Roadsides in Kalbinskiy Hills. {Warty Cabbage} 2002]
<i>Capsella bursa-pastoris</i>	Ruderal habitats in villages: Urunkhayka and Rakhmanovskie Klyuchi. {Shepherd's-purse} 2004
<i>Cardamine macrophylla</i>	Swamp woodland and streamsides at low-mid levels: Markakol, south end of Austrian Road and Rakhmanovskie Klyuchi & Maymir {a large bittercress with leaves like those of <i>Pimpinella major</i> } 2004
<i>Cardamine pratensis</i>	Marshes: on tree-line below Burkhat Pass and by lake at Rakhmanovskie Klyuchi. {Cuckoo-flower – notably dark pink form} 2004
<i>Cardaria repens</i>	Roadsides at low-mid levels in drier areas: Kalbinskiy Hills. {is this actually different to <i>C. draba</i> , the Hoary Pepperwort?}
<i>Chorispora bungeana</i>	Fine scree at high levels in Cim Bulak. {no common name}2004.
[<i>Descurainia sophia</i>	Roadsides and open ground, especially in steppe: Ust-Kamenogorsk, Uryl checkpoint and west through Bukhtarma valley. {Flixweed}. 2002]
[<i>Draba lanceolata?</i>	Rocks and stony slopes at mid-high altitudes: Cim Bulak and by Nn. Austrian Road. {a whitlow-grass, closely allied to <i>D. incana</i> }.]
[<i>Draba sibirica?</i>	Rock crevices, mainly at high levels: picnic bluff on Austrian Road and on Burkhat Pass {Low yellow whitlow-grass with longish leafless stem – may possibly be <i>D. melanopus</i> or <i>D. subamplexicaulis</i> }]
[<i>Erysimum croceum</i>	Rocky bluffs at mid altitudes in Cim Bulak. {an orange wallflower}. 2002]
[<i>Erysimum diffusum?</i>	Trackside north out of Markakol. {Resembling a very leafy <i>E. cheiranthoides</i> }]
[<i>Erysimum</i> #1	Sandy semi-desert by Zaysan south ferry. {Large-flowered rather narrow erect treacle-mustard}].

<i>[Eutrema integrifolia?</i>	Rocky slopes at high levels in Cim Bulak. {Rather robust cress with lanceolate leaves and flat-topped heads of white flowers}].
<i>Hesperis sibirica</i>	Scrub and woodland margins at all levels: Cim Bulak, above Markakol, south end of Austrian Road, and by Bukhtarma R. near Berel. {a dame's-violet – usually white in this area, but also pink}. 2004
<i>Isatis laevigata</i>	Stony roadsides in the Kalbinskiy Hills. {a woad}.
<i>Lepidium crassifolium?</i>	Edge of spring-fed saltmarsh in Zaysan depression. {a pepperwort}.
<i>Lepidium latifolium</i>	Moist saline areas in semi-desert: Zaysan campsite. {Dittander}.
<i>Lepidium ruderales</i>	Disturbed ground, mainly by roads in steppe: Zaysan depression and throughout Bukhtarma valley including Uryl. {Narrow-leaved Pepperwort}
<i>[Macropodium nivale</i>	Sheltered moist areas by rocks high on Burkhat Pass. {no common name – rather resembling <i>Lagotis</i> , and temporarily confused!} 2002]
<i>[Matthiola tatarica?</i>	Stony ridges in wet grassland, Bukhtarma valley. {a stock}}
<i>Rorippa sylvestris</i>	Disturbed damp waysides near Markakol. {Creeping Yellow-cress}
<i>Sisymbrium septulatum?</i>	Disturbed ground in dry steppe areas: Zaysan campsite and north ferry. {mustard close to <i>S. altissimum</i> , the Tumbling Mustard}.
<i>Thlaspi arvense</i>	Ruderal and disturbed habitats: Markakol. {Field Pennycress}
[unknown crucifer #1	Arid slopes and <i>Artemisia</i> steppe: Kiin Kerish. {Tiny fruiting cress with disk fruit and amplexicaul lanceolate leaves}].
[unknown crucifer #2	<i>Artemisia</i> steppe near shore of Zaysan lake. {Large fruiting cabbage with fruit composed of two abutting discs}]

Crassulaceae

<i>Orostachys spinosa</i>	Rocks, stony dry ground: Kalbinskiy Hills, picnic spot on Austrian Road, and Bukhtarma valley. {succulent resembling houseleek} 2004
<i>Rhodiola coccinea</i>	Rocks at mid-high levels: Cim Bulak, Cold Pass. {a roseroot}. 2004
<i>[Rhodiola heterodonta?</i>	Rocky slopes in upper Cim Bulak. {a roseroot with rather broad serrate leaves}.]
<i>Rhodiola linearifolia</i>	Cim Bulak 2004
<i>Rhodiola rosea</i>	Streamsides and wet rocks at mid-high levels: above Markakol, Burkhat Pass, riverine woodland at south end of Austrian Road, Karakaba river, and conifer woodland in Bukhtarma valley. {Roseroot} 2004
<i>Rhodiola semenovii</i>	By streams at high levels in Cim Bulak. {a roseroot}. 2004
<i>[Rhodiola viridula</i>	Flushes at mid-levels: Cim Bulak. {a roseroot}.]
<i>Sedum hybridum</i>	Rocks and dry open slopes up to mid-levels: above Almaty, Kalbinskiy Hills, and around Markakol. {a stonecrop}. 2004
<i>[Sedum purpureum</i>	Scattered records 2002.]

Saxifragaceae

<i>Bergenia crassifolia</i>	Rock outcrops above treeline, and rocky slopes within conifer forest: Burkhat Pass, Austrian Road in Bukhtarma valley, and around/above Rakhmanovskie Klyuchi. {Elephant-ears} 2004
<i>Chrysosplenium tianshanicum?</i>	Mossy flushes in spruce forest and at higher levels at Rakhmanovskie Klyuchi. {a golden-saxifrage with thin alternate leaves}.
<i>Chrysosplenium nudicaule?</i>	Moist foot of cliffs in upper Cim Bulak. {a golden-saxifrage with thick leaves and dense cluster of fruit}.
<i>Saxifraga macrocarpa</i>	Cim Bulak along the track to Tjuksu Gate 2004
<i>Saxifraga punctata?</i>	Margins of streams at mid-levels, also in moist woodland and locally on rocks on high levels: Markakol, all along Austrian Road, Burkhat Pass and Rakhmanovskie Klyuchi. {a saxifrage} 2004
<i>Saxifraga sibirica</i>	Rocky ground at mid-high levels: Cim Bulak, picnic site on Austrian Road, Burkhat Pass and rocks in forest to N. {Siberian Saxifrage}. 2004

Parnassiaceae

Parnassia palustris Seasonally wet grassland in Bukhtarma valley {Grass-of-Parnassus} July, Cimbulak and Austrian Road. 2004

Grossulariaceae

[*Grossularia acicularis* Rocky slopes and steppe: north of Markakol and west of Zaysan north ferry. {a gooseberry} 2002]
Ribes meyeri? Drier woodland at low-mid-levels: Markakol, Cold Pass and Rakhmanovskie Klyuchi. {a currant – with dull reddish flowers; possibly *R. atropurpureum*} 2004
Ribes nigrum Moist woodland at low-mid levels: Markakol, along Austrian Road (by river at south end and forest near north end) and Rakhmanovskie Klyuchi. {Black Currant – creamy white flower spikes}. 2004

