

The Altai Mountains

Where Four Worlds Meet

A Greentours Trip Report

18th July to 2nd August 2002

Led by Paul Cardy and Vladimir Kolbintsev

Trip report by Paul Cardy

Day 1 Thursday 18th July Journey to Almaty

The flights were on time, with a good connection at Frankfurt. Entry formalities at Almaty were rather lengthy, and the arrivals hall was so hot we felt we were experiencing our first sauna. Vladimir met us and we transferred to the hotel. After settling in to our rooms we all met in the café on Floor 3 for beer, vodka and snacks.

Day 2 Friday 19th July Cimbulak and Journey to Ust-Kamenogorsk

We ate a welcome buffet breakfast before a mini-bus arrived to take us up to Cimbulak for the day. Several Banded Demoiselles were active around the 'pond' outside the hotel. Our flight to Ust-Kamenogorsk was not until the evening, so it was good to have the opportunity to visit the mountains above Almaty, the eastern end of the Tien Shan range. Today we were pleased to escape a little from the city heat, and retreat to the mountains. We drove up past the Medeo ice-rink, and the ski-centre. Common Mynahs were noted on the journey. We passed a great variety of flowers including *Sedum hybridum* and *Aconitum leucostomum*.

Our first stop was to explore some of the flower rich meadows. *Nepeta pannonica*, *Mentha asiatica*, *Gentiana turkestanorum*, and *Parnassia palustris* were all in flower. Several Apollos drifted over the hillside, and a few Cardinals sped past. *Pedicularis dolichorhiza* and *Dactylorhiza umbrosa* were going over but the *Delphiniums* were in good bloom. Mazarine and Large Blue were found, and several False Commas and Hungarian Gliders were seen. Some *Salix* bushes supported a large number of attractive grey caterpillars, with spikes, and an orange patch on each segment. These were Camberwell Beauties. A colony of the black-veined white relative *Metaporina leucodice* was active around *Spiraea hypericifolia*. *Melanargia parca*, Eastern Pale Clouded Yellow, Small Copper and *Chazara enervata* were also here. The rhubarb relative *Rheum wittroeckii* was impressively large. Greenish Warblers and Common Rosefinch called. *Codonopsis klematidea*, *Papaver croceum* and a species of *Thesium* were also here. We ascended through the Tien Shan

Spruce covered hillsides, but were scuppered by the van breaking down. This didn't matter too much as we were more or less where we wanted to be. We made the best of the situation and prepared lunch. Our bad luck continued when the gas stove exploded rather impressively! We were not deterred however and we built a good small fire on which we could boil the water. Nothing would keep us from our tea and pot noodles! Hume's Yellow-browed Warbler was located nearby, and Black-throated Accentor sang from the conifers. The gorgeous *Erigeron aurantiacum* was in flower. *Proclissiana erubescens*, a Bog Fritillary relative, flew over the grassy hillside, in the company of *Erebia meta* subspecies *alexandra*.

After lunch we walked some way up towards the pass, in the direction of Kirghizstan. The track was lined with interesting plants. Here we recorded the Edelweiss, *Leontopodium fedschenkoanum*; *Rhodiola coccinea*; various *Alliums*; and *Potentilla fruticosa*. Among the butterflies were *Erebia turanica*, Queen-of-Spain Fritillary, *Coenonympha sunbecca*, Peacock, Brimstone, and Orange-tip. Crossbills and Grey-headed Goldfinches were feeding on the ground, as was a Hodgson's Mountain Finch. Among the many other plants here were *Cystopteris fragilis* and *Allium polyphyllum*. We returned to Almaty, and to a café for a snack before the flight. We checked in at a quiet terminal in town and were taken from there by bus to the airport. The flight on the Yak 42 took about two hours. The cloud formations were incredible during the whole journey. We arrived punctually and were met by Andrei, and transferred to the hotel for a welcome sleep.

Day 3 Saturday 20th July Journey to the Zaissan Desert

Following a very Russian breakfast, and once we had regained our passports from the local police formalities, we set off at nine heading over the Irtysh River, and south-east towards the Zaissan. The journey took us initially through steppe, and then into the Kalbinskiy Hills. *Salvia deserta* was abundant along the roadsides, and a very attractive large flowered Globe Thistle drew attention to itself. Our first stop in the hills proved very good for butterflies. We saw a Large Blue, Twin-spot Fritillary, Chestnut Heath, Idas Blue, and Lesser Marbled Fritillary. A beautiful yellow *Astragalus* flowered here. Esper's Marbled White, Ringlet, and *Hipparchia autonoe* were noted. Among the many flowers were *Sedum hybridum*, *Bupleurum longifolium*, *Galium verum*, and a white-flowered *Dianthus*. Red-backed Shrike and Tree Pipit were also noted. A local bus had broken down and the passengers had all started to walk ahead, but unusually they had decided to strip down to their underwear! Viper's Bugloss, Melilots and a tall white Hollyhock lined the roadsides on the way to the yourta where we were to have lunch. The little stream here was an excellent spot for mud-puddling butterflies. During our short visit we saw Wood White, Chequered Blue, *Tongeia fisheri*, Poplar Admiral, *Limenitis sydyi*, *Limenitis helmanni*, Map Butterfly, and Hungarian Glider.

We pressed on towards the ferry. In the desert here we found several of the fascinating endemic lizard Zaissan Toad-headed Agama, alongside their burrows. Yellow-legged Gulls were seen on or over the water. In the fringing reeds were Yellow Wagtails of the *feldegg* race, and two Bluethroats. Locals were swimming at the ferry dock. Common, Black and several Caspian Terns were here. The ferry crossing passed without incident, and we were soon back in the UAZs. Swallows seemed to be resident on the ferry. Continuing south we stopped at a filling station. A desert pond supported some thirty Ruddy Shelduck, Avocets, Black-winged Stilt, Redshank, Green Sandpiper, Ringed Plover and Little Stint. More Steppe Buzzards were seen en route, and three Sakers. After some time we left the tarmac and set off across the desert towards the shore of Lake Zaissan. Short-toed

Larks, and a few Black Larks flew up from the short vegetation as we flushed them. Dalmatian Pelicans were seen down by the lake. A Corsac Fox was a great surprise on the journey, and we had a very good view of it. Upland Buzzard and Isabelline Wheatear were also seen.

The journey to the camp took a long time, but we did arrive just before dark, to find quite a contingent from Altai Adventures there to meet us. They had just experienced a rather violent storm and one of the tents had been blown across the desert. A row of walk-in tents had been erected in a sandy gully, a short distance from the lake shore. We arranged ourselves into our separate tents, and regrouped for the first of Olga's delicious meals. Black Larks were numerous around the camp.

Day 4 Sunday 21st July Zaissan Desert

The day started overcast, and rather windy. Around the camp were huge numbers of Starling, and Sand Martin was abundant. Greylag Goose and Little Tern were noted down by the lake. We ate breakfast by the lakeshore with birds all around us. Gadwall, Ruddy Shelduck, and Common Terns were among them. We spent the morning walking into the desert. Two Demoiselle Cranes were spotted, and we were able to observe them through the telescope. *Rheum micrantha* was found in seed, and a species of *Limonium* was here. The desert was covered in Jerboa burrows. Steppe Runner and Sand Lizard were active here. A moment of excitement came when a Hobby sped past us pursuing a Short-toed Lark. The lark took refuge at our feet. However a second lark was less fortunate and we saw the Hobby catch it and then perch and eat it. A dead Wood Mouse was found too. A marshy area down by the lake supported Little Tern, Common Sandpiper, Kentish Plover, Little Ringed Plover, Oystercatcher, and Lapwing. Immature Yellow Wagtails were numerous in the reeds. Five Dalmatian Pelicans were seen, and Cormorant and Grey Heron were noted here too. Walking back along the beach to camp we saw Small White and Eastern Bath White. These were the only butterflies of the day! Some lovely yellow water lilies were in fine flower on the lake. Many more Dalmatian Pelicans sat in a group, and Redshank and Whimbrel were seen. After an excellent lunch we drove to the Kiin Kerish Canyon. On the way Upland Buzzards were seen, and two Demoiselle Cranes. We were delighted to see two Pallas's Sandgrouse on the road, but we had better views of these on the return journey. At Kiin Kerish we admired the splendid colourful rock formations, of red, ochre and white. Swifts were active over the canyon. A Shorelark was a good find, and a family of Isabelline Shrikes was here. There were some old Upland Buzzard nests. Among the many dried up plants in seed were *Ixiolirion tataricum*, *Tulipa altaica*, and *Ferula kriloviana*.

Following dinner some of us walked up onto the desert in search of Jerboas. We were rewarded with perhaps six Lesser Jerboas, after some perseverance. These really are the cutest animals. We were even able to stroke them and one took a liking to sitting on Vladimir's foot.

Day 5 Monday 22nd July Zaissan Desert

The morning was again cool, with only a little rain. Around the camp were Greylag Goose, and an attractive purple flowered species of *Lactuca* was found. After breakfast we drove to what we call the spring by the hill, where the eponymous spring provides a rather marshy lush area of vegetation. On the drive we saw both Upland and Long-legged Buzzards. The total of Dalmatian Pelicans was now forty-two along the lakeshore. Several Great Black-headed Gulls and the first of the days many Pallas's Sandgrouse were seen.

At the spring we saw families of Kestrels and Ortolan Buntings. Tawny Pipit was recorded and a young Rock Thrush. Pied Wheatears were much in evidence. Groups of up to thirty Pallas's Sandgrouse were coming in to drink, a lovely sight. Hoopoe, Red-headed Buntings, and Blyth's Reed Warbler added to the variety. Vladimir found a Lesser Fiery Copper. Pam and Martin found a dead Long-eared Hedgehog, which we managed to trick Mavis with (sorry Mavis!). She in turn had seen a Mountain Hare. Plants on the dry slopes here included *Halimodendron*, *Ephedra* and much *Tulipa altaica* in seed. *Dodartia orientalis* was a good find. An Adder skin was found, and later, by the camp, Vlad caught a Dione Snake.

Following a siesta we headed in the other direction along the lake shore to the area we had camped the previous year. Three more Demoiselle Cranes were seen and there were many Black Larks. A Golden Lemming ran across the road in front of us. Here were more colourful rock formations. Pied Wheatear was common, and a family of Lesser Kestrels was watched for some time. We flushed a Nightjar that settled just a little way off, and even allowed the photographers close approach. A species of *Atraphaxis* was in flower. We were surprised to actually see some people here. First of all a group camping by the lake, and then a family who were trying to drive the incredibly rough track down to the lake in a Lada. Needless to say they soon became stuck. We helped them out, but couldn't imagine how they would get back along the track in a saloon car.

That evening we were ready to do our checklists when the wind suddenly got up, the tents started to flap about a bit, and then started blowing wildly. The lake level rose and threatened to flood our tents. The staff of Altai Adventures did a grand job of running round and strengthening the tents, building up the sand defences and the like. They kept watch over us and whilst the group were all safe in their tents I had to abandon mine when the lake lapped at the door, and move in with Vlad and Michael and sleep on their floor. It was a most eventful night.

Day 6 Tuesday 23rd July Journey to Markakol

At dawn we abandoned camp. We loaded the vehicles as quickly as possible, and drove off in rather a bedraggled state! As we left we cast a last look at the flooded sorrowful camp! We were heading north-east, first to the Chinese border, and then up into the mountains and Markakol Lake. Little was seen on the first part of our journey due to the dreadful weather.

We continued through the steppe desert, passing some damp meadows along the way. We were now very close to the Chinese border, and in this obviously sensitive region had to spend some time at a checkpoint for routine bureaucracy. Here we saw several Richard's Pipits, and nearby were Rollers and Bee-eaters. After a brief stop in the nearby village (Alexeevka) to buy supplies we headed north, driving alongside the border fence. On the other side are extensive sand dunes, and beyond them the mountains of Xinjiang. At the Marble Pass we stopped for lunch, but sadly the weather

spoil the views of China. As we journeyed further north great conifer forests started, primarily of *Picea obovata* and *Larix sibirica*. The landscape became steadily greener. From the vehicles we could see swathes of *Veratrum lobelianum*, *Dianthus superbus*, *Dracocephalum* and *Pedicularis* in the rich meadows.

We arrived at the village of Markakol at three fifteen. All the houses here are built of wood, in the Siberian style. We were staying inside a fenced compound that is the national park headquarters. We organised our accommodation and the sauna was soon fired up. This was incredibly welcome tonight, the chance to warm up, dry out, wash, and relax after a rather wet day! Olga set to preparing dinner, which was a delicious buckwheat dish.

Day 7 Wednesday 24th July Markakol

Another overcast morning, but thankfully dry. Today saw us exploring our environs, taking the path that skirts the south shore of Markakol Lake. We had to cross the stream in the village, rather high due to all the rain. In the village were Steppe Buzzards and Black Kites. We had reasonable views of the Altai, with remnant snow patches on the higher peaks. Around the garden we saw Large Wall Brown, and the attractive *Geranium albiflorum* in flower. Our walk this morning was on the level, the only discomfort being the number of mosquitoes. The vegetation was heavily grazed along here and only poisonous species such as *Veratrum lobelianum*, *Aconitum leucostomum*, and *Delphiniums* were common. The blue berries of *Lonicera tatarica* were very noticeable, and some of the group ate a few! *Paeonia anomala* was abundant in seed. A wet flush contained some lovely *Potentilla palustris* and *Scutellaria galericulata*. Several passerines were active in the conifers, Long-tailed Tits, Nuthatches, Willow and Coal Tits and Nuthatches among them. We had good views of Siberian Chipmunk and Two Lesser Spotted Woodpeckers were seen.

