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An Account of the Plants collected by Mr. M. P. Price on the Carruthers-Miller-Price Expedition through North-West Mongolia and Chinese Dzungaria in 1910. By M. P. PRICE, M.A., and N. D. SIMPSON, B.A., F.R.M.S. (Communicated by Dr. O. STAFF, F.R.S., Sec.L.S.)

(With MAP and PLATES 21-23.)

[Read 17th April, 1913.]

I.

OBSERVATIONS ON THE VEGETATION OF THE SIBERIAN-MONGOLIAN FRONTIER, THE NORTH-WEST MONGOLIAN PLATEAU, AND CHINESE DZUNGARIA.

By M. P. PRICE.

THE expedition which yielded the material for the present paper was undertaken during the spring and summer of 1910 in company with Mr. Douglas Carruthers and Mr. J. H. Miller, the former of whom contributed a paper on the geographical results of the expedition to the Royal Geographical Society's Journal in June 1912.

Botanical observations and collections were made by the writer of this section of the paper throughout the journey from Minusinsk to the Siberian-Mongolian frontier and through N.W. Mongolia and Chinese Dzungaria until Kuldja was reached. A map showing the route of the expedition and the localities mentioned in the paper will be found on Pl. 20. It has been reprinted, with the addition of certain place-names, from the Journal of the Geographical Society, June 1912, with the permission of the Society. The plants collected by me have been worked out by Mr. N. D. Simpson, who has incorporated most of my field-notes in the part of the paper under his name. My thanks are due to the Royal Geographical Society for permission to reproduce the map, and to the Director of the Royal Gardens, Kew, for permitting Mr. Simpson to use the material in the Kew Herbarium.

A. THE BASIN OF THE UPPER YENISEI.

Itinerary and General Notes.

The Upper Yenisei plateau comprises an area drained by two rivers, called by the natives the Bei Kem and the Khua Kem, and is the upland from which the Siberian Yenisei River rises on the border of Siberia and Mongolia. The area is roughly 64,000 square miles, and the whole drainage area unites in one large stream called the Ulu Kem, and bursts through the mountain wall of the Sayansk range about 150 miles south of

the Siberian town of Minnusinsk. The Sayansk mountains, which form the nominal frontier between Siberia and Mongolia, are not a true range in the strict sense of the word, but rather a series of disjointed uplifts, of which the highest peaks reach 8000 and 9000 feet in places, and are connected by numerous passes of from 4000 to 5000 feet in altitude. The trend of the range is indefinite, and many spurs jut out far into the Siberian forests on the north and into the plateau basin of the Bei Kem on the south. The average height of the floor of the basin is roughly between 2000 and 3000 feet, and it is thus everywhere surrounded, except at the point where the Ulu Kem bursts through the Sayansk mountains in a series of gorges and rapids, by a complete range of encircling mountains. To the south lie the Tannu-ola range, a complete barrier between the Yenisei basin and the North-West Mongolian plateau.

The plains of the Siberian lowlands at Minnusinsk average about 900 feet in altitude, and going southwards from here the traveller rises on to the first step of the Central Asiatic plateau, which is formed by the northern spurs of the Sayansk mountain system. This first step of the plateau is clothed on its northern slopes with dense forests, which in their floral type show affinity to the sub-arctic forest of Siberia some 400 miles to the north. The latter lies between the latitudes of 56° and 72° , and nowhere rises above 600 feet above the level of the sea. Similar conditions, however, are found on the Sayansk mountains between latitudes 52° and 54° at heights varying from 3000 to 5000 feet. Thus the same vegetations are found in northern latitudes at low altitudes, as in southern latitudes at higher altitudes. In other words altitude compensates for latitude. Between the sub-arctic forest belt of Central Siberia and the forests of the Sayansk mountains lie the steps of Minnusinsk and Abakansk in the Minnusinsk Government of Siberia. Here the dry steppe-like vegetation of Central Asia seems to have pushed its way in as a wedge between what may at one time have been a continuous zone of sub-arctic forest. As the glaciers retreated northwards a steppe-like vegetation crept evidently into the Siberian lowlands, which lie in southern latitudes, and have thus effectively isolated the floral system of the Sayansk.

In the Upper Yenisei plateau, besides the sub-arctic forest and a flora characteristic of northern Siberia, there is also the Siberian Larch forest with an accompanying floral association. The former prevails in a long strip along the north or Siberian side of the Sayansk system and in all the higher parts of the plateau where the winter is long and severe. The Larch forest, on the other hand, prevails in the lower altitudes and is indicative of a drier climatic condition. For in winter snow lies less deeply in the more southern latitudes and on the lower altitudes of the Upper Yenisei plateau, than on the northern slopes of the Sayansk. In the former places the summer rainfall is only assured by numerous sharp thunder-storms.