Rosaceae

[*Agrimonia asiatica* Roadsides: above Almaty. {an agrimony}. 2002]
Alchemilla scalaris? Wet grassland and streamsides above Markakol. {an almost hairless lady's-mantle} 2004
Alchemilla sibirica Drier grassland at mid-levels: above Markakol. {a very hairy lady's-mantle} 2004
Alchemilla vulgaris s.l. Flushes and mountain grasslands at mid-levels: Cim Bulak. {"Common Lady's-mantles" occurred widely, some records were provisionally referred to particular species}. 2004
Cotoneaster melanocarpus? Low scrub (often of *Spiraea*) and rocky areas, mainly at mid-levels: Kalbinskiy Hills, Marble Pass, Cold Pass, and Burkhat Pass. {Typical neat small-leaved (1-3cm) *Cotoneaster*, white beneath; pinkish flowers} 2004
Cotoneaster multiflorus? Low scrub and rocks, often with latter species: Kalbinskiy Hills pine woods, Marble and Cold Passes. {Larger more open *Cotoneaster* with white flowers, and softer leaves, not white beneath and to 5cm in length}. 2004
Crataegus songorica Scrub: above Almaty. {a hawthorn}.
[*Crataegus* #1 Roadside north out of Markakol. {Hawthorn with leaves like a small *Sorbus torminalis*}]
Dryas oxyodonta Locally dominant in patches of stony herbaceous vegetation amongst dwarf birch scrub, and especially above the birch: Burkhat Pass. {a mountain-avens} July 2004.
Filipendula ulmaria Damp streamside scrub and wet woodland: Kalbinskiy Hills and Markakol. {Meadow-sweet}. 2004
Filipendula vulgaris Dry grassland and steppe: Kalbinskiy Hills and near Kamenka. {Dropwort}. 2004
Fragaria vesca Dry grassland: north of Markakol. {Wild Strawberry} 2004
[*Fragaria viridis* Drier grasslands and scrub: Kalbinskiy Hills. {a strawberry}. 2002]
[*Geum aleppicum* By stream in apiary campsite near Kamenka. {an avens}. 2002]
Geum rivale Flushes, damp grassland and scrub at all levels: Cim Bulak, Kalbinskiy Hills, Markakol and south Austrian Road. {Water Avens} also at Rakhmanovskiy Kluchi & Maymir. 2004
Geum urbanum Shady areas at low-mid altitudes: above Almaty. {Herb Bennet}. 2004
Potentilla anserina Spring-fed saltmarsh in Zaysan semi-desert and seasonally wet grassland in Bukhtarma valley. {Silverweed}. 2004
[*Potentilla argentea* s.l. Drier grassland at low-mid levels: Cim Bulak, Ust-Kamenogorsk and Kalbinskiy Hills. {Hoary Cinquefoil}. 2002]
Potentilla asiatica Dry grassland north of Markakol 2004. {a cinquefoil}
[*Potentilla bifurca* Drier grasslands at low-mid levels, especially in more steppic sites: Cim Bulak, Kalbinskiy Hills and Marble Pass. {a cinquefoil}.]

<i>[Potentilla chrysantha</i>	Turf at low levels at Markakol. {a cinquefoil}}
<i>Potentilla fruticosa</i>	Rocky ground at mid-high levels, sometimes by streams: Cim Bulak, Cold Pass, by Karakaba River, Burkhat Pass and Rakhmanovskie Klyuchi. {Shrubby Cinquefoil} July also Markakol. 2004
<i>Potentilla orientalis</i>	Campsite below Burkhat Pass 2004
<i>Potentilla palustris</i>	Swamp woodland and marshes: Markakol and Rakhmanovskie Klyuchi. {Marsh Cinquefoil} 2004
<i>Potentilla recta</i>	Dry or open steppic grasslands: Marble and Cold Passes. {Sulphur Cinquefoil} 2004
<i>[Potentilla transcaspia</i>	Cimbulak. 2002]
<i>[Potentilla #1</i>	Roadsides in Ust-Kamenogorsk. {Small-flowered yellow cinquefoil, with pinnate leaves, 5-7 leaflets, diminishing in size from basal}}.
<i>[Potentilla #2</i>	Sandy semi-desert between Zaysan lake and Ust-Kamenogorsk. {Patch forming cinquefoil resembling intense grey <i>P. reptans</i> }}
<i>Prunus padus</i>	Riverine woodland at south end of Austrian Road. {Bird Cherry} 2004
<i>Rosa acicularis?</i>	Low scrub in low-mid levels: Kalbinskiy Hills, north of Markakol and steppe west of Zaysan north ferry. {a rose with dense soft “prickles” and pink flowers}. 2004
<i>Rosa alberti</i>	Cimbulak. 2004
<i>Rosa kokanica</i>	Drier grasslands at low-mid levels: Cim Bulak. {a rose}. 2004
<i>Rosa spinosissima</i>	Margin of Austrian Road in Bukhtarma valley. {Burnet Rose} 2004
<i>[Rosa #1</i>	Low dense scrub, mainly at low- mid levels: Kalbinskiy Hills. {a 1m tall rose with many 3cm diameter white flowers}}
<i>Rubus idaeus</i>	Low scrub at all levels: Cim Bulak and Markakol. {Raspberry}. 2004
<i>Rubus saxatilis</i>	Block scree above Rakhmanovskie Klyuchi. {Stone Bramble} 2004
<i>Sanguisorba alpina</i>	Flushes and streamsides at low-mid-levels: Cim Bulak. {a burnet}. 2004
<i>Sanguisorba officinalis</i>	Grassland at low-mid levels: Markakol, (including Cold Pass), northern Austrian Road and in Bukhtarma valley. {Great Burnet} 2004
<i>Sibbaldia procumbens</i>	Short turf and margins of snow patches at high levels: Burkhat Pass and Rakhmanovskie Klyuchi. {Sibbaldia} 2004
<i>Sorbus sibirica</i>	Scattered in conifer forests at mid-high levels: north from Burkhat Pass. {a mountain-ash} 2004
<i>Sorbus tianshanica</i>	Scrub at mid-levels: Cim Bulak. {a mountain-ash}. 2004
<i>Spiraea hypericifolia</i>	Scrub at all levels, often in relatively dry steppic sites: Cim Bulak, Kalbinskiy Hills, Marble Pass, north of Markakol, near Kamenka in Bukhtarma valley and west of Zaysan north ferry. {a bridewort}. 2004
<i>Spiraea media</i> ¹	Scrub at all levels, generally in less arid sites: Kalbinskiy Hills, at and near Markakol, and southern Austrian Road. {a bridewort}. 2004
<i>[Spiraea pilosa</i>	Scrub at mid-high level: Cim Bulak and north of Markakol. {a bridewort}. 2002]

Fabaceae

<i>Alhagi kirghisorum?</i>	Roadsides in semi-desert of Zaysan depression. {low spiny shrub with reddish flowers}
<i>Caragana sp.</i>	Northern Austrian Road.
<i>Astragalus alpinus</i>	Grasslands at mid-high levels: Cim Bulak, and by Karakaba river. {Alpine Milk-vetch}. 2004
<i>Astragalus andaulgensis?</i>	Drier grasslands at low-mid levels: Cim Bulak and north of Markakol {a hairy milk-vetch with yellow flowers stalkless in a cluster at the base of the leaves}.
<i>[Astragalus #1</i>	Drier grasslands at low-mid levels: Cim Bulak, Kalbinskiy Hills and by spring-fed saltmarsh in Zaysan semi-desert. {Robust plant like Wild Liquorice, with spikes of flowers of two-tone pink – at Zaysan purplish

¹ Are some populations of *S. media/pilosa* referable to *S. chamaedryfolia* or *S. triloba*?