On the lake we saw Mallard and Goldeneye. Spotted Flycatchers were numerous and Red-backed Shrike was here. An Osprey hunted and dived over the lake, whilst Black Storks fed along the lakeshore. Growing in the meadows we found *Polemonium caeruleum*, *Bupleurum aureum*, *Trifolium lupinaster*, *Dianthus hoeltzeri*, and *Ribes meyeri*. *Viola disjuncta* was very attractive with its pale mauve lower petals and dark purple uppers. There were some particularly fine Siberian Larches here. Due to the dull weather butterflies were almost absent. We saw only Mazarine Blue and Eastern Bath White. We returned to the house for lunch.

In the afternoon we drove a short distance back along the road we had travelled in on yesterday, but had had no time to stop. First of all we stopped at the pass, at some 1850m. The meadows here were yellow with the lovely *Bupleurum aureum*. *Dracocephalum grandiflorum*, *Antennaria dioica*, *Potentilla asiatica*, and *Papaver nudicaule* contributed to the floral spectacle. Lesser Marbled Fritillary was noted. We decided to collect a bunch of flowers from each of the afternoon's sites (a la Anna Ivaschenko) to grace our dinner table, and help us during the checklists. There were so many beautiful flowers here that the table was really a picture. Other species from this productive first stop were *Pedicularis proboscidea*, *Sanguisorba officinalis*, *Valeriana officinalis* and a *Scutellaria* species. Moving back towards the village we found a good population of *Swertia obtusa*. Also here were *Parnassia palustris*, and *Scirpus sylvaticus*. Stonechat was here, and Quail was heard. The third stop gave us *Aconitum baicalense*, *Aconitum leucostomum* and *Achillea ledebourii* for the table. Back at the house the sauna had been fired up and we took it in turns to

enjoy this typical Central Asian experience. We were relieved to see Yevgeny and the others arrive from Zaissan, having dismantled the camp in very adverse conditions.

Day 8 Thursday 25th July Markakol - the Cold Pass

Today was a little more strenuous as we set off to walk up to the Cold Pass, at 1750m some 300m in altitude above the village. Masked and Grey Wagtails were noticeable as we walked through the village. Initially our route was heavily grazed but the vegetation improved the further up we got. Again Black Kites were common. *Dactylorhiza fuchsii* put on a good show. Greenish Warblers and three Ospreys were seen, and Small Tortoiseshells and Dark Green Fritillaries were on the wing. At last we had blue skies.

We strayed into a meadow that looked promising for butterflies, and we were not disappointed. Apollo was here, and Dusky Large Blue was found on its foodplant *Sanguisorba officinalis*. Fritillaries were represented by Niobe, Dark Green, and Lesser Marbled. *Erebia theano* was not uncommon. Beside the stream were Amanda's Blue and two Chestnut Heaths. *Mellicta centralasiae*, Tessellated Skipper and Scarce Copper added to the variety. Tree Pipits, Ravens, Willow Tit and Steppe Buzzard were all here too. We continued slowly to the pass. Common Lizard was noted on the way. The beautiful *Aquilegia glandulosa* was here, and the impressive knapweed-like *Rhaponticum carthamoides*. Crossbills were a good find, and both High Brown and Titania's Fritillaries were seen here. We ate our packed lunch on the pass, and then walked into the larches. The flies were present in clouds but we persevered and were rewarded with some lovely patches of the *Aquilegia*. Altai Pika was heard whistling, and we found a food collecting area of this species. It was pleasing to see *Erebia jeniensis* here again. *Aster alpinus* was in fine bloom on the pass. *Corydalis nobilis*, and *Allium altaica* were here and Vlad saw a Three-toed Woodpecker. Below us opened out a vast grassland and we watched some horsemen as they rode towards us. On the return walk we saw Redstart, a pale phase Booted Eagle, and *Clematis integrifolia* in flower. Near the village were several Grey-headed Goldfinches. Back at the house, Olga prepared tea and snacks for us. The evening was beautiful and tonight's sauna was particularly welcome. At dinner we celebrated Michael's fiftieth birthday.

Day 9 Friday 26th July The Austrian Road

The Austrian Road starts a short distance from Markakol and leads up to the Burkhat Pass. It is so called as it was built by central European prisoners of war during the First World War. This really is a rough track, but it leads up through some great habitat. Today we explored the lowest parts of this road.

As we left Markakol we had great views of two Black Storks beside the lake. We stopped first to photograph the distinctive graveyard just outside the village, with each grave having a yourta frame like construction around it. A little further along on the main road, were extensive meadows full of the usual plant community. The first of many *Erebia theano* was here, and a great find was Ripart's Anomalous Blue, in exactly the same spot that one was seen last year. *Clematis integrifolia* was here in seed. Common Rosefinch was numerous, whilst Stonechat was here too. Moor Frog was found. The mosquitoes got the better of us and we headed on. The next riverside stop had a stand of *Populus laurifolius*. We walked a little way along the track that leads to Mongolia. Essex Skipper,

Blyth's Reed Warbler, Steppe Buzzard, and Black Kites were all here.

Now we set off on the Austrian Road. Initially this is nothing more than a rocky stream bed, but the UAZs did a marvellous job of coping with it. The highlight on the drive up was a female Capercaillie with two young that sat on the track for several minutes before moving off. An excellent view. A rocky hillside further up held many Apollos and their foodplant *Sedum hybridum* was common here. Here we found one Chequered Blue. The shady roadsides held an interesting flora including many Twinflowers, *Pyrola minor*, Oak Fern and many lichens. We reached the lower pass where we ate lunch in a flowery meadow with magnificent vistas of vast spaces with no sign of human presence at all. The snow-capped peaks were particularly impressive. *Tulipa heterophylla* was here in seed, as was *Erythronium sibiricum*. A Spotted Fritillary of the *meridionalis* form was seen, as was a Lesser Spotted Fritillary. A Nuthatch appeared out of a large hole in one of the trees.

In the afternoon we walked back down the road, each of us going at our own pace. We had great views of Ortolan Bunting, and Yellowhammer was here too. Apollos were present in reasonable numbers. High Brown and Dark Green Fritillaries were here, and a female Chequered Blue. Nymphalids were represented by Hungarian Glider, Yellow-legged Tortoiseshell and Painted Lady. Mazarine Blue was very common, and Silvery Argus was a good find. Many interesting plants grew alongside the track. *Dictamnus angustifolius* was an impressive find. *Papaver nudicaule*, *Gymnospermium altaicum*, *Spiraea media* and *Alfredia cernua* were all here too. *Lilium martagon* and *Moneses uniflora* were added to the list.

Day 10 Saturday 27th July Journey to Burkhat Pass

Today we left Markakol and headed for the Burkhat Pass. Before we left we had a quick look in Markakol museum, with its' interesting collection of rather decaying specimens. A Ural Owl, a Bear with two cubs, and an odd form of Peacock butterfly with white suffusion around the eye spots were among the exhibits. Great Black-headed Gulls flew over the village. The neighbours had a cat with three beautiful kittens, and whilst those of us that go soft over such things were admiring them, rather incredibly a mouse appeared from inside the blanket in the bottom of the cat box! A mouse that lived with four cats!

Our route took us back along the Austrian Road, and to below the Burkhat Pass. The road was very muddy today as there had been a thunder storm overnight. Vlad was lucky enough to see a Corncrake from the moving vehicle. Red-backed Shrikes were seen too. We stopped on the Austrian road to admire the displays of Twinflowers, and One-flowered and Lesser Wintergreens. A stop by a rather bent bridge produced *Sedum purpurea*, *Potentilla fruticosa*, *Equisetum hyemale*, Apollo, and Silver-studded Blue. We arrived at the camp that had been set up for us at lunchtime. They really had chosen a fine setting, beside a rushing river. Michael spotted a Dipper in the river. Having settled in to the tents we convened for another of Olga's excellent lunches. Yellow-legged Tortoiseshell, Lesser Marbled Fritillary, and Mazarine Blues were here and there was a good colony of Silver-studded Blues.

In the afternoon we walked along the track in the direction of the pass. It was rather cloudy, with sunny spells, but we had rain towards the end of the afternoon. The butterflies were good this

afternoon. A female Alpine Blue was the highlight, but a male *Polyommatus erotides* was almost as impressive. Scarce Copper, *Mellicta centralasiae* and Titania's Fritillary were also here. An immature Golden Eagle soared overhead with Steppe Buzzards. A group of about six Blyth's Reed Warblers responded well to pishing.

Among the plants here were a species of *Woodsia*, *Parnassia palustris*, *Aster alpinus*, *Astragalus alpinus* (the foodplant of Alpine Blue), and two species of *Primula* in seed. Some dead logs supported a good selection of beetles including a large black longhorn and two smaller grey species. A Wasp Beetle, and a Velvet Ant were here. There was also an impressive wood boring wasp.

Day 11 Sunday 28th July Burkhat Pass

The night was very cold, but we awoke to much improved weather. After breakfast I found a Frog Orchid near my tent. We drove up to the Burkhat Pass, about one hour to the north. On the way we saw a few Long-tailed Susliks on a rocky outcrop. Once at the pass we negotiated the very thick dwarf birch scrub and headed towards a rocky outcrop where the snow had very recently melted. The flora was marvellous up here, with a fine display. *Trollius altaicus* was in glorious flower, as was *Aquilegia glandulosa*. The stunning white *Gentiana gelida* was very impressive. *Viola altaicus* and *Anemone protracta*, *Corthusa altaica*, *Saxifraga sibirica*, *Saxifraga punctata*, *Pedicularis oederi*, *Lloydia serotina*, and *Callianthemum angustifolium* gave a wonderful show! *Gentiana glandulifera* and *Ranunculus altaicus* added to the variety. Two superficially similar white flowers, *Macropodium nivale* and *Lagotis integrifolia* belonged to very different families. The former is a crucifer and the latter belongs to the Scrophulariaceae. There were no fewer than three species of dwarf willows up here, with the species listed as number 4 in the list being particularly attractive. *Rhodiola rosea* and *Bergenia crassifolia* were also here. We moved on to a nearby more or less permanent small snow patch. Here was a distinctive white flower, somewhat *Parnassia* like. The identity of this puzzled us for some time until I realised it was the spring-beauty *Claytonia joanneana*. *Dryas oxyodonta* was common in seed. *Pyrola rotundifolia*, *Sibbaldia procumbens*, *Gentiana grandiflora* and *Pedicularis compacta* were all seen too.

The butterflies were surprisingly good up here today, with one sheltered spot holding many interesting species. A female Purple-edged Copper, and two male Alpine Blues were here, the latter being an especially beautiful colour blue. Fritillaries were well represented by Bog Fritillary, Mountain Fritillary, Small Pearl-bordered Fritillary, *Clossiana selenis* and *Issoria eugenia*. False Comma, *Erebia maurisianus*, and *Erebia theano* were also here. A surprise sighting on the pass was a flock of eighteen Ruddy Shelduck. A male Hen Harrier hunted over the hillsides, giving very good views. Water Pipits sang, and an immature Rock Thrush was seen. Nutcracker was heard, and Hodgson's Mountain Finches seen. Siberian Chipmunk was noted too.

After lunch eaten in the relative warmth of the vehicle, we ambled downhill in the direction of the camp, having arranged for Andrei to drive and pick us up later in the afternoon. A good selection of flowers was seen, and a highlight was an Altai Pika.

Day 12 Monday 29th July Journey to Rakmanovkiye Kluchi

The night had been wet, and the Austrian Road was rather muddy as a consequence. We decamped and set off northwards, once again across the Burkhat Pass, and on to almost the border with Siberia, and the 'resort' at Rakmanovskiye Kluchi.

We stopped on the north side of the pass, and walked on for some way. Arran Brown was on the wing, together with *Erebia jenisiensis*. Imperial Eagle was seen, and the much commoner Steppe Buzzard. We were pleased to find Creeping Ladies Tresses here, and a little further on we saw *Veratrum nigrum*.

Once back onto the tarmac, in the Bukhtarma Valley, we headed east. The checkpoint in the town of Uryl took only five minutes, as Andrei used his influence with the officials there! We stopped for lunch in a side valley near Uryl, and this proved to be an excellent spot. Nutcrackers were much in evidence, and Michael found a Black Woodpecker for us. It was the butterflies here that were most impressive however. A female *Parnassius nomion* started things off, and then we found a colony of Damon Blue, a Reverdin's Blue, Dryads, *Coenonympha amaryllis*, Dusky Meadow Brown, and a Large Blue. The plants here included a species of *Asparagus* and *Dianthus deltoides*. Whilst we were seeing all this Olga prepared a welcome soup for lunch.

The weather deteriorated, and we arrived at Rakmanovskiye late afternoon in the rain. We were pleased to learn that we were all accommodated in the same cottage, that we had to ourselves, and that it had been recently redecorated. Having settled in we took an evening stroll down to the lake. Velvet Scoter was seen on the water and Pacific Swifts wheeled overhead. Greenish Warblers were active in the trees. In the wet flushes was growing *Potamogeton alpinus* and under the trees we found three species of clubmoss – *Diphasiastrum complanatum*, *Huperzia selago* and *Lycopodium annotinum*. *Sorbus sibirica* was also here.