	and possibly another species}].
[<i>Astragalus</i> # 2	Stony slopes: Kalbinskiy Hills. {Slender milk-vetch with dense spikes of small rose-pink flowers}].
[<i>Astragalus</i> #3	Sandy semi-desert by Zaysan south ferry. {Short “hedgehog” milk-vetch with few silvery narrow leaflets}].
[<i>Astragalus</i> #4	Arid steppe at Alekseyevka. {Robust milk-vetch with dense long-oval pale-yellow heads with silky-haired calyces}].
[<i>Astragalus</i> #5	Arid steppe at Alekseyevka. {Low milk-vetch with dense round yellow heads, fruiting calyces much inflated}].
[<i>Astragalus</i> #6	Arid steppe and rocky ground: Alekseyevka and Karakaba river. {Low milk-vetch with violet flowers and black hairs on calyx, resembling <i>A. danicus</i> }].
[<i>Astragalus</i> #7	Dry south-facing grass slope on Marble Pass. {like <i>A. onobrychis</i> }]
[<i>Astragalus</i> #8	Grassy bluffs at high levels on Burkhat Pass. {violet and blue, shaggy hairy milk-vetch – another plant at this site with pink flowers is probably merely a colour-variant}]
<i>Caragana</i> sp.	Zaysan. 2002
<i>Halimodendron halodendron</i>	Steep dry slopes at Kiin Kerish. spiny shrub – no common name}
<i>Hedysarum consanguineum</i> ?	Moist grassland at mid-higher levels: Cold Pass, by Karakaba river and Burkhat pass. {a French-sainfoin} 2004
<i>Hedysarum flavescens</i>	Streamsides at mid-levels in Cim Bulak. {a French-sainfoin}. 2004
<i>Hedysarum neglectum</i>	Grassland at upper levels: Cim Bulak. {a French-sainfoin}. 2004
<i>Lathyrus gmelinii</i>	Lush grasslands and light shade at low-mid levels: Kalbinskiy Hills, around and above Markakol, and around Rakhmanovskie Klyuchi. {a bitter-vetch – in the Rakhmanovskie area often with an otherwise similar plant with linear-lanceolate leaflets – a variety or distinct species?}].
<i>Lathyrus pratensis</i>	Grasslands at all levels: Cim Bulak and Rakhmanovskie Klyuchi. {Meadow Pea}. July also Markakol. 2004
<i>Lathyrus tuberosus</i> ?	Riverside scrub of Irtysh, Ust-Kamenogorsk. {Earthnut Pea}.
[<i>Lathyrus</i> #1	Low scrub and lush grass at low-mid levels: Kalbinskiy Hills, and north of Markakol. {pea with winged stem, large ovate stipules, leaves with <i>ca</i> 8 leaflets, tendrils and a spike of pink-brown rather small flowers, fading multi-coloured – seems most likely to be <i>L. humilis</i> or <i>L. pisiformis</i> }].
<i>Medicago falcata</i>	Dry grassland, especially on steppe: Ust-Kamenogorsk and near Zaysan north ferry. {Sickle Medick}.
[<i>Medicago lupulina</i>	Grass verges in Bukhtarma valley. {Black Medick} 2002]
[<i>Medicago sativa</i>	Disturbed grassland: near Zaysan north ferry. {Lucerne}. 2002]
[<i>Medicago x varia</i>	With parents near Zaysan north ferry. {Sand Lucerne – <i>Medicago falcata</i> x <i>M. sativa</i> }.]
[<i>Melilotus alba</i>	Roadsides and rough grassland: Ust-Kamenogorsk. {White Melilot}. 2002]
<i>Melilotus officinalis</i>	Roadsides and rough grass: Ust-Kamenogorsk. {Common Melilot} 2004
[<i>Onobrychis amoena</i> ?	Dry grassy bluffs in the Kalbinskiy Hills. {a pale sainfoin}.]
[<i>Onobrychis viciifolia</i>	Dry grassland and roadsides: Ust-Kamenogorsk and colouring fields (presumably cultivated) in the Bukhtarma valley. {Sainfoin}. 2002]
<i>Orobus luteus</i>	Montane woodlands and meadows: Cim Bulak. {a bitter-vetch}. 2004
<i>Sophora alopecuroides</i>	Often dominant in disturbed or overgrazed areas in the steppe or semi-desert zones, where it is prominent by roads and near water: throughout Zaysan depression. {no common name}. 2004
<i>Thermopsis alpina</i>	Stony slopes at high altitudes: Cim Bulak and Burkhat Pass. {no common name}. 2004

<i>[Thermopsis #1</i>	Stony ridges in wet grassland in Bukhtarma valley. {large, hairless, glaucous, yellow-flowered – probably <i>T. alterniflora</i> , <i>T. lanceolata</i> or <i>T. turkestanica</i> }
<i>Trifolium fragiferum</i>	Lawns in Panfilov Park, Almaty. {Strawberry Clover}
<i>Trifolium lupinaster</i>	Grasslands at mid-high levels: around and above Markakol, by Karakaba river and Rakhmanovskie Klyuchi. {a clover}.
<i>Trifolium medium</i>	Austrian Road. . Zigzag Clover
<i>Trifolium pratense</i>	Grasslands at low-mid levels: Cim Bulak and Bukhtarma valley. {Red Clover}.
<i>Trifolium repens</i>	Nutrient-rich grassland at low-mid levels: around Markakol. {White Clover}.
<i>Trigonella arcuata</i>	More open grassland at low-mid levels: near Cold Pass and south of Markakol. {a fenugreek}
<i>Vicia tenuifolia</i>	Roadsides and meadows at low-mid levels: Cim Bulak, Kalbinskiy Hills, and Bukhtarma valley part of Austrian Road. {a vetch}. 2004
<i>[Vicia #1</i>	Lush meadows and open forest: Markakol, Cold Pass. {Resembles a rather large lax <i>V. sepium</i> , with fewer flowers and half-hastate stipules}.

Oxalidaceae

<i>Oxalis acetosella</i>	Spruce forest at Rakhmanovskie Klyuchi. {Wood-sorrel}.
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Geraniaceae

<i>Geranium affine</i>	Hill steppe west of pine forests in Kalbinskiy Hills. {a crane's-bill} 2004
<i>Geranium albiflorum</i>	Grasslands and light shade at all levels: Cim Bulak, Kalbinskiy Hills, around and above Markakol, Burkhat Pass and Rakhmanovskie Klyuchi. {a crane's-bill}. 2004
<i>Geranium collinum</i>	Grasslands: north and south of Markakol, by Austrian Road below (and north of) Burkhat Pass. {a crane's-bill} 2004
<i>Geranium pseudosibiricum?</i>	Forest edges and taller grassland: around Markakol. {Large pink cranes-bill, apparently with two distinct flower sizes}. 2004
<i>Geranium rectum?</i>	Moist grassland at lower levels: Cim Bulak. {Meadow Crane's-bill}
<i>[Geranium saxatile</i>	Rocky grassland at higher levels in Cim Bulak. {a crane's-bill}. 2002]
<i>Geranium pratense</i>	Maymir. 2004. Meadow Cranesbill.

Zygophyllaceae

<i>Zygophyllum plerocarpum</i>	Arid cliff-top steppe at Kiin Kerish. {like a prostrate vetch with winged petiole – no common name}.
<i>Peganum harmala</i>	July, in flower in Zaysan. 2004

Rutaceae

<i>Dictamnus angustifolius</i>	Scrub, meadows and sunny slopes: above Almaty, Kalbinskiy Hills, (locally abundant), and around Markakol. {Burning-bush}. 2004
<i>Haplophyllum perforatum</i>	Dry steppe grassland at Alekseyevka. {no common name}.

Polygalaceae

<i>Polygala hybrida</i>	Drier grassland at low-mid levels: Kalbinskiy Hills and Cold Pass {a milkwort}. 2004
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Euphorbiaceae

<i>[Euphorbia humilis?</i>	Grassland at high levels in Cim Bulak. {a spurge}.
<i>[Euphorbia pilosa?</i>	Moist grassland at mid-levels: southern Austrian Road. {a spurge} 2002]
<i>[Euphorbia tianshanica</i>	Cimbulak. 2002.]

Euphorbia virgata? Rough grassland and roadsides at low levels: Ust-Kamenogorsk. {Twiggy Spurge}.

[*Euphorbia* #1 *Artemisia* steppe: Zaysan depression. {an annual spurge, broad leaved and regularly branched, spring flowering, now in late fruit}].

Aceraceae

Acer negundo Naturalised in shelter belts and woodland margins, mainly at low levels: Cim Bulak and Kalbinskiy Hills. {Box-elder}.

Balsaminaceae

[*Impatiens parviflora* Urban parks and scrub at low-mid levels: Almaty city and lower Cim Bulak. {Small Balsam}. 2002]

Malvaceae

Alcea nudiflora Sparingly on roadsides near Zaysan north ferry. {a hollyhock} 2004
Alcea frolovii? Roadsides and rough steppe grassland: Ust-Kamenogorsk, the Kalbinskiy Hills and near Katon-Karangay. {short pink hollyhock}. 2002

[*Lavatera thuringiaca* With hollyhocks between Ust-Kamenogorsk and Katon-Karangay. {a tree-mallow} 2002]

Thymelaeaceae

Daphne altaica Low scrub on sheltered slope: Marble Pass. {no common name}.

Hypericaceae

[*Hypericum elongatum* Dry grassland at low-mid altitudes: Marble Pass, and north from Markakol. {a St. John's-wort} 2002]

Hypericum perforatum Dry or disturbed grassland: Marble Pass. {Common St John's-wort} 2004

Hypericum scabrum Dry grassland at low-mid altitudes: Marble Pass. {a St John's-wort} 2004

Tamaricaceae

Myricaria bracteata? Banks of lake and rivers: Zaysan campsite, Karakaba river and river by access track to Rakhmanovskie Klyuchi. {a "spiked tamarisk"}. 2004

Tamarix hispida? Lake shore at Zaysan campsite. {a tamarisk}.

Violaceae

[*Viola acutiloba* Stony slopes at high altitudes in Cim Bulak. {a yellow pansy}.]

Viola altaica Drier grassland at mid-high levels, often abundant: Cim Bulak, Cold Pass, Burkhat Pass, and Rakhmanovskie Klyuchi. {a pansy, either pale yellow or violet}. 2004

Viola biflora Sheltered rocks at mid-high levels and scrub: Cim Bulak, Markakol, scattered along Austrian Road, Burkhat Pass, and around Rakhmanovskie Klyuchi. 2004 {Yellow Wood-violet}

Viola disjuncta Grasslands mainly at mid-levels: Kalbinskiy Hills, around and above Markakol, and southern Austrian Road. {a typical pansy}. 2004

[*Viola palustris* Damp mossy willow scrub *etc*: at and above Markakol and Rakhmanovskie Klyuchi (where plants tiny, and possibly another related species?). {Marsh Violet}]

[*Viola tricolor* Rakhmanovskie Klyuchi. 2002]

[*Viola rupestris?* Occasional on rocky ground at mid-high levels: Cim, Bulak, Cold Pass, and all along Austrian Road. {Teesdale Violet}]

Onagraceae

- Chamerion angustifolium* Scrub and meadows at low-mid levels: above Almaty, around and above Markakol, and Rakhmanovskie Klyuchi. {Rosebay}. 2004
- Chamerion latifolium* Big pink flowers. Flowering along the Austrian Road in loose gravelly ground along the river & near our campsite 2004
- [*Epilobium hirsutum*
Epilobium palustre Scattered records. {Great Willowherb}. 2002]
Rakhmanovskie Klyuchi. Marsh Willowherb. 2002]

Callitrichaceae

- [*Callitriche palustris* Depressions in swamp birch woodland near Markakol. {a water-starwort}.]

Cucurbitaceae

- [*Bryonia alba* Scrub edges above Almaty. {a white-bryony}.]

Apiaceae

- Angelica decurrens* Rocky streamsides etc: Cim Bulak, Markakol, and by Austrian Road in Bukhtarma valley. {an angelica}. 2004
- [*Anthriscus sylvestris*
Bupleurum aureum Lush grassland and forest margins: around Markakol. {Cow Parsley}]
Grassland, mainly at mid-levels: abundant on the Cold Pass and elsewhere near Markakol, along Austrian Road and Rakhmanovskie Klyuchi. {a hare's-ear} 2004
- Bupleurum krylovianum?* Drier grassland from Markakol to the Austrian Road. {a hare's-ear} and possibly Maymir in 2004
- Bupleurum longifolium?* Low scrub at low-mid levels: Kalbinskiy Hills, Marble Pass and Maymir 2004
- Bupleurum multinerve?* High-level ridges above Burkhat Pass. {a hare's-ear – to be confirmed, plants immature} 2004
- [*Conium maculatum*
Ferula krilovii Roadside: Uryl checkpoint. {Hemlock}]
Rockier and/or less saline parts of the Zaysan semi-desert – probably also this by Zaysan north ferry. {a giant-fennel}. 2004
- Ferula penninervis* Drier grasslands at low-mid levels: Cim Bulak. {a giant-fennel} 2004
- [*Ferulago* sp.
Heracleum dissectum Dry slopes at Kiin Kerish. {Like a low fennel, with few leaves}.
Scrub margins and streamsides at low-mid levels: above Almaty, around Markakol, and southern Austrian Road. {a hogweed}. 2004
- Heracleum sibiricum* Spruce forest and scrub margins: above Markakol. {a hogweed} 2004
- Prangos ledebourii?* Steppic grassland north of Markakol. {no common name}
- [unknown umbellifer #1 Grassland at low-mid levels: Markakol. {Resembling a pink pignut with linear rather than thread-like leaf segments}]
- [unknown umbellifer #2 Open areas amongst and above dwarf birch thickets on Burkhat Pass. {Rather resembles a *Meum* – genus unknown in Kazakhstan}]
- [unknown umbellifer #3 Seasonally wet grassland in Bukhtarma valley. {Resembles a slender pinkish water-dropwort, but probably another genus – no fruit seen}]
- [unknown umbellifer #4 Col at 2200m above Rakhmanovskie Klyuchi. {finely-divided basal leaves and remains of last year's stems – a *Seseli* species?}]

Ericaceae

- Vaccinium myrtillus* Understorey in spruce forest and high-level rocky grassland: Cold Pass, southern Austrian Road, Burkhat Pass and Rakhmanovskie Klyuchi. {Bilberry}. 2004
- Vaccinium vitis-idaea* Under dwarf birch scrub and spruce forest at mid-high levels: Burkhat Pass and Rakhmanovskie Klyuchi. {Cowberry} 2004

Empetraceae

Empetrum nigrum Rakmanovskie Klyuchi. {Crowberry}. 2004

Pyrolaceae

Orthilia secunda Mossy ground in conifer forest by Austrian Road in Bukhtarma valley. {Serrated Wintergreen} 2004

[*Pyrola minor* Understorey in spruce forest: southern Austrian Road and Rakmanovskie Klyuchi, also in riverside willows by access track to latter. {Lesser Wintergreen}. 2002]

Pyrola rotundifolia Mossy ground in conifer (especially spruce) forest and dwarf birch thickets: Burkhat Pass, Austrian Road in Bukhtarma valley, forest at Rakmanovskie Klyuchi and willow-scrub by river on track to last site. {Round-leaved Wintergreen – some plants in sunny ground had coral-pink flowers} 2004

Moneses uniflora Austrian Road. {One-flowered Wintergreen}. 2004

Primulaceae

Androsace lactiflora Moist to quite dry turf, mainly at mid-levels: Kalbinskiy Hills, at and around Markakol, and by Austrian Road in Bukhtarma valley. {a rock-jasmine}.

Androsace maxima Dry open habitats in semi-desert and rock: Zaysan south ferry and Kiin Kerish. {Annual Rock-jasmine, subsp. *turczaninovii*} In seed 2004.

[*Androsace olgae* Stony slopes at high altitudes in Cim Bulak. {a rock-jasmine}]

[*Androsace septentrionalis* Moist more open or mossy vegetation by streams *etc*: Markakol and north to Austrian Road {Northern Rock-jasmine} 2002]

Cortusa altaica By streams at low-mid levels and also on moist rocks at high levels: Markakol, forest by Austrian Road in Bukhtarma valley and on Burkhat Pass. {an alpine-bells} 2004

Cortusa brotherii Flushes and by streams, mid-high level: Cim Bulak. {an alpine-bells} 2004

Glaux maritima Spring-fed saltmarsh in Zaysan semi-desert. {Sea-milkwort}.