Day 13 Tuesday 30th July Rakmanovskiye Kluchi

Another wet day. We split into two groups, with Vladimir leading a walk up to the pass, where in clear weather there are fine views of Belukha, the highest peak in the Altai. It proved a good walk for mammals, with seven Altai Pikas, three Grey Marmots, and a Mole being seen. Hodgson's Mountain Finch was found on the pass, with a Brown Accentor and Black Redstart too. The rest of the group accompanied me along the entrance road, where despite the rain we saw some interesting things. *Cardamine macrophylla* was in fine flower, and the wet flushes supported a variety of interesting plants such as *Carex melanantha*, *Carex pallescens*, *Eleocharis palustris* and *Epilobium palustris*. We saw several Siberian Chipmunks and a Red Squirrel. Nuthatches were common today, and we had good views of Black-throated Accentors. On the lake were twenty-five Velvet Scoters, and two Tufted Ducks. Yellow-browed Warbler was added to the list, and two Crossbills were seen. Crowberry was a good find, and *Gentiana grandiflora* and *Doronicum altaicum* were seen. Bluethroats were not uncommon today.

In the afternoon we all explored the nearer lakeshore. The weather had improved a little and we managed to find a few butterflies. Mazarine Blue, Dark Green Fritillary, Lesser Marbled Fritillary,

and *Erebia theano* were all here. Northern Wall Brown and Chequered Skipper were both additions to the trip list. A Sparrowhawk flew over the conifers, and on the lakeshore we found Moor Frog and Green Toad. A Fragrant Orchid was a new species for the trip.

Day 14 Wednesday 31st July Journey to Ust Kamenogorsk

We loaded the vehicles and set off on the long journey to Ust-Kamenogorsk. Again it was pouring with rain. We made good progress, and reached the Zaissan ferry in good time. Bullfinch was seen on the journey, and a Wryneck sitting on a fence post in almost exactly the spot we had seen one the previous year. Raptors were much in evidence on the journey, with Imperial Eagle, Steppe Eagle, Montagu's Harrier, Sparrowhawk, Black Kite, and Kestrel all seen today. Hoopoe was seen and Corvids and Starlings were abundant. We caused much interest among the other passengers on the Zaissan ferry. Cormorants, Yellow-legged Gull, Great Black-headed Gull and Common Tern were all seen from the ferry.

We ate lunch in a yourta. Nearby we saw False Grayling and Common Blue. Sand Lizard and Adder were found. Another stop at the roadside yourta in the Kalbinsky Hills produced *Tongeia fischeri*, Holly Blue and a female Chequered Blue. Other species noted on the journey were Moorhen, Bee-eaters, and a Cuckoo. Two Red-cheeked Susliks were noted on the journey to Ust-Kamenogorsk. We arrived in town before dark and settled in to a pleasant hotel beside the river. A much cleaner and well-dressed group met for a great meal in the nearby pizza restaurant, and we were joined by some of the people from Altai Adventures.

Day 15 Thursday 1st August Journey to Almaty

After a Russian breakfast in the hotel we went to the airport. We said our farewells to Andrei, Micha, and our drivers, and went through the check-in procedures. We flew on a Yak 40, a smaller aircraft than we'd flown up on, but the flight was still perfectly smooth. The views of the Tien Shan as we approached Almaty were very impressive.

Almaty was hot. We transferred to the hotel and ate a pleasant lunch outside in a café. In the afternoon Vladimir took some of the group on a shopping trip. That evening we had another farewell dinner in a local restaurant. We retired to bed for a short nights sleep.

Day 16 Friday 2nd August Departure

We were up in the early hours and on the way to the airport. It was rather busy but things went smoothly enough. The flight was on time, and we caught our connection at Frankfurt with no problem.

Systematic List Number 1

Mammals

Long-eared Hedgehog	<i>Hemiechinus auritus</i>	One dead in Zaysan.
Pipistrelle	<i>Pipistrellus pipistrellus</i>	Almaty and Ust-Kamenogorsk. 2/14
Red-cheeked Suslik	<i>Spermophilus erythrogeus</i>	A few in the Zaysan Desert. 1/14
Long-tailed Suslik	<i>Spermophilus undulatus</i>	Scattered records. Max daily count of 3. 3/14
Siberian Chipmunk	<i>Eutamias sibiricus</i>	Quite frequent in wooded areas of the Altai. Max daily count 3. 6/14
Red Squirrel	<i>Sciurus vulgaris</i>	Only at Racmanovskie Klyuchi. 1/14
Golden Lemming	<i>Lagurus luteus</i>	This strange bundle of grey fur is a tertiary relict species and has few modern-day relatives. 1 in the Zaysan Desert! 1/14
Lesser Jerboa	<i>Allactaga elaphus</i>	At least 6 seen on night walk in Zaysan. 1/14
Grey Marmot	<i>Marmota bibacinia</i>	3 above Racmanovskiye Kluchi. 1/14
Red Pika	<i>Ochotona rutila</i>	1 at Cimbulak. 1/14
Altai Pika	<i>Ochotona</i>	Burkhat Pass, and Racmanovskiye Kluchi. 2/14
Mountain Hare	<i>Lepus timidus</i>	One at 'Spring by the hill', Zaysan. 1/14
Wolf	<i>Lupus lupus</i>	None seen but droppings at Uryl.
Corsac Fox	<i>Vulpes corsac</i>	2 sightings in Zaysan. 2/14
Mole	<i>Talpa europaea</i>	1 above Racmanovskiye Kluchi. 1/14
Wood Mouse	<i>Apodemus sylvaticus</i>	One dead in Zaysan.

Systematic List Number 2 Birds

The taxonomy is largely taken from Professor Edward Gavrillov's summary of status and distribution to be found in the 'Guide to the Birds of the Kazakhstan Republic' published in 2000. A few common names and subspecies details are taken from MacKinnon and Phillipps's Birds of China also published in 2000.

To give an idea of frequency of sightings we give a figure at the end of the comments section which indicates the number of days out of 14 on which a species was seen – 6/14 means that a species was noted on 6 days out of 14. 'Leader only records' are indicated by the leaders initials – PC= Paul Cardy, VK = Vladimir Kolbintsev.

Itinerary in brief –

July 19 th	Daytrip from Almaty to Cim Bulak and the Tyuk-su Gate
July 20 th	Full day journey across the Kalbinskiy Hills and through the Zaysan Desert to camp on north shore of Lake Zaysan
July 21 st	Morning around campsite and afternoon at the Kiin Kerish canyon, both in the Zaysan Desert
July 22 nd	Morning visit to the 'spring by the hill'. Afternoon visit to 'old campsite'. Both in Zaysan Desert.
July 23 rd	Journey from Zaysan to Markakol. Some time on Zaysan's shore and at various points en route including the Marble Pass near Alexeevka on the Chinese Border
July 24 th	Full day at Markakol – walks from the village
July 25 th	Full day at Markakol – walk to the 'Cold Pass'
July 26 th	Full day at Markakol – road towards Burkhat – the Alatay Pass
July 27 th	Journey north across the south Altai to the Burkhat Pass. Karakaba River.
July 28 th	Burkhat Pass
July 29 th	Journey to Racmanovskiye Kluchi.
July 30 th	Full day at Racmanovskiye Kluchi.
July 31 st	Journey west to Ust-Kamenogorsk
August 1 st	Ust-Kamenogorsk to Almaty. Afternoon free in city

Dalmatian Pelican	<i>Pelecanus crispus</i>	Up to a maximum of 42 by the Zaysan shore. 3/14
Great White Egret	<i>Egretta alba</i>	A maximum of 2 at Zaysan. 2/14
Grey Heron	<i>Ardea cinerea</i>	Seen at Zaysan. 3/14
Black Stork	<i>Ciconia nigra</i>	Up to 3 noted daily at Markakol. 3/14
Greylag Goose	<i>Anser anser</i>	Noted at Zaysan. 2/14
Ruddy Shelduck	<i>Tadorna ferruginea</i>	Scattered. A group of 18 on the Burkhat Pass! 4/14
Shelduck	<i>Tadorna tadorna</i>	Up to 15 daily at Zaysan. 3/14
Gadwall	<i>Anas strepera</i>	A few at Zaysan Lake. 1/14
Mallard	<i>Anas platyrhynchos</i>	Markakol. 2/14
Tufted Duck	<i>Aythya fuligula</i>	3 at Racmanovskie Klyuchi. 2/14
Goldeneye	<i>Clangula bucephala</i>	Markakol in small numbers. 1/14
Velvet Scoter	<i>Melanitta deglandi</i>	Small numbers at Racmanovskie Kluchi. A female at Markakol. 4/14
Goosander	<i>Mergus merganser</i>	8 at Burkhat campsite. 1/14
Osprey	<i>Pandion haliaeetus</i>	Scattered records at Markakol. 3/14
Black Kite	<i>Milvus migrans</i>	Widespread and abundant. 12/14

Pallid Harrier	<i>Circus macrourus</i>	1 in Zaysan Desert. 1/14
Montagu's Harrier	<i>Circus pygargus</i>	Scattered. A total of 5. 2/14
Hen Harrier	<i>Circus cyaneus</i>	A male at Burkhat. 1/14
Sparrowhawk	<i>Accipiter nisus</i>	Singles at Racmanovskiye Kluchi. 2/14
Common Buzzard	<i>Buteo buteo</i>	'vulpinus' race? Noted most days. Max daily count 4. 9/14
Long-legged Buzzard	<i>Buteo rufinus</i>	Only 2, in Zaysan. 1/14
Upland Buzzard	<i>Buteo hemilasius</i>	10+ a day in the Zaysan desert area, mostly between the camp site and Kiin Kerish Canyon. 4/14
Steppe Eagle	<i>Aquila nipalensis</i>	Only one record (VK). 1/14
Imperial Eagle	<i>Aquila heliaca</i>	Zaysan and north of Burkhat. 3/14
Golden Eagle	<i>Aquila chrysaetos</i>	2 immatures near Burkhat campsite. 1/14
Booted Eagle	<i>Hieraaetus pennatus</i>	A pale phase bird at Markakol. 1/14
Lesser Kestrel	<i>Falco naumanni</i>	4+ in the Zaysan. May have been missed elsewhere. 1/14
Common Kestrel	<i>Falco tinnunculus</i>	Widespread except in Markakol area. 9/14
Hobby	<i>Falco subbuteo</i>	Scattered. A maximum of 4. 3/14
Saker	<i>Falco cherrug</i>	2 in Zaysan. 2/14
Black Grouse	<i>Tetrao tetrix</i>	Droppings on Cold Pass.
Capercaillie	<i>Tetrao urogallus</i>	Droppings in Markakol area. A female with 2 young seen very well on the Austrian Road. 1/14
Quail	<i>Coturnix coturnix</i>	Heard occasionally. 3/14
Corncrake	<i>Crex crex</i>	1 north of Markakol (VK). 1/14
Moorhen	<i>Gallinula chloropus</i>	On route to Ust-Kamenogorsk (PC). 1/14
Demoiselle Crane	<i>Anthropoides virgo</i>	Max count of 5 on the shores of Lake Zaysan. 2/14
Oystercatcher	<i>Haematopus ostralegus</i>	Max of 5 along shores of Lake Zaysan. 3/14
Black-winged Stilt	<i>Himantopus himantopus</i>	Scattered along shores of Lake Zaysan. 1/14
Avocet	<i>Recurvirostra avosetta</i>	4 at Zaysan. 1/14
Little Ringed Plover	<i>Charadrius dubius</i>	Up to 10 at Zaysan. 3/14
Ringed Plover	<i>Charadrius hiaticula</i>	Zaysan. 1/14
Kentish Plover	<i>Charadrius alexandrinus</i>	Zaysan. 1/14
Lapwing	<i>Vanellus vanellus</i>	Scattered along Zaysan's shore. 4/14
Little Stint	<i>Calidris minuta</i>	1 at Zaysan. 1/14
Curlew Sandpiper	<i>Calidris ferruginea</i>	1 at Zaysan. 1/14
Black-tailed Godwit	<i>Limosa limosa</i>	Up to 15 at Zaysan. 4/14
Whimbrel	<i>Numenius phaeopus</i>	Zaysan. 1/14
Curlew	<i>Numenius arquata</i>	Up to 15 on Zaysan's shore. 3/14
Common Redshank	<i>Tringa totanus</i>	Common along Zaysan's shore. 4/14
Green Sandpiper	<i>Tringa ochropus</i>	On route to Ust-Kamenogorsk. 1/14
Wood Sandpiper	<i>Tringa glareola</i>	3 in Zaysan. 1/14
Common Sandpiper	<i>Actitis hypoleucos</i>	Widespread in small numbers. 10/14
Great Black-headed Gull	<i>Larus ichthyaetus</i>	Lake Zaysan and Markakol. 5/14
Black-headed Gull	<i>Larus ridibundus</i>	Very common around Zaysan. 5/14
'Herring' Gull	<i>Larus 'argentatus'</i>	Scattered around Zaysan. 6/14 – most seemed to be of the 'barabensis' race?
Gull-billed Tern	<i>Gelochelidon nilotica</i>	Noted at Lake Zaysan. 3/14
Caspian Tern	<i>Sterna caspia</i>	14 by the Zaysan Lake. 2/14
Common Tern	<i>Sterna hirundo</i>	Lake Zaysan. 5/14
Little Tern	<i>Sterna albifrons</i>	Quite common along Zaysan's shores. 4/14
Whiskered Tern	<i>Chlidonias hybridus</i>	Zaysan. 1/14
White-winged Tern	<i>Chlidonias leucopterus</i>	Zaysan. 3/14
Pallas's Sandgrouse	<i>Syrphaptus paradoxus</i>	Max daily count of about 50 in the Zaysan Desert. 2/14

Rock Dove	<i>Columba livia</i>	Widespread. 7/14
Rufous Turtle Dove	<i>Streptopelia orientalis</i>	Widespread. 8/14
Cuckoo	<i>Cuculus canorus</i>	Only one record. 1/14
Nightjar	<i>Caprimulgus europaeus</i>	3 in Zaysan. 2/14
Common Swift	<i>Apus apus</i>	Common at Zaysan Desert. 2/14
Pacific Swift	<i>Apus pacificus</i>	Quite common at Racmanovskie Klyuchi. 1/14
European Bee-eater	<i>Merops apiaster</i>	Common near Alexeevka. 3/14
Roller	<i>Coracias garrulus</i>	Alexeevka. 1/14
Hoopoe	<i>Upupa epops</i>	Scattered. 6/14
Wryneck	<i>Jynx torquilla</i>	2 on fencepost en route from Racmanovskie Klyuchi. 1/14
Black Woodpecker	<i>Dryocopus martius</i>	1 near Uryl. 1/14
Northern Three-toed Woodpecker	<i>Picoides tridactylus</i>	1 on the Cold Pass above Markakol. 1/14
Lesser-spotted Woodpecker	<i>Dendrocopos minor</i>	2 at Markakol. 1/14
Black Lark	<i>Melanocorypha yeltoniensis</i>	Very common in the Zaysan Desert. 3/14
Short-toed Lark	<i>Calandrella brachydactyla</i>	Common in the Zaysan Desert. 3/14
Asian Short-toed Lark	<i>Calandrella cheelensis</i>	Only 1 in the Zaysan. Drives through the desert put up hundreds of small larks that were not identified specifically. 1/14
Shore Lark	<i>Eremophila alpestris</i>	1 at Kiin Kerish. 1/14
Sand Martin	<i>Riparia riparia</i>	Abundant around Lake Zaysan. 3/14
Swallow	<i>Hirundo rustica</i>	Widespread. 11/14
Richard's Pipit	<i>Anthus richardi</i>	1 by the police checkpoint near Alexeevka. 1/14
Tawny Pipit	<i>Anthus campestris</i>	Scattered in drier habitats. 2/14
Tree Pipit	<i>Anthus trivialis</i>	Common around Markakol, Burkhat Pass and Racmanovskie Klyuchi. 7/14
Water Pipit	<i>Anthus spinoletta</i>	2 on the Burkhat Pass. 1/14
Yellow Wagtail	<i>Motacilla flava</i>	Several of the 'beema' race noted at Zaysan along with a few 'feldegg' but most in this area seemed to be the race 'melanogrisea'. 5/14
Grey Wagtail	<i>Motacilla cinerea</i>	Common in the hills. 9/14
White Wagtail	<i>Motacilla alba</i>	Scarce. 1/14
Masked Wagtail	<i>Motacilla personata</i>	Widespread. 8/14
Dipper	<i>Cinclus cinclus</i>	1 near Burkhat campsite. 1/14
Brown Accentor	<i>Prunella fulvescens</i>	Racmanovskiye Kluchi. 1/14
Black-throated Accentor	<i>Prunella atrogularis</i>	Cimbulak and Racmanovskiye Kluchi. 2/14
Bluethroat	<i>Luscinia svecica</i>	Scattered records. 5/14
Black Redstart	<i>Phoenicurus ochruros</i>	1 at Uryl and 1 at Racmanovskiye Kluchi. 2/14
Common Redstart	<i>Phoenicurus phoenicurus</i>	Widespread in wooded areas of the hills. 4/14
Stonechat	<i>Saxicola torquata</i>	Widespread and locally abundant. 9/14
Isabelline Wheatear	<i>Oenanthe isabellina</i>	Common in the Zaysan Desert. 5/14
Northern Wheatear	<i>Oenanthe oenanthe</i>	Widespread. 7/14
Pied Wheatear	<i>Oenanthe pleschanka</i>	Old campsite area in Zaysan. 1/14
Rock Thrush	<i>Monticola saxatilis</i>	Immatures in Zaysan and at Burkhat Pass. 2/14
Song Thrush	<i>Turdus philomelos</i>	Markakol area. 2/14
Mistle Thrush	<i>Turdus viscivorus</i>	Common in the hills. 6/14
Black-throated Thrush	<i>Turdus atrogularis</i>	Only in Racmanovskiye area. 2/14
Blyth's Reed Warbler	<i>Acrocephalus dumetorum</i>	Common in meadow herbage and forest understory around Markakol – also scattered elsewhere. 8/14
Altai Lesser Whitethroat	<i>Sylvia curruca altai</i>	Common in the hills. 3/14

Desert Lesser Whitethroat	<i>Sylvia minutula</i>	Several seen at Kiin Kerish, Zaysan Desert
Common Whitethroat	<i>Sylvia communis</i>	Scattered. 2/14
Greenish Warbler	<i>Phylloscopus trochiloides</i>	Quite common in woodlands and forests. 8/14
Hume's Yellow-browed Warbler	<i>Phylloscopus humei</i>	A few above Cim Bulak, Almaty. 1/14
Yellow-browed Warbler	<i>Phylloscopus inornatus</i>	Racmanovskie Klyuchi. 1/14
Chiffchaff	<i>Phylloscopus collybita</i>	Quite widespread - interesting song! 5/14
Spotted Flycatcher	<i>Muscicapa striata</i>	Scattered records. 5/14
Long-tailed Tit	<i>Aegithalos caudatus</i>	Markakol area. 2/14
Great Tit	<i>Parus major</i>	Scattered. 4/14
Coal Tit	<i>Parus ater</i>	Scattered records. 4/14
Willow Tit	<i>Parus montanus</i>	Common in all wooded areas in the Altai. 6/14
Nuthatch	<i>Sitta europaea</i>	Scattered in wooded areas. 5/14
Treecreeper	<i>Certhia familiaris</i>	2 at Racmanovskiye Kluchi. 1/14
Red-backed Shrike	<i>Lanius collurio</i>	Widespread and very common. 6/14
Red-tailed Shrike	<i>Lanius phoenicuroides</i>	3 in Zaysan. 1/14
Lesser Grey Shrike	<i>Lanius minor</i>	Near Chinese border. 1/14
Great Grey Shrike	<i>Lanius excubitor</i>	'funereus' race, Zaysan. 1/14
Magpie	<i>Pica pica</i>	Widespread. 9/14
Nutcracker	<i>Nucifraga caryocatactes</i>	Not uncommon on the Burkhat Pass and also at Racmanovskie Klyuchi. Max daily count 3. 3/14
Jackdaw	<i>Corvus monedula</i>	Widespread and locally abundant. 4/14
Rook	<i>Corvus frugilegus</i>	Widespread and locally abundant. 3/14
Carrion Crow	<i>Corvus corone</i>	Subspecies 'orientalis'. Widespread. 12/14
Hooded Crow	<i>Corvus corone</i>	Subspecies 'cornix'. Noted at Ust- Kemenogorsk. 2/14
Raven	<i>Corvus corax</i>	Widespread in low numbers. 5/14
Starling	<i>Sturnus vulgaris</i>	Abundant in Zaysan. 4/14
Rose-coloured Starling	<i>Sturnus roseus</i>	Very scarce this year. 1/14
Common Myna	<i>Acridotheres tristis</i>	Almaty. 1/14
House Sparrow	<i>Passer domesticus</i>	Noted in villages etc. 2/14
Tree Sparrow	<i>Passer montanus</i>	Locally quite common. 4/14
Grey-headed Goldfinch	<i>Carduelis carduelis caniceps</i>	Scattered records. 3/14
Linnet	<i>Carduelis cannabina</i>	Scattered records. 2/14
Hodgson's Rosy Finch	<i>Leucosticte arctoa</i>	Cimbulak and Burkhat Pass. 2/14
Common Rosefinch	<i>Carpodacus erythrinus</i>	Widespread. 9/14
Crossbill	<i>Loxia curvirostra</i>	Scattered records. 4/14
Bullfinch	<i>Pyrrhula pyrrhula</i>	1 near Racmanovskiye Kluchi. 1/14
Yellowhammer	<i>Emberiza citrinella</i>	Scattered records. 2/14
Ortolan Bunting	<i>Emberiza hortulana</i>	Zaysan and Austrian Road. 2/14
Yellow-breasted Bunting	<i>Emberiza aureola</i>	A male near Markakol (VK). 1/14
Red-headed Bunting	<i>Emberiza bruniceps</i>	Zaysan. 2/14

Systematic List Number 3 Amphibians and Reptiles

Moor Frog	<i>Rana arvalis</i>	Noted at Markakol, on the Burkhat Pass, and at Racmanovskiye Kluchi.
Green Toad	<i>Bufo viridis</i>	3 in pines across the lake at Racmanovskie Klyuchi.
Common Toad	<i>Bufo bufo</i>	Markakol
Sand Lizard	<i>Lacerta agilis</i>	Widespread – e.g. by the Zaysan Camp.
Common Lizard	<i>Lacerta vivipara</i>	Scattered records.
Steppe Runner	<i>Eremurus arguta</i>	4 in the Zaysan Desert.
Sun-watcher	<i>Phrynocephalus helioscopa</i>	1 in the Zaysan Desert.
Zaysan Toad-headed Agama	<i>Phrynocephalus melanurus</i>	Common in sandy desert near the first ferry crossing at Lake Zaysan
Adder	<i>Vipera berus</i>	A skin in Zaysan, one near Burkhat campsite (VK), and 1 on journey to Ust-Kamenogorsk
Dione Snake	<i>Elaphus dione</i>	Zaysan campsite
Grass Snake	<i>Natrix natrix</i>	Austrian Road.

Systematic List Number 4 Butterflies

The taxonomy and nomenclature for the following list has been taken from ‘Die Tagfalter Nordwestasiens’ by Lukhtanov and Lukhtanov (1994)

Papilionidae

<i>Papilio machaon</i>	Swallowtail	Rather scarce – only two records. Kalbinsky Hills and Cold Pass. 2/14
<i>Parnassius nomion</i>		A female near Uryl. 1/14
<i>Parnassius apollo</i>	Apollo	subspecies ‘ <i>alpherakyi</i> ’. Widespread and common. 6/14 subspecies ‘ <i>mongolicus</i> ’. Cimbulak. 1/14

Pieridae

<i>Anthocharis cardamines</i>	Orange-Tip	Scarce this year. 3/14
<i>Aporia crataegi</i>	Black-veined White	Scarce in Markakol area. 2/14
<i>Metaporis leucodice</i>		Several at Cimbulak. 1/14
<i>Colias erate</i>	Eastern Pale Clouded Yellow	Several at Cimbulak, also in Zaysan. 3/14
<i>Gonepteryx rhami</i>	Brimstone	Cimbulak and Kalbinsky Hills. 2/14
<i>Leptidea sinapis</i>	Wood White	Cimbulak and Kalbinsky Hills. 2/14
<i>Pieris brassicae</i>	Large White	Cimbulak. 1/14
<i>Pieris napi muechi</i>	Green-veined White	Scattered records. 3/14
<i>Pieris rapae</i>	Small White	Scattered records. 3/14
<i>Pontia edusa</i>	Eastern Bath White	Widespread and common. 8/14
<i>Pontia chlorodice</i>	Small Bath White	One below the Cold Pass. 1/14

Lycaenidae

<i>Lycaena phlaeas</i>	Small Copper	Cimbulak. 1/14
<i>Lycaena thersamon</i>	Lesser Fiery Copper	1 near the spring by the hill, Zaysan. 1/14
<i>Lycaena virgaureae</i>	Scarce Copper	Common in Markakol area. 4/14
<i>Lycaena hippothoe</i>	Purple-edged Copper	A pair on the Burkhat Pass. 1/14
<i>Tongeia fisheri</i>		Kalbinsky Hills and Austrian Road. 3/14
<i>Celastrina argiolus</i>	Holly Blue	Kalbinsky Hills. 2/14
<i>Cupido osiris</i>	Osiris Blue	Scattered records. 2/14
<i>Cupido minimus</i>	Small Blue	3 on the Austrian Road. 1/14
<i>Scolitantides orion</i>	Chequered Blue	A female on the Austrian Road and 2 at the Zaysan lunchtime yourta. 3/14
<i>Maculinea arion</i>	Large Blue	Scattered records. Cimbulak, Uryl, and Kalbinsky Hills. 3/14
<i>Maculinea nausithous</i>	Dusky Large Blue	1 below Cold Pass. 1/14
<i>Plebeius argyrognomon</i>	Reverdin’s Blue	Near Uryl. 1/14
<i>Plebeius idas</i>	Idas Blue	Scot’s Pine in Kalbinsky Hills and Bukhtarma Valley. 2/14
<i>Plebeius argus</i>	Silver-studded Blue	Common around Burkhat campsite. 3/14
<i>Albulina orbitulus</i>	Alpine Blue	A female and two males in Burkhat area. 2/14
<i>Aricia artaxerxes</i>	Mountain Argus	subspecies ‘ <i>strandii</i> ’. Common in the Markakol area. 5/14
<i>Aricia nicias</i>	Silvery Argus	A total of 20 in the Markakol area. 1/14
<i>Eumedonia eumedon</i>	Geranium Argus	Kalbinsky Hills. 1/14
<i>Cyaniris semiargus</i>	Mazarine Blue	Widespread and common. 7/14
<i>Agrodiaetus amandus</i>	Amanda’s Blue	Scattered records. 3/14