Primula algida Recent snowmelt and flushes at high level: Cim Bulak. {a primrose} 2004.

[*Primula longiscapa* Moist grassland, especially near streams at mid altitudes: around and above Markakol (including Cold Pass), Karakaba river, and Bukhtarma valley. {a primrose}. In seed 2002.]

Primula nivalis By streams at mid-high altitudes in Cim Bulak. {a primrose}]. One in flower 2004.

Primula sibirica A few flowering by a stream below Rakmanovskie 2004 {a primrose}

Primula veris Margins of snow-patches and rocky slopes: Kalbinskiy Hills, by Karakaba river and Burkhat Pass. {Cowslip – subsp. *macrocalyx*} 2004.

Plumbaginaceae

Limonium gmelinii? Edge of spring-fed saltmarsh in Zaysan depression. (a sea-lavender) 2004

[*Limonium* #1 Arid saline hummocks and rocks: Kiin Kerish and Marble Pass. {Sea-lavender with prominent white calyx and flat rosette of glaucous oblanceolate leaves}]. 2002

Gentianaceae

Gentiana aquatica Sedge/grass/lichen community near Markakol (by road on Burkhat Pass 2002). {a gentian} 2004

[*Gentiana cruciata* Open forest and high-level grassland to 2200m at Rakmanovskie Klyuchi. {Cross Gentian} 2002]

- Gentiana grandiflora* Short turf, (notably by snow-patches) sometimes on forest edge and scrub, only at upper levels: Burkhat Pass and Rakhmanovskie Klyuchi in 2004
- [Gentiana uniflora* Shorter grassland at mid-upper levels: Cold Pass, south of Markakol, and all along Austrian Road, including Burkhat Pass. {a gentian} 2002]
- [Gentiana karelini* July, Cimbulak.]
- [Gentiana turkestanorum* July, Cimbulak. 2002]
- [Gentiana kaufmanniana* July, Cimbulak.]
- [Gentiana gelida* July, common on Burkhat Pass. 2002]
- [Gentiana #1* Mossy opening in spruce forest along southern Austrian Road and grassy gully at 2250m on Burkhat Pass. {resembles *G. verna*}]
- Gentianella atrata?* Possibly this tall species in warm slopes below Burkhat Pass 2004
- Gentianopsis barbata* Bukhtarma Valley orchid site 2004
- Halenia corniculata* Margins of seasonally wet grassland in Bukhtarma valley. {Spur Gentian. This is the identity of one of the “mystery plants” in the orchid field - in leaf like a centaur; pairs (or three in a whorl) of 4-merous flowers; calyx cut to base, linear lobed; corolla of 4 yellow lanceolate lobes, separate for much of length, but with very pronounced hooked whitish spur at base} 2004
- Swertia obtusa* All kinds of wet places e.g. swamp woodland, mossy flushes etc at all levels: around and above Cold Pass 2004, southern Austrian Road (including Karakaba river), and around Rakhmanovskie Klyuchi. {a marsh felwort} 2002.

Polemoniaceae

- Polemonium caeruleum* Scrub and meadows at low-mid levels: Cim Bulak, Kalbinskiy Hills, around Markakol, Cold Pass, and Berel. {Jacob’s-ladder}. 2004

Convolvulaceae

- Calystegia sepium* Roadsides and scrub margins: above Almaty. {Greater Bindweed} 2004
- Convolvulus arvensis* Roadsides and dry grassland, included disturbed steppe: Ust-Kamenogorsk. {Field Bindweed}. 2004

Apocynaceae

- [Trachomitum lancifolium* Banks of roadside ditch in Zaysan semi-desert. {no common name}]

Cuscutaceae

- [Cuscuta campestris?* Roadsides and coarse vegetation, mainly in steppe areas: Zaysan depression including spring-fed saltmarsh, and Marble Pass (spicata species too). {a dodder – at least another coarse yellow dodder present, with spicate inflorescence e.g. *C. indica* or *C. monogyna*}. 2002]
- [Cuscuta sp.1* Red flowers, on *Campanula*. Markakol 2002.]

Boraginaceae

- [Asperugo procumbens* Disturbed grassland north out of Markakol. {Madwort}]
- [Cerinthe minor* Rakmanovskye Klyuchi. 2002]
- [Cynoglossum officinale?* Dry grassland and scrub margins: Kalbinskiy Hills and Markakol. {Common Hound’s-tongue – some plants are notably narrow-leaved and may be *C. capusii*}.]
- Echium vulgare* Roadsides, fallow and disturbed steppe: above Almaty, Marble Pass and colouring fields from Katon-Karangay to Zaysan lake north ferry. {Viper’s Bugloss} 2004
- [Eritrichium tianshanicum* Moist rocky slopes in upper Cim Bulak. {no common name}]
- [Eritrichium villosum?* Short stony turf on the Cold Pass. {no common name}]

<i>[Heterocaryum spp.?</i>	Drier grasslands at low-mid levels: Cim Bulak and Markakol. {Relatives of the forget-me-nots with pale flowers in umbel-like inflorescences and narrow leaves}.
<i>[Lappula #1</i>	<i>Artemisia</i> steppe: Zaysan south ferry and campsite. {a bur forget-me-not – possibly <i>L. microcarpa</i> – another species in Bukhtarma?} 2002
<i>[Lithospermum arvense</i>	Drier grasslands at low-mid levels; Cim Bulak. {Field Gromwell}.
<i>[Mertensia sp.</i>	Scrub margins at low-mid levels in the Altai: Kalbinskiy Hills, Markakol, and by Karakaba river. {like a large-flowered blue lungwort with widely-spreading corolla-lobes}.
<i>Myosotis alpestris</i>	Grassland and rocks at mid-high levels: Cim Bulak, Markakol (and Cold Pass) and Burkhat Pass. {Alpine Forget-me-not – the similar <i>M. sylvatica</i> evidently absent from Kazakhstan}. 2004
<i>[Myosotis laxa</i>	Springline marsh north of Markakol. {Tufted Forget-me-not}
<i>Myosotis scorpioides</i>	Mossy streamsides at low-mid levels: Markakol and Rakhmanovskie Klyuchi. {Water Forget-me-not} 2004
<i>[Nonea #1</i>	Dry grassy roadsides: east of Uryl and near Zaysan north ferry. { <i>Nonea pulla</i> or <i>N. caspica</i> ?}
<i>Onosma gmelinii?</i>	Drier grassland north of Markakol. {a golden-drop} 2004
<i>[Onosma #1</i>	Grassy bluffs in Kalbinskiy Hills. {a white “golden drop”}. 2002
<i>Pulmonaria sp.</i>	A narrow leaved species around Cold Pass 2004