<i>Agrodiaetus damon</i>	Damon Blue	subspecies 'mongolicus'. A colony near Uryl. 1/14
<i>Agrodiaetus ripartii</i>	Ripart's Anomalous Blue	1 near Markakol. 1/14
<i>Polyommatus icarus</i>	Common Blue	Scarce. 3/14
<i>Polyommatus eroides</i>		A male near Burkhat campsite. 1/14

Nymphalidae

<i>Argynnis adippe</i>	High Brown Fritillary	Common in Markakol area. 3/14
<i>Argynnis aglaja</i>	Dark Green Fritillary	Very common in the Markakol area. 5/14
<i>Argynnis pandora</i>	Cardinal	1 at Cimbulak. 1/14
<i>Clossiana erubescens</i>		2 at Cimbulak. 1/14
<i>Clossiana eunomia</i>	Bog Fritillary	1 at Burkhat Pass. 1/14
<i>Clossiana selene</i>	Small Pearl-bordered Fritillary	1 at Burkhat Pass. 1/14
<i>Clossiana selenis</i>		1 at Burkhat Pass. 1/14
<i>Clossiana titania</i>	Titania's Fritillary	Several in the Markakol area. 2/14
<i>Issoria lathonia</i>	Queen of Spain Fritillary	Cimbulak and Markakol. 3/14
<i>Issoria eugenia</i>		4 on the Burkhat Pass. 1/14
<i>Boloria napaea</i>	Mountain Fritillary	2 on Burkhat Pass. 1/14
<i>Brenthis hecate</i>	Twin-spot Fritillary	2 in Kalbinsky Hills. 1/14
<i>Brenthis ino</i>	Lesser Marbled Fritillary	Widespread and very common. 6/14
<i>Melitaea didyma</i>	Spotted Fritillary	Markakol area. <i>meridionalis</i> form. 2/14
<i>Melitaea trivialis</i>	Lesser Spotted Fritillary	Austrian Road. 2/14
<i>Mellicta centralasiae</i>		Scattered records in Markakol area. 3/14
<i>Neptis rivularis</i>	Hungarian Glider	Cimbulak and Austrian Road. 4/14
<i>Limenitis populi</i>	Poplar Admiral	Yurt in Kalbinsky Hills. 1/14
<i>Limenitis sydyi</i>		Yurt in Kalbinsky Hills. 1/14
<i>Limenitis helmanni</i>		Yurt in Kalbinsky Hills. 1/14
<i>Nymphalis antiopa</i>	Camberwell Beauty	Many larvae on <i>Salix</i> at Cimbulak. 1/14
<i>Nymphalis vau-album</i>	False Comma	Cimbulak and Austrian Road. 2/14
<i>Nymphalis xanthomelas</i>	Yellow-legged Tortoiseshell	5 in Markakol area. 2/14
<i>Aglais urticae</i>	Small Tortoiseshell	Widespread in small numbers. 6/14
<i>Araschnia levana</i>	Map Butterfly	4 at yurt in Kalbinsky Hills. 1/14
<i>Inachis io</i>	Peacock	Cimbulak. An interesting form with white scales around the eye-spots in the museum at Markakol. 1/14
<i>Cynthia cardui</i>	Painted Lady	Widespread in small numbers. 4/14
<i>Polygonia c-album</i>	Comma	Kalbinsky Hills and Austrian Road. 2/14

Satyridae

<i>Chazara enervata</i>		Common at Cimbulak. 1/14
<i>Chazara heydenreichi</i>		Kalbinsky Hills. 1/14
<i>Minois dryas</i>	Dryad	Only near Uryl. 1/14
<i>Coenonympha glycerion</i>	Chestnut Heath	Several in Markakol and Kalbinsky areas. 5/14
<i>Coenonympha pamphilus</i>	Small Heath	Widespread. 3/14
<i>Coenonympha amaryllis</i>		Near Uryl. 1/14
<i>Coenonympha sunbecca</i>		2 at Cimbulak. 1/14
<i>Erebia ligea</i>	Arran Brown	Burkhat Pass. 1/14
<i>Erebia jeniseiensis</i>		A few in the Markakol area. 2/14
<i>Erebia kindermanni</i>		Several on the Burkhat Pass. 1/14
<i>Erebia maurisius</i>		4 on the Burkhat Pass. 1/14
<i>Erebia theano</i>		Widespread and common in meadows above about 1100m. 5/14
<i>Erebia meta</i>		Cimbulak. 1/14

Erebia turanica
Aphantopus hyperantus
Arethusana arethusa
Hyponphele lycaon
Hipparchia autonoe
Lasiommata maera
Lasiommata petropolitana
Melanargia russiae
Kirinia eversmanni

False Grayling
Dusky Meadow Brown

Large Wall Brown

Esper's Marbled White

Cimbulak. 1/14
Singletons in Kalbinsky Hills. 1/14
By the lunchtime yourta in the Zaysan. 1/14
Kalbinsky Hills. 1/14
Kalbinsky Hills. 1/14
Quite common in Markakol area. 3/14
1 at Racmanovskie Kluchi. 1/14
Scot's Pine in Kalbinsky Hills. 1/14
Cimbulak. 1/14

Hesperiidae

Ochlodes venetus
Muschampia tessellum
Thymelicus lineola
Carterocephalus palaemon

Large Skipper
Tesselated Skipper
Essex Skipper
Chequered Skipper

Only at Markakol. 1/14
Cold Pass. 1/14
Widespread. 5/14
1 at Racmanovskie Kluchi. 1/14

Systematic List Number 5

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.

Species recorded this year are annotated 2002.

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. {Water Horsetail} 2002
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

Aspleniaceae

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

Athyriaceae

<i>Cystopteris fragilis</i>	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
<i>Gymnocarpium dryopteris</i>	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
<i>Matteucia struthiopteris</i> [<i>Woodsia</i> #1]	Woodland by Bukhtarma River, near Berel. {Ostrich Fern} Rock crevices high on Burkhat Pass. { <i>W. acuminata</i> , <i>W. calcarea</i> or <i>W. ilvensis</i> } 2002
Aspidiaceae	
<i>Dryopteris dilatata</i>	Woodland by Bukhtarma River. {Broad Buckler-fern}
<i>Dryopteris filix-mas</i>	Woodland by Bukhtarma River. {Male Fern}
Polypodiaceae	
<i>Polypodium vulgare</i> s.l.	Rocks in pine woods in Kalbinskiy Hills. {Polypody}. 2002
Ophioglossaceae	
<i>Botrychium lunaria</i>	Turf at higher levels in Cim Bulak. {Moonwort}.

B. CONIFEROPSIDA

Conifer trees and their allies

Pinaceae

<i>Larix sibirica</i>	Mountain forests up to the tree line: Cim Bulak, around and above Markakol, and near Rakhmanovskie Klyuchi. {Siberian Larch}. 2002
<i>Picea obovata</i>	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} 2002
<i>Picea tianshanica</i>	Mountain forests up to the tree line: Cim Bulak. {Tien Shan Spruce} 2002
<i>Pinus sibirica</i>	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} 2002
<i>Pinus sylvestris</i>	Locally dominant in central Kalbinskiy Hills. {Scots Pine}. 2002

Cupressaceae

<i>Juniperus pseudosabina</i>	Drier slopes at all levels: Cold Pass, 10km north of Markakol, Burkhat Pass and Rakhmanovskie Klyuchi forest. {a juniper} 2002
<i>Juniperus sabina</i>	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}. 2002
<i>Juniperus sibirica?</i>	Rocky slopes at Cim Bulak {a juniper} 2002

Ephedraceae

[<i>Ephedra</i> sp.]	Arid slopes: Kiin Kerish and Marble Pass. {low greyish bushy joint-pine, probably either <i>E. dahurica</i> or <i>E. equisetina</i> } 2002
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C. MONOCOTYLEDONES “Monocot” flowering plants

Typhaceae

Typha laxmannii Wet depressions: Kuchun. {a reedmace}. 2002

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

Juncaginaceae

Triglochin maritimum Spring-fed saltmarsh in Zaysan depression. {Sea Arrowgrass}. 2002
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

<i>Phleum alpinum</i>	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>Blysmus 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 streamsides 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

- [*Isolepis/Scirpus* #1 Seasonally-wet grassland in Bukhtarma valley. {Like *I. setacea* but taller and even more slender}]
- [*Schoenoplectus* #1 Pool margins by seasonally wet grassland in Bukhtarma valley. {a clubrush resembling dwarf *S. tabernaemontani* – is it *S. hippolyti*?}]
- 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}. 2002
- Eremurus altaicus* Dry grassland and steppe in south Altai: Kalbinskiy Hills, Marble Pass and west from Zaysan north ferry. {a foxtail-lily}.
- Eremurus fuscus* Grasslands at low-mid levels: Cim Bulak. {a foxtail-lily}.
- Erythronium sibiricum* Grassland and forest at mid-high levels, flowering by snow-patches: around and above Markakol (including Cold Pass), along Austrian Road (common on Burkhat pass) and above Rakhmanovskie Klyuchi. {a dog's-tooth-violet} July all in seed. 2002
- [*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}. 2002
July gone over.
- Lloydia serotina* Rocks and damp fine scree, mid-high levels: Cim Bulak, by Austrian Road in Bukhtarma valley and on Burkhat Pass. {Snowdon Lily}
July Burkhat Pass. 2002
- 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}. 2002
- Tulipa biflora?* Arid slopes at Kiin Kerish and adjacent to spring-fed saltmarsh; probably also near Markakol. {a short tulip}. 2002
- Tulipa dasystemon* Recent snowmelt at high levels in Cim Bulak. {a tulip}.
- Tulipa heteropetala?* Stony south-facing slope: Marble Pass and near Markakol (especially to north). {a tulip}.

Tulipa heterophylla Flushed rocky ground at high levels: Cim Bulak. {a tulip}. 2002
Tulipa patens? Stony south-facing slope: Marble Pass and near Markakol. {a tulip}.
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} 2002
Veratrum nigrum Low scrub at mid-levels: Kalbinskiy Hills, Marble Pass and toward north end of Austrian Road. {Black False-Helleborine}. 2002

Alliaceae

Allium altaicum? Coarse flush vegetation above Rakhmanovskie Klyuchi. {Very tall fistulose onion with whitish globular head} 2002
Allium atosanguineum Moist rocky slopes in upper Cim Bulak. {a garlic}. 2002
Allium caesium Low scrub margins on Marble Pass. {a blue garlic}.
Allium hymenorrhizum Drier grasslands at all levels: Cim Bulak and between Zaysan lake and Ust-Kamenogorsk. {a garlic}. 2002
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}
 [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 Drier short grassland, mainly at mid-levels: Kalbinskiy Hills (probably this), Cold Pass, south of Markakol, and picnic bluff on Austrian Road. {short pale yellow iris}. 2002
Iris ruthenica Grassland and more open forest, mainly at mid-levels: Kalbinskiy Hills, around and above Markakol (including Cold Pass), Burkhat Pass, and around Rakhmanovskie Klyuchi. {a blue iris}. 2002
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. 2002

<i>Dactylorhiza incarnata</i>	Marshes and wet depressions: above Markakol (including hybrids with the latter), toward Austrian Road and by Karakaba river. {Early Marsh-orchid}.
<i>Dactylorhiza umbrosa</i>	Wet flushes in the mountains and marshy grassland at lower altitudes: Cim Bulak, and above Marble Pass. {a marsh-orchid} July gone over at Cimbulak. 2002
[<i>Dactylorhiza</i> #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 <i>D. knorringiana</i> , <i>D. salina</i> or a form of <i>D. traunsteineri</i> }]
<i>Goodyera repens</i>	Mossy ground in mixed conifer forest by Austrian Road north of Burkhat Pass. {Creeping Lady's-tresses}2002
<i>Herminium monorchis</i>	Abundant (patches of >> 50/m ²) in seasonally wet grassland in Bukhtarma valley. {Musk Orchid}
<i>Gymnadenia conopsea</i>	Racmanovskie 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} 2002

Populus nigra s.l.

Along rivers in steppe areas: Kalbinskiy Hills. {Black Poplar}. 2002

Populus tremula

Woodland at low-mid levels, especially near water: above Almaty, Kalbinskiy Hills, and southern Austrian Road. {Aspen}. 2002

Salix caprea

Damp scrub at low-mid levels: Markakol. {Goat Willow} 2002

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* #1]

By rivers at low-mid levels: Markakol and near south end of Austrian Road. {willow, oval leaves, glaucous beneath – *S. caesia/rorida?*} 2002

[*Salix* #2]

Dwarf birch scrub at high levels: Burkhat Pass. {Dwarf willow with leaves like *S. phylicifolia* and glaucous beneath}] 2002

[*Salix* #3]

Grass/sedge/lichen community by road on Burkhat Pass. {Prostrate with tiny oval leaves 7mm across}] 2002

[*Salix* #4]

Moist low vegetation on Burkhat Pass. {Prostrate/ascending with green leaves like small willow, 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 willow, 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}. 2002

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} 2002

[*Betula* #1]

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

[*Betula* #2]

Upper 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}.