Lamiaceae

<i>Dracocephalum grandiflorum</i>	Grassland at mid-high levels, where it may turn slopes blue: around and above Markakol (including Cold Pass), and Burkhat Pass. {a dragonhead} 2004
<i>Dracocephalum imberbe</i>	Rocks at high altitudes in Cim Bulak. {a dragonhead}. 2004
<i>Dracocephalum integrifolium</i>	Beautiful narrow-leaved species, frequent in grasslands around the Burkhat camp and elsewhere around Markakol. Typical deep blue flowers. 2004
<i>Dracocephalum ruyschiana</i>	Drier grasslands, mainly at mid-levels: Kalbinskiy Hills, Marble Pass and drier slopes below Burkhat Pass 2004. {bright blue dragonhead with linear – lanceolate untoothed leaves}.
<i>[Dracocephalum sp.</i>	Grassland at high levels in Cim Bulak. {Resembling <i>D. grandiflorum</i> but slightly smaller flowered}.
<i>Eremostachys molucelloides</i>	Open arid more grassy steppe: Zaysan camp and Alekseyevka. 2004 {no common name}
<i>[Eremostachys speciosa</i>	Grasslands at low-mid levels: Cim Bulak. {no common name}.
<i>[Glechoma hederacea</i>	Grass verges in Bukhtarma valley. {Ground-ivy} 2002]
<i>[Galeopsis sp.</i>	Scattered. 2002]
<i>[Hyssopus officinalis?</i>	Steppe west of Zaysan north ferry. {Hyssop: plant observed may belong to an allied genus, true hyssop seems to be absent }
<i>[Lagochilus daicanthophyllus?</i>	Arid hummocks at Kiin Kerish. {palmately-lobed leaves, spiny calyx and pale pinkish flowers}.
<i>Lamium album</i>	Lush grassland in both village and natural montane habitats: Markakol. {White Dead-nettle}. 2004
<i>[Leonurus glaucescens</i>	Dry grassland and disturbed steppe: Kalbinskiy Hills, by spring-fed saltmarsh in Zaysan semi-desert, southern Austrian Road, and Uryl checkpoint. {a motherwort}. 2002]
<i>Mentha asiatica</i>	Flushes and marshes at all levels: Cim Bulak and Markakol. {a mint} 2004
<i>Nepeta pannonica</i>	Grasslands at low-mid levels: Cim Bulak and Markakol (including Cold Pass). {a catmint}. 2004
<i>Nepeta sibirica</i>	Tall, attractive herb with skyblue flowers and lanceolate leaves common in Bukhtarma Valley 2004

<i>Origanum vulgare</i>	Scrub and meadows at low-mid levels: Cim Bulak, and north of Markakol. {Marjoram – the <i>O. tyttanthum</i> of the western Tien Shan probably belongs here}. 2004
<i>Phlomis oreophila</i>	Grassland at mid-high levels: Cim Bulak. {a Jerusalem-sage} also at Markakol 2004
[<i>Phlomis</i> #1	Grassland and open woodland around Rakhmanovskie Klyuchi. {similar to latter but with very long prominent bracteoles}]
<i>Phlomopsis brachystegia?</i>	Drier grassland at low-mid levels: Kalbinskiy Hills, Marble Pass, around Markakol, Austrian Road (Bukhtarma Valley), and near Kamenka. {a Jerusalem-sage} 2004
<i>Prunella vulgaris</i>	Grassland at all levels: Cim Bulak and Bukhtarma valley. {Self-heal} 2004
<i>Salvia deserta</i>	Roadsides and steppe grassland, where often abundant and colouring slopes: Ust Kamenogorsk, Kalbinskiy Hills and Zaysan depression. {a sage}. 2004 at Maymir
[<i>Scutellaria orientalis</i>	Arid bluffs and rocks: Kiin Kerish, picnic spot on southern Austrian Road, and Burkhat Pass. {a skullcap} 2002]
<i>Scutellaria sieversii</i>	Shorter grassland at mid-levels: around Markakol. {a skullcap} 2004
[<i>Scutellaria galericulata</i>	Markakol. 2002. Scullcap.]
[<i>Scutellaria</i> #1	Grassy bluffs in the Kalbinskiy Hills. {erect skullcap whose cream flowers have a purple throat – the same species with pure cream flowers further east?}].
[<i>Scutellaria</i> #2	Seasonally-wet grassland in Bukhtarma grassland. {skullcap with narrow leaves and disproportionately large blue flowers}]
[<i>Scutellaria</i> #3	Seasonally-wet grassland in Bukhtarma grassland. {resembles <i>S. galericulata</i> , but shorter, neater and large blue flowers}]
<i>Thymus altaicus?</i>	Drier turf: southern Austrian Road and Burkhat Pass {a thyme} 2004
[<i>Thymus</i> sp.	Dry grassland and steppe: Kalbinskiy Hills and west of Zaysan north ferry. {strongly scented thyme with notably long fruiting spike}.
<i>Ziziphora clinopodioides</i>	Dry grassland and steppe, locally also in montane zone of the Altai, where mainly on south-facing slopes: Kalbinskiy Hills, Marble Pass., north of Markakol and sandy semi-desert between Zaysan lake and Ust-Kamenogorsk. {no common name}. 2004
[unknown Labiate #1	Seasonally wet grassland in Bukhtarma valley and margins of north Austrian Road. {Tall slightly foetid herb with leaves like spearmint, and large hooded blue-purple flowers}]

Solanaceae

[<i>Hyoscyamus niger</i>	Ruderal habitats in villages: Urunkhayka, and near Kamenka. {Henbane}]
[<i>Hyoscyamus pusillus</i>	Open gravel ridges by spring-fed saltmarsh in Zaysan semi-desert. {a henbane}]
[<i>Solanum dulcamara</i>	Rough roadsides: Ust-Kamenogorsk and Marble Pass. {Bittersweet}. 2002]

Scrophulariaceae

[<i>Dodartia orientalis</i>	Steppe grassland: by spring-fed saltmarsh in Zaysan semi-desert and between Zaysan lake and Ust-Kamenogorsk. {no common name}. 2002]
[<i>Euphrasia tartarica?</i>	Grasslands at mid-levels: Cim Bulak. {Eyebrights}. 2002]
[<i>Lagotis integrifolia</i>	Open areas in dwarf birch scrub and grassland at high levels: Burkhat Pass. {no common name} 2002]
[<i>Linaria</i> #1	Sandy semi-desert: Zaysan south ferry. {low yellow toadflax, widely branched and with linear leaves}]. 2002
[<i>Linaria</i> #2	Rock crevices: south Austrian Road and near Uryl. {similar to latter but erect and unbranched – <i>L. acutiloba</i> , <i>L. altaica</i> or <i>L. hepatica</i> ?}]

<i>[Linaria #3</i>	Sandy semi-desert between Zaysan north ferry and Ust-Kamenogorsk {Long-spurred lilac toadflax with thread-like leaves}]
<i>Pedicularis amoena</i>	Flushes, sometimes stony, at mid-high levels: Cim Bulak, Cold Pass and Rakhmanovskie Klyuchi. 2004 {a lousewort}.
<i>[Pedicularis tristis</i>	Drier rocky grassland: by picnic spot on southern Austrian Road. {a lousewort}]
<i>Pedicularis dolichorrhiza</i>	Grasslands at mid levels: Cim Bulak. {a lousewort}. 2004
<i>[Pedicularis dubia?</i>	Drier grassland north of Markakol. {a lousewort}]
<i>Pedicularis oederi</i>	Dwarf birch scrub and grassland at high levels: Burkhat Pass {a lousewort} 2004 Cim Bulak
<i>[Pedicularis pubiflora</i>	Stony flushed slopes at high altitudes in Cim Bulak. {a lousewort}]
<i>Pedicularis elata</i>	Lusher grasslands at low-mid levels: Kalbinskiy Hills, and both around and above Markakol. {a lousewort}. 2004
<i>Pedicularis compacta</i>	Flowery meadows in plateau south of Burkhat pass, and gaps in dwarf birch scrub on pass itself. {a lousewort} 2004
<i>Pedicularis proboscidea?</i>	Longer grassland at all levels, but especially mid-levels: south of Markakol, southern Austrian Road and Rakhmanovskie Klyuchi. {Tall leafy lousewort with dense narrow yellow spike} 2004
<i>[Pedicularis #2</i>	Tracksides scrub approaching Rakhmanovskie Klyuchi. {pale yellow lousewort with strongly-beaked flower, alternate leaves}]
<i>Rhinanthus songoricus</i>	Scrub margins and seasonally-wet grasslands at low-mid levels: Marble Pass and Bukhtarma valley. {a yellow-rattle} 2004
<i>[Verbascum phoeniceum</i>	Dry grassland and steppe: Kalbinskiy Hills, near Kamenka and west of Zaysan north ferry. {Purple Mullein}.
<i>[Verbascum songoricum</i>	Steppe verges: Bukhtarma valley to Ust-Kamenogorsk. {a mullein} 2002]
<i>Verbascum thapsus</i>	Steppe grassland near Kamenka. {Common Mullein} 2004
<i>[Verbascum pulverulentum</i>	Cimbulak. Hoary Mullein. 2002]
<i>[Veronica anagallis-aquatica</i>	Markakol. 2002]
<i>Veronica beccabunga</i>	Streamsides and ruts at low levels: Markakol. {Brooklime} 2004
<i>[Veronica chamaedrys</i>	Flush edges at low-mid levels: Cim Bulak. {Bird's-eye Speedwell}]
<i>Veronica laeta</i>	Steppe west of Zaysan north ferry. {a pale spiked speedwell}
<i>[Veronica longifolia</i>	Margin of Austrian Road in Bukhtarma valley. {Garden Speedwell} 2002]
<i>Veronica multifida</i>	Dry grassland: below Burkhat Pass, Maymir and Kalbinskiy Hills (white-flowered). {a speedwell} 2004
<i>[Veronica porphyriana</i>	Rocks by picnic spot on south Austrian Road. {a speedwell} 2002]
<i>[Veronica serpyllifolia</i>	Moist turf by streams and in the mountains: at and above Markakol, and southern Austrian Road. {Thyme-leaved Speedwell}]
<i>Veronica spicata</i>	Drier grassland at all levels: Kalbinskiy Hills, Marble Pass, Markakol area and by Karakaba river. {Spiked Speedwell} 2004
<i>[Veronica teucrium</i>	Open woodland and grassland, mainly at mid-levels: Kalbinskiy pine woods, Markakol, and Cold Pass. {Large Speedwell}. 2002]
<i>[Veronica #1</i>	Pathsides in Urunkhayka. {Very slender erect speedwell, with both lanceolate leaves and blue flowers minute}]
<i>[Veronica #2</i>	Margins of snow-patches at high levels: Burkhat Pass. {short erect speedwell with crowded leaves and contracted purple spike}] 2002