	2002
<i>Humulus lupulus</i>	Scrub margins above Almaty and poplar gallery woodland in Kalbinskiy Hills. {Hop}. 2002
<i>Urticaceae</i>	
<i>Urtica cannabina</i>	Roadsides and fallow/waste ground: apiary campsite near Keramka and by Uryl checkpoint. {a nettle with 5-lobed leaves} 2002
<i>Urtica dioica</i>	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 <i>U. galeopsifolia</i> }. 2002
<i>Santalaceae</i>	
<i>Thesium refractum?</i>	Drier grassland and rocks at mid-high levels: around Markakol, picnic spot on south Austrian Road, and Burkhat Pass. {a bastard-toadflax}
<i>Thesium repens?</i>	Forming patches in light shade: south end of Austrian Road and Rakhmanovskie Klyuchi. {a bastard-toadflax}
<i>Polygonaceae</i>	
<i>Persicaria bistorta</i>	Montane grassland at mid-high levels: Cim Bulak and Burkhat Pass. {Bistort}. 2002
<i>Persicaria vivipara</i>	Montane grassland at mid-high levels: Cim Bulak and Bukhtarma Valley (including by northern Austrian Road).. {Alpine Bistort}. July abundant on Burkhat Pass. 2002
<i>Polygonum alpinum</i>	Abundant in hill and mountain grasslands: Cim Bulak and Kalbinskiy Hills. {Alpine Knotweed}. 2002
<i>Polygonum aviculare</i> s.l.	Roadsides and disturbed ground: Ust-Kamenogorsk and Markakol. {Knotgrass}. 2002
<i>Polygonum undulatum</i>	Rocky grassland at upper levels: Cim Bulak and Burkhat Pass. {a knotweed}. 2002
[<i>Polygonum</i> 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
<i>Rheum altaicum?</i>	Drier south-facing grass slopes above Markakol. {a rhubarb} 2002
<i>Rheum wittroekii</i>	Moist grassland at mid-levels: Cim Bulak. {a rhubarb}. July gone over. 2002
<i>Rheum nanum?</i>	Arid slopes: Kiin Kerish, and north of Markakol. {a small rhubarb}. 2002
<i>Rumex acetosa</i>	Grassland (except arid) at all levels: Markakol, southern Austrian Road, and Burkhat Pass. {Common Sorrel} 2002
<i>Rumex tianshanicus</i>	Grasslands at low-mid levels: Cim Bulak. {a dock}. 2002
<i>Chenopodiaceae</i>	
<i>Arthrophyton haloxylon</i>	Saline semi-desert, locally common: Zaysan depression. {Saxual} 2002
<i>Chenopodium suecicum?</i>	Ruderal habitats in villages: Urunkhayka. {a goosefoot}
<i>Chenopodium urbicum?</i>	Disturbed ground, especially in arid places: Ust-Kamenogorsk and Kiin Kerish (elsewhere in Zaysan depression). {Upright Goosefoot}. 2002
<i>Halimione verrucifera?</i>	Salt-steppe in the Zaysan depression, notably by spring-fed marsh {a “sea-purslane”} 2002
<i>Halocnemum strobilaceum?</i>	Low-lying saline areas of semi-desert where water stood late: Zaysan depression. {a perennial glasswort}. 2002

<i>[Kochia sp.?</i>	Dry and saline semi-desert at Kiin Kerish and by salt-spring. {Mats of needle like leaves, and erect flowering stems}}
<i>Nanophyton erinaceum</i>	Saline arid badlands at Kiin Kerish. {no common name}. 2002
<i>Salsola kali</i>	Arid cliff top at Kiin Kerish. {Spineless Saltwort, subsp. <i>ruthenica</i> } 2002
<i>[Salsola spp.</i>	Gravel ridges by saltmarsh below spring in Zaysan semi-desert. { <i>S. collina</i> , <i>S. nitraria</i> or <i>S. soda</i> are possibilities}}
<i>[Suaeda spp.</i>	Saline steppe: Zaysan depression <i>e.g.</i> by spring-fed saltmarsh. { <i>S. acuminata</i> , <i>S. heterophylla</i> and <i>S. microphylla</i> are possibilities}}] 2002
Amaranthaceae	
<i>Amaranthus retroflexus</i>	Weed in Panfilov Park, Almaty {Common Amaranth} July Ust-Kamenogorsk.
Portulacaceae	
<i>Claytonia joanneana</i>	Gaps in dwarf birch scrub and grassland above, at high levels on Burkhat Pass. {a spring-beauty} 2002
Caryophyllaceae	
<i>Acanthophyllum pungens</i>	Arid cliff-top and slopes at Kiin Kerish. {no common name}.
<i>Cerastium cerastioides</i>	Grasslands and rocks at mid-high levels, often common: Cim Bulak, around/above Markakol, and Burkhat Pass. {Starwort Mouse-ear}. 2002
<i>Cerastium dahuricum</i>	Disturbed ground at low-mid altitudes: Cim Bulak, Kalbinskiy Hills, and Markakol. {a mouse-ear}. 2002
<i>Cerastium fontanum</i>	Grasslands at low-mid levels: Cim Bulak and Markakol. {Common Mouse-ear}. 2002
<i>[Cerastium #1</i>	Mossy flushes by southern Austrian Road. {linear-leaved mouse-ear with large flowers}}
<i>Dianthus hoeltzeri</i>	Drier grassy bluffs in the Kalbinskiy Hills. {a pink}. 2002
<i>Dianthus superbus</i>	Drier grassland north of Markakol. {a pink} 2002
<i>Dianthus versicolor?</i>	Dry south-facing grassland on Burkhat Pass. {a pink} 2002
<i>Dianthus deltoides</i>	Near Uryl. 2002. Maiden Pink
<i>[Dianthus #1</i>	Dry steppe grassland at Alekseyevka. {a slender white pink}].
<i>[Dianthus #2</i>	Stony ridges in wet grassland in Bukhtarma valley. {a lacinate pink-flowered pink}}
<i>Eremogone longifolia?</i>	Steep south-facing steppe slope at Marble Pass. {resembles a tall erect long linear-leaved sandwort}
<i>Gypsophila paniculata</i>	Dry, often sandy ground in steppe and semi-desert, including stony verges: Zaysan campsite and west from north ferry. {a gypsophila}. 2002
<i>[Gypsophila #1</i>	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 <i>G. capituliflora</i> or <i>G. diffusa?</i> }}
<i>[Gypsophila #2</i>	Stony slope near lower Rakhmanovskie lake. {a prostrate gypsophila, resembling <i>G. glandulosa</i> of section <i>Heterochroa</i> – which is endemic to Turkey}}
<i>Herniaria glabra</i>	Dry stony slope 10km north of Markakol. {Smooth Rupturewort} 2002
<i>Minuartia biflora?</i>	Sedge/grass/lichen vegetation: near road on Burkhat Pass and above Rakhmanovskie Klyuchi. {Northern Sandwort} 2002
<i>Minuartia verna</i>	Grassy dry bluffs at high levels on Burkhat Pass. Spring Sandwort} 2002
<i>Moehringia umbrosa</i>	Mossy ground in spruce forests, less often in sheltered rock crevices: Cold Pass, all along Austrian Road and Rakhmanovskie Klyuchi. {a sandwort} 2002

<i>Sagina procumbens</i>	Wet mossy turf at all levels: Markakol. {Mossy Pearlwort} 2002
<i>Sagina saginoides?</i>	Mossy flushes by southern Austrian Road. {Alpine Pearlwort – may be a related species} 2002
<i>Silene adenopetala</i>	Rocks at high levels in Cim Bulak. {Low campion with few nodding flowers, each with an inflated sticky calyx almost concealing petals}
<i>Silene otites</i>	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. 2002
<i>Silene latifolia</i>	Widespread. 2002. White Campion.
[<i>Silene</i> #1	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
 <i>Paeoniaceae</i>	
<i>Paeonia anomala</i>	Low scrub and forest margins at low-mid levels: Kalbinskiy Hills, locally abundant around Markakol, riverine forest south end of Austrian Road, and north of Berel. {a large pink peony}. July in fruit. 2002
<i>Paeonia hybrida</i>	Steep stony south-facing slope on Marble Pass and verges west from Zaysan north ferry. {a peony}.
 <i>Ranunculaceae</i>	
<i>Aconitum baicalense</i>	Mossy damp willow scrub in Markakol. {a monk's-hood} 2002
<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}. 2002
<i>Aconitum songoricum</i>	Woodland margins at low-mid levels above Almaty. (a monk's-hood)
<i>Anemone altaica</i>	Woodland at low-mid levels, sometimes moist: Markakol and nearby, and southern end of Austrian Road. {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 2002 in seed.
<i>Anemone protracta</i>	Grassland at mid-high levels: Cim Bulak. {anemone of <i>A. narcissiflora</i> group}.
[<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} 2002
<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} 2002 in seed.
<i>Aquilegia glandulosa</i>	Mountain meadows at all levels, and also in shade: around and above Markakol (including Cold Pass), entire length of Austrian Road, Burkhat Pass, and Rakhmanovskie Klyuchi (access track, and colouring the slopes above the site). {a columbine} 2002

<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 2002 in seed.
<i>Callianthemum alatavicum</i>	Fine scree <i>etc</i> soil at high levels in Cim Bulak. {no common name}.
<i>Callianthemum angustifolium</i>	Edge of snow-patches, moist stony grassland at mid-upper levels: Cold Pass, Burkhat Pass and Rakhmanovskie Klyuchi. {no common name} 2002 leaves.
<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}. 2002
<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} 2002
<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. {a delphinium – possibly the same species above Rakhmanovskie Klyuchi}.
<i>Delphinium elatum</i> [<i>Delphinium spp.</i>]	Mountain meadows: above Almaty and Markakol. {a delphinium}. 2002 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}.
<i>Pulsatilla patens</i>	Drier grassland at all levels: Kalbinskiy Hills and north of Markakol. {a pasque-flower}.
<i>Ranunculus altaicus</i>	Margins of snow patches, mainly at high levels: Burkhat Pass and Rakhmanovskie Klyuchi. {a buttercup} 2002
<i>Ranunculus auricomus</i> s.s.	Woodland at low-mid levels: Markakol and southern Austrian Road. {Goldilocks Buttercup} 2002
<i>Ranunculus polyanthemus</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} 2002
[<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}
<i>Thalictrum collinum</i>	Grasslands at low-mid levels: Cim Bulak, Marble Pass and Markakol. {a meadow-rue}. 2002
<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-rue}
<i>Trollius altaicus</i>	Grassland and open woodland, especially at mid-levels, where it colours the ground: Kalbinskiy Hills, near Marble Pass, around and above Markakol (+ Cold Pass) and north of Berel. {a globe-flower} 2002 Burkhat Pass.
<i>Trollius dshungariensis</i>	Moist grasslands at mid-levels: Cim Bulak. {a globe-flower}. 2002
<i>Trollius lilacinus</i>	Stony slopes recently covered in snow at high altitudes in Cim Bulak. {a globe-flower}.

Berberidaceae

Gymnospermium altaicum Stony moist slopes with incomplete vegetation cover: near Cold Pass, and north of Markakol to southern Austrian Road {no common name – related to *Leontice*} 2002

Nymphaeaceae

Nuphar lutea Zaysan Lake. Yellow Water Lily. 2002

Papaveraceae

Chelidonium majus

Fine scree and rocky edges at low-mid levels: Kalbinskiy Hills, by apiary campsite near Kamenka, and near Berel. {Greater Celandine – Altai populations are much bigger-flowered than those of Europe}. 2002

Corydalis nobilis

Woodland margins and shady rocks all levels: Markakol (including Cold Pass) and Austrian Road north of Burkhat Pass. {a corydalis} 2002

Corydalis pauciflora?

Under willow bushes near National Park HQ, Markakol. {Small creamy white corydalis}.

Fumaria vaillantii

Apiary campsite near Kamenka. {Few-flowered Fumitory}

Hypericum lactiflorum?

Gravel spit at Zaysan campsite. {a whitish *Hypericum*}.

Papaver croceum

Meadows and rocks at mid-high levels: Cim Bulak. {a yellow poppy}. 2002

Papaver nudicaule

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} July also Markakol. 2002

Papaver tianshanicum

Rocky ground at high levels in Cim Bulak. {an orange poppy}.

Brassicaceae

Alyssum lenense?

Rocky outcrop by picnic spot on south Austrian Road. {short silvery perennial Alison – possibly *A. turkestanicum*}

[*Alyssum* #1

Dry stony ridges in wet grassland in Bukhtarma valley. {a white-hairy Alison – *A. campestre*? Possibly this species also in sandy semi-desert between Zaysan lake and Ust-Kamenogorsk}]

Arabidopsis thaliana

Stony ground by Karakaba river. {Thale Cress}

Arabis glabra

Drier grasslands at low-mid levels: Cim Bulak and Rakhmanovskie Klyuchi. {Tower Mustard}. 2002

Barbarea vulgaris

Open ground and moist sites at all levels: Cim Bulak, Markakol and Rakhmanovskie Klyuchi. {Common Winter-cress – subsp. *arcuata*} 2002

Berteroa incana

Roadsides and dry grassland, notably in steppe: Ust-Kamenogorsk, Marble Pass and Bukhtarma valley. {Hoary Alison}. 2002

Bunias orientalis

Roadsides in Kalbinskiy Hills. {Warty Cabbage} 2002

Capsella bursa-pastoris

Ruderal habitats in villages: Urunkhayka and Rakhmanovskie Klyuchi. {Shepherd's-purse} 2002

Cardamine macrophylla?