Orobanchaceae

<i>[Cistanche salsa</i>	Near slope top, Kiin Kerish. {royal purple and white broomrape}.]
<i>[Orobanche uralensis?</i>	Arid steppe at Kiin Kerish. {slender purple-tipped broomrape}]

Plantaginaceae

<i>[Plantago lanceolata</i>	Roadsides, disturbed steppe: above Almaty. {Ribwort Plantain}. 2002]
<i>Plantago major</i>	Paths near habitation: Markakol. {Great Plantain} 2004

Plantago maritima Edge of spring-fed saltmarsh in Zaysan semi-desert. {Sea Plantain}.
Plantago media Dry grassland and steppe: Kalbinskiy Hills, near Kamenka and elsewhere in Bukhtarma valley. {Hoary Plantain}. 2004

Rubiaceae

Galium boreale Lusher grassland and low scrub at all levels: Kalbinskiy Hills, Markakol, and Burkhat Pass. {Northern Bedstraw} 2004
Galium palustre Swamp woodland at Markakol (birch) and Rakhmanovskie Klyuchi. (spruce). {Marsh Bedstraw} 2004
Galium verum s.l. Drier grasslands at all levels, especially prominent in more steppic sites: Cim Bulak, Kalbinskiy Hills, and Burkhat Pass. {Lady's Bedstraw – probably mostly referable to *G. pamiro-altaicum*}. 2004
 [*Galium aparine* 2002]

Caprifoliaceae

Linnaea borealis Mossy ground in spruce forests etc: along entire length of Austrian Road and at Rakhmanovskie Klyuchi. {Twinflower} 2004 but not in flower
Lonicera hispida Low scrub and rocks at low-mid levels: Cim Bulak, Kalbinskiy Hills, and Cold Pass. {"Bristly Honeysuckle"}. 2004
 [*Lonicera microphylla* Rocky slopes and crevices: north of Markakol, and southern Austrian Road. {a honeysuckle}]
 [*Lonicera nummulariifolia* Scrub at low-mid levels: Cim Bulak. {a shrub honeysuckle}.]
Lonicera tatarica Often dominant in low scrub at low-mid levels, sparingly higher: at and near Markakol. {a pink-flowered shrub honeysuckle} July in berry. 2004
 [*Lonicera* #1 Stony south-facing slopes: Marble Pass. {low glaucous shrub honeysuckle with orange berries}]
 [*Lonicera* #2 Low scrub at mid-high levels: around Markakol, Burkhat Pass and Rakhmanovskie Klyuchi. {low bush with pendulous lemon flowers}]
Viburnum opulus Streamside scrub in the Kalbinskiy Hills. {Guelder-rose}.

Adoxaceae

Adoxa moschatellina Moist woodland and shady margins at low-mid levels: Markakol, Cold Pass, and southern Austrian Road. {Moschatel}

Valerianaceae

Patrinia intermedia Dry grassland: Marble Pass, south-facing hills north of Markakol and west of Zaysan north ferry. {no common name}.
Patrinia sibirica Rocky outcrops in high-levels grassland on the Burkhat Pass. {no common name}
Valeriana officinalis s.l. Grasslands (usually moist) at low-mid levels: Cim Bulak, Marble Pass, Cold Pass and north of Markakol. {Common Valerian - probably mostly referable to *V. collina*}. 2004

Campanulaceae

[*Campanula altaica* Grasslands and low scrub at low-mid levels: Kalbinskiy Hills, Cold Pass and elsewhere around Markakol, and southern Austrian Road. {a bellflower, close to *C. patula* (Spreading Bellflower) - Kalbinskiy populations appear especially close}. 2002]
Campanula glomerata Grasslands at low-mid altitudes: Cim Bulak, Marble Pass, and Austrian Road in Bukhtarma valley. {Clustered Bellflower}. July, Markakol. 2004
Campanula latifolia? Woodland margins at low levels above Almaty. {Giant Bellflower}.

<i>Campanula sibirica</i>	Drier grassland and scrub: Kalbinskiy Hills, Marble Pass, margins of wet grassland in Bukhtarma valley and near Uryl. {a bellflower}. 2004
<i>Campanula volgensis</i>	Larger and more bell-like flowers than <i>C. sibirica</i> found in meadows around Markakol 2004
[<i>Codonopsis klematidea</i> <i>Adenophora lilifolia</i>]	Woodland margins: above Almaty. {no common name}. 2002] White flowers. Austrian Road. 2002]

Asteraceae

<i>Achillea millefolium</i>	Roadsides and all but the driest grassland: above Almaty; Kalbinskiy Hills, and north of Markakol. {Yarrow}. 2004
[<i>Achillea ledebourii?</i>	Grassland at mid-upper levels: Cold Pass. {pectinate toothed sneezewort} 2002]
<i>Alfredia cernua</i>	Lush meadows: around and above Markakol, and southern Austrian Road. {no common name} 2004
<i>Antennaria dioica</i>	Shorter drier grassland, mainly at mid-high levels, occasionally in open forest: Kalbinskiy Hills, Cold Pass, southern Austrian Road, Burkhat Pass, and Rakhmanovskie Klyuchi. {Mountain Everlasting} 2004
<i>Arctium tomentosum</i>	Forest margins and other coarser vegetation: Markakol, and near Berel. {a burdock} 2004
[<i>Artemisia absinthium</i>	Roadsides and rough grassland at low-mid levels: Cim Bulak, and north of Markakol. {Wormwood}. 2002]
<i>Artemisia dracunculus</i> [<i>Artemisia</i> spp.]	Margins of Austrian Road in Bukhtarma valley. {Tarragon} 2004 Dominant or co-dominant in drier steppe and semi-desert: Kalbinskiy Hills, and Zaysan Depression. {No attempt has been made to distinguish these, though from a casual examination of leaf morphology, indumentum and aroma, at least five species are common in this habitat, including some resembling <i>A. campestris</i> and others very grey and scented}].
<i>Aster alpinus</i>	Rocky grassland at mid-high levels: Cim Bulak, Kalbinskiy Hills, Cold Pass, and southern Austrian Road. {Alpine Aster}. Burkhat Pass. 2004
<i>Aster altaicus</i>	Drier grassland and steppe: Kalbinskiy Hills, Bukhtarma valley, Maymir and Zaysan north ferry. {an aster}. 2004
[<i>Cacalia hastata</i>	Riverside willow scrub by access track to Rakhmanovskie Klyuchi. {no common name}.
<i>Carduus nutans?</i>	Rough grassland and steppe: Kalbinskiy Hills. {Musk Thistle – subsp. <i>songoricus</i> }. 2002]
<i>Centaurea ruthenica</i>	Tall yellow flowered species in dry meadows near Maymir 2004
<i>Centaurea squarrosa</i>	Steppic grassland: by spring-fed saltmarsh in Zaysan semi-desert and in eastern Kalbinskiy Hills. {a knapweed}. 2004