Swamp woodland and streamsides at low-mid levels: Markakol, south end of Austrian Road and Rakhmanovskie Klyuchi. {a large bittercress with leaves like those of *Pimpinella major*} 2002

Cardamine pratensis

Marshes: on tree-line below Burkhat Pass and by lake at Rakhmanovskie Klyuchi. {Cuckoo-flower – notably dark pink form} 2002

Cardaria repens

Roadsides at low-mid levels in drier areas: Kalbinskiy Hills. {is this actually different to *C. draba*, the Hoary Pepperwort?}

Chorispora bungeana

Fine scree at high levels in Cim Bulak. {no common name}.

<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}. 2002
<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 rudemale</i>	Disturbed ground, mainly by roads in steppe: Zaysan depression and throughout Bukhtarma valley including Uryl. {Narrow-leaved Pepperwort}. 2002
<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} 2002
<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} 2002
[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} 2002
<i>Rhodiola coccinea</i>	Rocks at mid-high levels: Cim Bulak, Cold Pass. {a roseroot}. 2002
<i>Rhodiola heterodonta?</i>	Rocky slopes in upper Cim Bulak. {a roseroot with rather broad serrate leaves}.
<i>Rhodiola rosea</i>	Streamsides and wet rocks at mid-high levels: above Markakol, riverine woodland at south end of Austrian Road, Karakaba river, and conifer woodland in Bukhtarma valley. {Roseroot} 2002
<i>Rhodiola semenovii</i>	By streams at high levels in Cim Bulak. {a roseroot}. 2002
<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}. 2002
<i>Sedum purpureum</i>	Scattered records 2002.

Saxifragaceae

- Bergenia crassifolia* Rock outcrops above treeline, and rocky slopes within conifer forest: Burkhat Pass, Austrian Road in Bukhtarma valley, and around/above Rakhmanovskie Klyuchi. {Elephant-ears} 2002
- Chrysosplenium tianshanicum?* Mossy flushes in spruce forest and at higher levels at Rakhmanovskie Klyuchi. {a golden-saxifrage with thin alternate leaves}.
- Chrysosplenium nudicaule?* Moist foot of cliffs in upper Cim Bulak. {a golden-saxifrage with thick leaves and dense cluster of fruit}.
- Saxifraga punctata?* 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} 2002
- Saxifraga sibirica* Rocky ground at mid-high levels: Cim Bulak, picnic site on Austrian Road, Burkhat Pass and rocks in forest to N. {Siberian Saxifrage}. 2002

Parnassiaceae

- Parnassia palustris* Seasonally wet grassland in Bukhtarma valley {Grass-of-Parnassus}
- July, Cimbulak and Austrian Road. 2002

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*} 2002
- 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}. 2002

Rosaceae

- Agrimonia asiatica* Roadsides: above Almaty. {an agrimony}. 2002
- Alchemilla scalaris?* Wet grassland and streamsides above Markakol. {an almost hairless lady's-mantle} 2002
- Alchemilla sibirica* Drier grassland at mid-levels: above Markakol. {a very hairy lady's-mantle} 2002
- 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}. 2002
- 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}].
- 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}. 2002
- 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 2002 in seed.

<i>Filipendula ulmaria</i>	Damp streamside scrub and wet woodland: Kalbinskiy Hills and Markakol. {Meadow-sweet}. 2002
<i>Filipendula vulgaris</i>	Dry grassland and steppe: Kalbinskiy Hills and near Kamenka. {Dropwort}. 2002
<i>Fragaria vesca</i>	Dry grassland: north of Markakol. {Wild Strawberry} 2002
<i>Fragaria viridis</i>	Drier grasslands and scrub: Kalbinskiy Hills. {a strawberry}. 2002
<i>Geum aleppicum</i>	By stream in apiary campsite near Kamenka. {an avens}. 2002
<i>Geum rivale</i>	Flushes, damp grassland and scrub at all levels: Cim Bulak, Kalbinskiy Hills, Markakol and south Austrian Road. {Water Avens} July also at Rackmanovskiye Kluchi. 2002
<i>Geum urbanum</i>	Shady areas at low-mid altitudes: above Almaty. {Herb Bennet}. 2002
<i>Potentilla anserina</i>	Spring-fed saltmarsh in Zaysan semi-desert and seasonally wet grassland in Bukhtarma valley. {Silverweed}. 2002
<i>Potentilla argentea</i> s.l.	Drier grassland at low-mid levels: Cim Bulak, Ust-Kamenogorsk and Kalbinskiy Hills. {Hoary Cinquefoil}. 2002
<i>Potentilla asiatica</i>	Dry grassland north of Markakol. {a cinquefoil}
<i>Potentilla bifurca</i>	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. 2002
<i>Potentilla palustris</i>	Swamp woodland and marshes: Markakol and Rakhmanovskie Klyuchi. {Marsh Cinquefoil} 2002
<i>Potentilla recta</i>	Dry or open steppic grasslands: Marble and Cold Passes. {Sulphur Cinquefoil} 2002
<i>Potentilla transcaspia</i>	Cimbulak. 2002
[<i>Potentilla</i> #1	Roadsides in Ust-Kamenogorsk. {Small-flowered yellow cinquefoil, with pinnate leaves, 5-7 leaflets, diminishing in size from basal}].
[<i>Potentilla</i> #2	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} 2002
<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}.
<i>Rosa alberti</i>	Cimbulak. 2002
<i>Rosa kokanica</i>	Drier grasslands at low-mid levels: Cim Bulak. {a rose}. 2002
<i>Rosa spinosissima</i>	Margin of Austrian Road in Bukhtarma valley. {Burnet Rose}
[<i>Rosa</i> #1	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}. 2002
<i>Rubus saxatilis</i>	Block scree above Rakhmanovskie Klyuchi. {Stone Bramble} 2002
<i>Sanguisorba alpina</i>	Flushes and streamsidess at low-mid-levels: Cim Bulak. {a burnet}. 2002
<i>Sanguisorba officinalis</i>	Grassland at low-mid levels: Markakol, (including Cold Pass), northern Austrian Road and in Bukhtarma valley. {Great Burnet} 2002

<i>Sibbaldia procumbens</i>	Short turf and margins of snow patches at high levels: Burkhat Pass and Rakhmanovskie Klyuchi. { <i>Sibbaldia</i> } 2002
<i>Sorbus sibirica</i>	Scattered in conifer forests at mid-high levels: north from Burkhat Pass. {a mountain-ask} 2002
<i>Sorbus tianshanica</i>	Scrub at mid-levels: Cim Bulak. {a mountain-ash}. 2002
<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}. 2002
<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}. 2002
<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</i> sp.	Northern Austrian Road.
<i>Astragalus alpinus</i>	Grasslands at mid-high levels: Cim Bulak, and by Karakaba river. {Alpine Milk-vetch}. 2002
<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</i> #1	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 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} 2002
<i>Hedysarum consanguineum</i> ?	Moist grassland at mid-higher levels: Cold Pass, by Karakaba river and Burkhat pass. {a French-sainfoin} 2002
<i>Hedysarum flavescens</i>	Streamsides at mid-levels in Cim Bulak. {a French-sainfoin}. 2002
<i>Hedysarum neglectum</i>	Grassland at upper levels: Cim Bulak. {a French-sainfoin}. 2002

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

<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. 2002
<i>Lathyrus tuberosus?</i> [<i>Lathyrus</i> #1]	Riverside scrub of Irtysh, Ust-Kamenogorsk. {Earthenut Pea}. 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} 2002
<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}. 2002
<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}. 2002
<i>Thermopsis alpina</i>	Stony slopes at high altitudes: Cim Bulak and Burkhat Pass. {no common name}. 2002
[<i>Thermopsis</i> #1]	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}. 2002
<i>Trifolium medium</i>	Austrian Road. 2002. Zigzag Clover
<i>Trifolium pratense</i>	Grasslands at low-mid levels: Cim Bulak and Bukhtarma valley. {Red Clover}. 2002
<i>Trifolium repens</i>	Nutrient-rich grassland at low-mid levels: around Markakol. {White Clover}. 2002
<i>Trigonella arcuata</i>	More open grassland at low-mid levels: near Cold Pass and south of Markakol. {a fenugreek} 2002
<i>Vicia tenuifolia</i>	Roadsides and meadows at low-mid levels: Cim Bulak, Kalbinskiy Hills, and Bukhtarma valley part of Austrian Road. {a vetch}. 2002
[<i>Vicia</i> #1]	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

Oxalis acetosella

Spruce forest at Rakhmanovskie Klyuchi. {Wood-sorrel}.

Geraniaceae

Geranium affine Hill steppe west of pine forests in Kalbinskiy Hills. {a crane's-bill}
Geranium albiflorum Grasslands and light shade at all levels: Cim Bulak, Kalbinskiy Hills, around and above Markakol, Burkhat Pass and Rakhmanovskie Klyuchi. {a crane's-bill}. 2002

Geranium collinum Grasslands: north and south of Markakol, by Austrian Road below (and north of) Burkhat Pass. {a crane's-bill} 2002

Geranium pseudosibiricum? Forest edges and taller grassland: around Markakol. {Large pink cranes-bill, apparently with two distinct flower sizes}. 2002

Geranium rectum? Moist grassland at lower levels: Cim Bulak. {Meadow Crane's-bill}
Geranium saxatile Rocky grassland at higher levels in Cim Bulak. {a crane's-bill}. 2002
Geranium pratense Kalbinskiy Hills. 2002. Meadow Cranesbill.

Zygophyllaceae

Zygophyllum plerocarpum Arid cliff-top steppe at Kiin Kerish. {like a prostrate vetch with winged petiole – no common name}.
Peganum harmala July, in flower in Zaysan. 2002

Rutaceae

Dictamnus angustifolius Scrub, meadows and sunny slopes: above Almaty, Kalbinskiy Hills, (locally abundant), and around Markakol. {Burning-bush}. July Austrian Road. 2002
Haplophyllum perforatum Dry steppe grassland at Alekseyevka. {no common name}.

Polygalaceae

Polygala hybrida Drier grassland at low-mid levels: Kalbinskiy Hills and Cold Pass {a milkwort}. 2002

Euphorbiaceae

Euphorbia humilis? Grassland at high levels in Cim Bulak. {a spurge}.
Euphorbia pilosa? Moist grassland at mid-levels: southern Austrian Road. {a spurge} 2002
Euphorbia tianshanica 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} 2002
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} 2002

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

Tamaricaceae

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

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}. 2002

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

Viola disjuncta Grasslands mainly at mid-levels: Kalbinskiy Hills, around and above Markakol, and southern Austrian Road. {a typical pansy}. 2002

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}. 2002

Epilobium hirsutum Scattered records. {Great Willowherb}. 2002

Epilobium palustre 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}. 2002

Anthriscus sylvestris Lush grassland and forest margins: around Markakol. {Cow Parsley}

Bupleurum aureum Grassland, mainly at mid-levels: Cold Pass and elsewhere near Markakol, along Austrian Road and Rakhmanovskie Klyuchi. {a hare's-ear} 2002

Bupleurum krylovianum? Drier grassland from Markakol to the Austrian Road. {a hare's-ear} 2002

Bupleurum longifolium? Low scrub at low-mid levels: Kalbinskiy Hills and Marble Pass. {a hare's-ear}. 2002

Bupleurum multinerve? High-level ridges above Burkhat Pass. {a hare's-ear – to be confirmed, plants immature} 2002

Conium maculatum Roadside: Uryl checkpoint. {Hemlock}

Ferula krilovii Rockier and/or less saline parts of the Zaysan semi-desert – probably also this by Zaysan north ferry. {a giant-fennel}. 2002

Ferula penninervis? Drier grasslands at low-mid levels: Cim Bulak. {a giant-fennel}.

[*Ferulago* sp.] Dry slopes at Kiin Kerish. {Like a low fennel, with few leaves}.

Heracleum dissectum Scrub margins and streamsides at low-mid levels: above Almaty, around Markakol, and southern Austrian Road. {a hogweed}. 2002

Heracleum sibiricum Spruce forest and scrub margins: above Markakol. {a hogweed} 2002

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}. 2002

Vaccinium vitis-idaea Under dwarf birch scrub and spruce forest at mid-high levels: Burkhat Pass and Rakhmanovskie Klyuchi. {Cowberry} 2002

Empetraceae

Empetrum nigrum Rakmaovskie Klyuchi. Crowberry. 2002

Pyrolaceae

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

Pyrola minor Understorey in spruce forest: southern Austrian Road and Rakhmanovskie 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 Rakhmanovskie Klyuchi and willow-scrub by river on track to last site. {Round-leaved Wintergreen – some plants in sunny ground had coral-pink flowers} 2002

Moneses uniflora Austrian Road. One-flowered Wintergreen. 2002

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 2002.

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} 2002

Cortusa brotherii Flushes and by streams, mid-high level: Cim Bulak. {an alpine-bells} 2002

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

Primula algida Recent snowmelt and flushes at high level: Cim Bulak. {a primrose} In seed 2002.

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}]. In seed 2002.

Primula sibirica By streams and wet mossy forest edges: below Rakhmanovskie and on lakeshore. {a primrose}

Primula veris Margins of snow-patches and rocky slopes: Kalbinskiy Hills, by Karakaba river and Burkhat Pass. {Cowslip – subsp. *macrocalyx*} In seed 2002.

Plumbaginaceae

Limonium gmelinii? Edge of spring-fed saltmarsh in Zaysan depression. (a sea-lavender) 2002

[*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 by road on Burkhat Pass. {a gentian} 2002

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

Gentiana grandiflora Short turf, (notably by snow-patches) sometimes on forest edge and scrub, especially at mid-upper levels: Cold Pass, Burkhat Pass and Rakhmanovskie Klyuchi. {a gentian} 2002

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 barbata July, Cimbulak and Bukhtarma Valley.

Gentiana karelini July, Cimbulak.

Gentiana turkestanorum July, Cimbulak. 2002

Gentiana kaufmanniana July, Cimbulak.

<i>Gentiana gelida</i> [<i>Gentiana</i> #1	July, common on Burkhat Pass. 2002 Mossy opening in spruce forest along southern Austrian Road and grassy gully at 2250m on Burkhat Pass. {resembles <i>G. verna</i> }
<i>Halenia corniculata</i>	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}.
<i>Swertia obtusa</i>	All kinds of wet places e.g. swamp woodland, mossy flushes etc at all levels: around and above Markakol, southern Austrian Road (including Karakaba river), and around Rakhmanovskie Klyuchi. {a marsh felwort} 2002.
<i>Polemoniaceae</i>	
<i>Polemonium caeruleum</i>	Scrub and meadows at low-mid levels: Cim Bulak, Kalbinskiy Hills, around Markakol, Cold Pass, and Berel. {Jacob’s-ladder}. 2002
<i>Convolvulaceae</i>	
<i>Calystegia sepium</i> <i>Convolvulus arvensis</i>	Roadsides and scrub margins: above Almaty. {Greater Bindweed}. Roadsides and dry grassland, included disturbed steppe: Ust-Kamenogorsk. {Field Bindweed}. 2002
<i>Apocynaceae</i>	
<i>Trachomitum lancifolium</i>	Banks of roadside ditch in Zaysan semi-desert. {no common name}
<i>Cuscutaceae</i>	
<i>Cuscuta campestris?</i>	Roadsides and coarse vegetation, mainly in steppe areas: Zaysan depression including spring-fed saltmarsh, and Marble Pass (<i>spicata</i> species too). {a dodder – at least another coarse yellow dodder present, with spicate inflorescence e.g. <i>C. indica</i> or <i>C. monogyna</i> }. 2002
<i>Cuscuta</i> sp.1	Red flowers, on <i>Campanula</i> . Markakol 2002.
<i>Boraginaceae</i>	
<i>Asperugo procumbens</i> <i>Cerinthe minor</i> <i>Cynoglossum officinale?</i>	Disturbed grassland north out of Markakol. {Madwort} Rakmanovskye Klyuchi. 2002 Dry grassland and scrub margins: Kalbinskiy Hills and Markakol. {Common Hound’s-tongue – some plants are notably narrow-leaved and may be <i>C. capusii</i> }.
<i>Echium vulgare</i>	Roadsides, fallow and disturbed steppe: above Almaty, Marble Pass and colouring fields from Katon-Karangay to Zaysan lake north ferry. {Viper’s Bugloss} 2002
<i>Eritrichium tianshanicum</i> <i>Eritrichium villosum?</i> <i>Heterocaryum</i> spp.?	Moist rocky slopes in upper Cim Bulak. {no common name} Short stony turf on the Cold Pass. {no common name} 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</i> #1	<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}. 2002
<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} 2002
<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}
<i>[Onosma #1</i>	Grassy bluffs in Kalbinskiy Hills. {a white “golden drop”}. 2002
<i>Lamiaceae</i>	
<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} 2002
<i>Dracocephalum imberbe</i>	Rocks at high altitudes in Cim Bulak. {a dragonhead}. 2002
<i>Dracocephalum ruyschiana</i>	Drier grasslands, mainly at mid-levels: Kalbinskiy Hills, Marble Pass and around Markakol. {bright blue dragonhead with linear –lanceolate untoothed leaves}. 2002
<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. {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}. 2002
<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} 2002
<i>Nepeta pannonica</i>	Grasslands at low-mid levels: Cim Bulak and Markakol (including Cold Pass). {a catmint}. 2002
<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}. 2002
<i>Phlomis oreophila</i>	Grassland at mid-high levels: Cim Bulak. {a Jerusalem-sage}. 2002
<i>[Phlomis #1</i>	Grassland and open woodland around Rakhmanovskie Klyuchi. {similar to latter but with very long prominent bracteoles}
<i>Phlomis brachystegia?</i>	Drier grassland at low-mid levels: Kalbinskiy Hills, Marble Pass, around Markakol, Austrian Road (Bukhtarma Valley), and near Kamenka. {a Jerusalem-sage} 2002
<i>Prunella vulgaris</i>	Grassland at all levels: Cim Bulak and Bukhtarma valley. {Self-heal} 2002

<i>Salvia deserta</i>	Roadsides and steppe grassland, where often abundant and colouring slopes: Ust Kamenogorsk, Kalbinskiy Hills and Zaysan depression. {a sage}. 2002
<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} 2002
<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} 2002
[<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}. 2002
[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</i> #3	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. {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}. 2002

<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} 2002
<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}. 2002
<i>Pedicularis compacta</i>	Flowery meadows in plateau south of Burkhat pass, and gaps in dwarf birch scrub on pass itself. {a lousewort} 2002
<i>Pedicularis probuscidea?</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} 2002
[<i>Pedicularis</i> #2	Trackside 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} 2002
<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} 2002
<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} 2002
<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: near apiary campsite near Kamenka and Kalbinskiy Hills (white-flowered). {a speedwell} 2002
<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, near Alekseyevka, Marble Pass, Cold Pass, and by Karakaba river. {Spiked Speedwell} 2002
<i>Veronica teucrium</i>	Open woodland and grassland, mainly at mid-levels: Kalbinskiy pine woods, Markakol, and Cold Pass. {Large Speedwell}. 2002
[<i>Veronica</i> #1	Pathsides in Urunkhayka. {Very slender erect speedwell, with both lanceolate leaves and blue flowers minute}]
[<i>Veronica</i> #2	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} 2002
<i>Plantago maritima</i>	Edge of spring-fed saltmarsh in Zaysan semi-desert. {Sea Plantain}.
<i>Plantago media</i>	Dry grassland and steppe: Kalbinskiy Hills, near Kamenka and elsewhere in Bukhtarma valley. {Hoary Plantain}. 2002

Rubiaceae

<i>Galium boreale</i>	Lusher grassland and low scrub at all levels: Kalbinskiy Hills, Markakol, and Burkhat Pass. {Northern Bedstraw} 2002
<i>Galium palustre</i>	Swamp woodland at Markakol (birch) and Rakhmanovskie Klyuchi. (spruce). {Marsh Bedstraw} 2002
<i>Galium verum</i> 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 <i>G. pamiro-altaicum</i> }. 2002
<i>Galium aparine</i>	2002
Caprifoliaceae	
<i>Linnaea borealis</i>	Mossy ground in spruce forests etc: along entire length of Austrian Road and at Rakhmanovskie Klyuchi. {Twinflower} 2002
<i>Lonicera hispida</i>	Low scrub and rocks at low-mid levels: Cim Bulak, Kalbinskiy Hills, and Cold Pass. {"Bristly Honeysuckle"}. 2002
<i>Lonicera microphylla</i>	Rocky slopes and crevices: north of Markakol, and southern Austrian Road. {a honeysuckle}
<i>Lonicera nummulariifolia</i>	Scrub at low-mid levels: Cim Bulak. {a shrub honeysuckle}.
<i>Lonicera tatarica</i>	Often dominant in low scrub at low-mid levels, sparingly higher: at and near Markakol. {a pink-flowered shrub honeysuckle} July in berry. 2002
[<i>Lonicera</i> #1	Stony south-facing slopes: Marble Pass. {low glaucous shrub honeysuckle with orange berries}]
[<i>Lonicera</i> #2	Low scrub at mid-high levels: around Markakol, Burkhat Pass and Rakhmanovskie Klyuchi. {low bush with pendulous lemon flowers}]
<i>Viburnum opulus</i>	Streamside scrub in the Kalbinskiy Hills. {Guelder-rose}.
Adoxaceae	
<i>Adoxa moschatellina</i>	Moist woodland and shady margins at low-mid levels: Markakol, Cold Pass, and southern Austrian Road. {Moschatel}
Valerianaceae	
<i>Patrinia intermedia</i>	Dry grassland: Marble Pass, south-facing hills north of Markakol and west of Zaysan north ferry. {no common name}.
<i>Patrinia sibirica</i>	Rocky outcrops in high-levels grassland on the Burkhat Pass. {no common name}
<i>Valeriana officinalis</i> 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 <i>V. collina</i> }. 2002
Campanulaceae	
<i>Campanula altaica</i>	Grasslands and low scrub at low-mid levels: Kalbinskiy Hills, Cold Pass and elsewhere around Markakol, and southern Austrian Road. {a bellflower, close to <i>C. patula</i> (Spreading Bellflower) - Kalbinskiy populations appear especially close}. 2002
<i>Campanula glomerata</i>	Grasslands at low-mid altitudes: Cim Bulak, Marble Pass, and Austrian Road in Bukhtarma valley. {Clustered Bellflower}. July, Markakol. 2002
<i>Campanula latifolia?</i>	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}. 2002
<i>Codonopsis klematidea</i>	Woodland margins: above Almaty. {no common name}. 2002
<i>Adenophora lilifolia</i>	White flowers. Austrian Road. 2002

Asteraceae

- Achillea millefolium* Roadsides and all but the driest grassland: above Almaty; Kalbinskiy Hills, and north of Markakol. {Yarrow}. 2002
- Achillea ledebourii?* Grassland at mid-upper levels: Cold Pass. {pectinate toothed sneezewort} 2002
- Alfredia cernua* Lush meadows: around and above Markakol, and southern Austrian Road. {no common name} 2002
- Antennaria dioica* 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} 2002
- Arctium tomentosum* Forest margins and other coarser vegetation: Markakol, and near Berel. {a burdock} 2002
- Artemisia absinthium* Roadsides and rough grassland at low-mid levels: Cim Bulak, and north of Markakol. {Wormwood}. 2002
- Artemisia dracunculus* Margins of Austrian Road in Bukhtarma valley. {Tarragon} 2002
- [*Artemisia* spp.] 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 *A. campestris* and others very grey and scented}].
- Aster alpinus* Rocky grassland at mid-high levels: Cim Bulak, Kalbinskiy Hills, Cold Pass, and southern Austrian Road. {Alpine Aster}. Burkhat Pass. 2002
- Aster altaicus* Drier grassland and steppe: Kalbinskiy Hills, Bukhtarma valley and Zaysan north ferry. {an aster}. 2002
- Cacalia hastata* Riverside willow scrub by access track to Rakhmanovskie Klyuchi. {no common name}.
- Carduus nutans?* Rough grassland and steppe: Kalbinskiy Hills. {Musk Thistle – subsp. *songoricus*}. 2002
- Centaurea squarrosa* Steppic grassland: by spring-fed saltmarsh in Zaysan semi-desert and in eastern Kalbinskiy Hills. {a knapweed}. 2002
- [*Centaurea* #1] South-facing grassland on hill north of Markakol. {*C. adpressa?* – a lovely plant, leaves like *Knautia* but erect and appressed silvery, mostly basal, stem prostrate/procumbent with erect head – brown bracts, white fimbriate, flowers pale pink, white in centre – rayed}].
- Cicerbita azurea* Margins of scrub at mid levels: Cim Bulak and by Austrian Road in Bukhtarma valley. {an alpine sow-thistle}. 2002
- Cichorium intybus* Roadsides and fallow land: above Almaty, Ust-Kamenogorsk and from Bukhtarma valley to Zaysan lake. {Chicory}. 2002
- Doronicum altaicum* Spruce forest and high-level grassland at Rakhmanovskie Klyuchi. {a leopard's-bane} 2002
- Doronicum turkestanorum* Scrubby grassland at mid-levels in Cim Bulak. {a leopard's-bane}. 2002
- Echinops nanus?* Rough steppe in the Kalbinskiy Hills. {a globe-thistle with heads 1cm diameter and the plant 50cm tall}.
- Erigeron auranteus* Rocky grassland at higher levels in Cim Bulak. {an orange fleabane} 2002
- Erigeron pseudoseravschanica* Rocky dry grassland on the Cold and Burkhat Passes. {white one-headed fleabane – probably either *E. altaicum* or *E. krylovii*}]
- [*Erigeron* #1]
- [*Erigeron* #2] Rocky river bank of Karakaba. {similar to latter but rose-pink}
- Galinsoga quadriradiata* 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} 2002
<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}. 2002
<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} 2002
<i>Mycelis muralis</i>	2002
<i>Matricaria discoidea</i>	Widespread. 2002
<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} 2002
[<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} 2002
<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 spp.</i>	Grasslands, especially prominent at mid-high levels: Cim Bulak and Markakol. {Dandelions}. 2002
<i>Tragopogon pratensis</i>	Roadsides and drier grasslands at low-mid levels: Ust-Kamenogorsk and Markakol. {Goat's-beard – subsp. <i>orientalis</i> }. 2002
[<i>Tragopogon #1</i>	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}. 2002
<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 *Carduus argentatus*, the other looking like a tall *Crupina* 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 *Artemisia*, sepals joined at base, 5 free pink petals – possibly *Hololachne soongorica* or maybe a *Reaumuria* sp.}