<i>[Centaurea #1</i>	South-facing grassland on hill north of Markakol. { <i>C. adpressa?</i> – a lovely plant, leaves like <i>Knautia</i> but erect and appressed silvery, mostly basal, stem prostrate/procumbent with erect head – brown bracts, white fimbriate, flowers pale pink, white in centre – rayed}].
<i>[Cicerbita azurea</i>	Margins of scrub at mid levels: Cim Bulak and by Austrian Road in Bukhtarma valley. {an alpine sow-thistle}. 2002]
<i>Cichorium intybus</i>	Roadsides and fallow land: above Almaty, Ust-Kamenogorsk and from Bukhtarma valley to Zaysan lake. {Chicory}. 2004
<i>[Doronicum altaicum</i>	Spruce forest and high-level grassland at Rakhmanovskie Klyuchi. {a leopard's-bane} 2002]
<i>Doronicum turkestanorum</i>	Scrubby grassland at mid-levels in Cim Bulak. {a leopard's-bane}. 2004
<i>Echinops nanus?</i>	Rough steppe in the Kalbinskiy Hills. {a globe-thistle with heads 1cm diameter and the plant 50cm tall 2004.
<i>Echinops sp.</i>	Taller species 60cm+ in dry meadows near Maymir 2004
<i>Erigeron auranteus</i>	Rocky grassland at higher levels in Cim Bulak. {an orange fleabane} 2004
<i>Erigeron pseudoseravschanica</i>	
<i>[Erigeron #1</i>	Rocky dry grassland on the Cold and Burkhat Passes. {white one-headed fleabane – probably either <i>E. altaicum</i> or <i>E. krylovii</i> }]
<i>[Erigeron #2</i>	Rocky river bank of Karakaba. {similar to latter but rose-pink}2004]
<i>Galinsoga quadriradiata</i>	Weed in Panfilov Park, Almaty. {Shaggy-soldier}
<i>Gnaphalium norvegicum?</i>	Mossy spruce forest at Rakhmanovskie Klyuchi. {Highland Cudweed}
<i>Gnaphalium sylvaticum</i>	Drier pathside in willow scrub at south end of Austrian Road, and grounds of Rakhmanovskie Klyuchi. {Heath Cudweed}
<i>Hypochoeris maculata</i>	Dry south-facing grassland: sites north of Markakol and Rakhmanovskie Klyuchi. {Spotted Cat's-ear}
<i>Lactuca undulata?</i>	Rough grassland: north of Markakol, Sn. Austrian Road {a lettuce}
<i>Leontopodium fedtschenkoanum</i>	Rocky turf at high levels in Cim Bulak. {an edelweiss}. 2004
<i>Ligularia alpigena</i>	Moist grassland at mid-levels: Cim Bulak. {no common name}.
<i>Ligularia heterophylla</i>	Woodland margins above Almaty. (no common name)
<i>Ligularia macrophylla?</i>	Upland and mountain meadows, especially where slopes are moist: Kalbinskiy pine-woods, and north of Markakol. {no common name} Also at Cim Bulak 2004
<i>Ligularia sibirica</i>	smaller version of <i>S.macrophylla</i> widespread along Austrian Road to Burkhat Pass 2004
<i>[Mycelis muralis</i>	2002]
<i>Matricaria discoidea</i>	Widespread. 2004
<i>Onopordum leptolepis</i>	Roadsides in steppe from Bukhtarma valley to Zaysan lake. {a cotton thistle}
<i>Pilosella cymosa?</i>	Grasslands at mid-levels: Cim Bulak. {a mouse-ear hawkweed}.
<i>[Pulicaria sp.</i>	Rough grassland at Ust-Kamenogorsk. {Resembles a larger-headed, more slender <i>P. dysenterica</i> }].
<i>Rhaponticum carthamoides</i>	Lush grassland mainly at mid-levels: nearing Cold Pass, south of Markakol and Rakhmanovskie Klyuchi. {Large knapweed-like herb with big heads} 2004
<i>[Scorzonera spp.</i>	a) Spring-fed saltmarsh in Zaysan semi-desert; b) grassy slopes at tree-line on Burkhat Pass; c) Rakhmanovskie Klyuchi; and d) tall leafy plant in steppe west of Zaysan north ferry. {Viper's-grasses – one species at a) and d), a second at b) and c)?}
<i>Senecio jacobaea</i>	Disturbed steppe west of Zaysan north ferry. {Common Ragwort – naturalised?}.
<i>Senecio praticola?</i>	Drier grassland mainly at mid-levels: Kalbinskiy Hills, near Cold Pass, and north of Markakol. {a ragwort with narrow-lanceolate toothed leaves, and a subumbellate cluster of yellow heads with rays swept back at maturity}.
<i>Senecio vulgaris</i>	Weed in Panfilov Park, Almaty. {Common Groundsel}

<i>Serratula latifolia?</i>	Lush grassland at foot of south-facing hills north of Markakol. {a saw-wort} 2004
[<i>Solidago virgaurea</i>	Grassland at medium levels: Rakhmanovskie Klyuchi. {Goldenrod} 2002]
[<i>Tanacetum santolina?</i>	Drier grasslands, mainly at lower levels: Kalbinskiy Hills, and north of Markakol. {Small neat silvery-grey tansy with few button heads}. 2002]
[<i>Tanacetum tanacetoides?</i>	Dry grassland: Marble Pass. {Large feather-leaved tansy, with many button heads}. 2002]
<i>Taraxacum</i> spp.	Grasslands, especially prominent at mid-high levels: Cim Bulak and Markakol. {Dandelions}. 2004
<i>Tragopogon pratensis</i>	Roadsides and drier grasslands at low-mid levels: Ust-Kamenogorsk and Markakol. {Goat's-beard – subsp. <i>orientalis</i> }. 2004
[<i>Tragopogon</i> #1	Steppic grassland north of Markakol. {Goat's-beard – possibly <i>T. dubius</i> or <i>T. dubianskyi</i> } 2002
<i>Tussilago farfara</i>	Flushes and damp roadsides at all altitudes: Cim Bulak. {Colt's-foot}. 2004
[<i>Xanthium strumarium</i>	Disturbed and damp ground: Ust-Kamenogorsk. {Common Cocklebur}. 2002]
[Unknown composite #1	Margins of northern part of Austrian Road. {Like spiked mayweed with pendulous rayless flowers}]
[Unknown thistles	Sandy semi-desert between Zaysan lake and Ust-Kamenogorsk. {Two plants seen, one resembling <i>Carduus argentatus</i> , the other looking like a tall <i>Crupina</i> with untoothed pinnae, silver below}

Appendix: Species as yet not allocated to a family

Species #1	Arid slopes of Kiin Kerish. {low shrub with linear leaves and widely branched fruiting stems, each fruit like a silvery marbled bladder}.
Species #2	Stony ridges in wet grassland in Bukhtarma valley. {Erect herb, alternate leaves which are pinnatisect like an <i>Artemisia</i> , sepals joined at base, 5 free pink petals – possibly <i>Hololachne soongorica</i> or maybe a <i>Reaumuria</i> sp.}