Separating the Yenisei basin from the plateau of North-West Mongolia lie the Tannu-ola mountains, in latitude 60–61°. They form the second step of the plateau, and after crossing them the traveller finds himself on the floor of the Mongolian desert plateau, which from this point southwards averages about 5000 feet in altitude.

The first section of the journey was undertaken from the Siberian lowlands across the Sayansk mountains and the Upper Yenisei plateau to the northern slopes of the Tannu-ola mountains. Ascending the Amil River, a tributary which flows into the Yenisei near Minnusinsk, the party, consisting of a caravan of 24 horses, reached the watershed between that river and the tributaries of the Upper Bei Kem in June 1910. After plunging through dense forests of Siberian pine and spruce, we crossed the Sayansk mountains by a low pass and reached the Upper Yenisei plateau. Descending the Sisti Kem tributary, we explored several of the valleys which drain the right bank of the Bei Kem. Several side expeditions were undertaken in boats, which in this district are made by the Siberian fur-traders out of dug-out poplar logs, and eventually the whole party made a raft and floated down the Bei Kem River for 150 miles, shooting a series of rapids about 50 miles above the junction of the Bei Kem and Khua Kem. The party at last arrived at Dja Kul, a small frontier trading centre on the steppes of the Kemchik, where a fresh caravan was made up for the journey across the North-West Mongolian plateau.

The observations on the floral and botanical conditions on this first part of the journey can be divided into two sections, one dealing with the northern slopes of the Sayansk mountains, and the other with the valley of the Bei Kem in the Upper Yenisei plateau.

Taking the first section, I can tabulate the following observations while ascending the Amil River.

After leaving the steppes south of the Minnusinsk district, a thin zone of *Pinus sylvestris* forest appears and forms an intermediate zone between the steppes and the dense sub-arctic forests further to the south. *Pinus sylvestris* attains its best development here, and the ground flora is accompanied by many species of the steppes to the north as well as several species of herbs, which I describe later in the Larch-forest association. South of this zone we reached that of the sub-arctic forest. The dominant species were *Abies sibirica*, *Picea obovata*, and *Pinus sibirica* *. The sub-arctic forest zone lay scattered along the northern side of the different uplifts, which compose the Sayansk system, and varied from 70 to 100 miles in width from north to south. Immense areas of swamp punctuated the dense jungle of Siberian

* The specimens collected on the expedition are *Pinus Cembra*, Linn., var. *sibirica*, P. Mayr. The variety seems only to differ physiologically from the species.—N. D. SIMPSON.

Spruce and Pine, and everywhere the sub-arctic flora of northern Siberia with *Sphagnum* and *Vaccinium* association was dominant. Progress in this forest from the traveller's point of view was difficult and dangerous.

On the slopes of the valleys with southern aspects the forests of *Abies sibirica* and *Pinus sibirica* appeared to be weaker in growth and were possibly diminishing in area, for considerable forest fires had taken place here in recent years. Where the fires had occurred I saw indications of dry steppe-like flora, containing many types of Gramineæ accompanied by Aspen, Poplar, and Birch, creeping in and competing with the *Vaccinium* association. In addition to this there were certain places where the swamps appeared to be in a state of partial desiccation with evidences of former mossy hummocks, now dry and covered with grasses and species from the steppes further to the north.

The second series of observations were made after entering the Upper Yenisei plateau by a low neck between two disconnected ridges of the Sayansk system. We descended the valley to the Sisti Kem for some distance, but before its junction with the Bei Kem, turned east through the Larch forests and followed up a side stream, called by the natives the "Japsa," to its source in another isolated uplift called the Tashkel mountains. Crossing from here to the watershed of the Shabash River, we followed this down to its junction with the Kamsara River and finally reached the Upper Bei Kem. A further expedition was made towards the head-waters of the Bei Kem in the neighbourhood of Lake Todju Kul, after which a long journey was made in a raft down the Bei Kem, past a series of rapids into the steppes of the Ulu Kem and the Kemchik.

In the upper regions of the Sisti Kem and Shabash Rivers, the valley bottoms of which average about 3000 feet in altitude, we found forests of *Pinus sibirica* accompanied by sub-arctic flora, indicating cold conditions in winter and a considerable rainfall in summer. This forest and association also covered the mountains of the Tashkel. In the lower reaches, averaging 2000 feet in altitude, the forest consisted of *Larix sibirica* scattered in park-like glades with natural meadows. The flora associated with this was of a distinct type and might be called the "Siberian Larch-Forest Association."

In the Larch forest on the Japsa River I found *Gentiana verna* var. *angulosa*, *Vaccinium*, *Vitis-Idæa*, *Spiræa* sp., *Potentilla fruticosa*, and *Erythronium Dens-canis*.

On approaching the Tashkel mountains, forests of *Pinus sibirica* and *Abies sibirica* began to appear on the valley bottoms and reached up to the sides of the mountains to 5000 feet. The ground flora here consisted of *Betula nana*, *Vaccinium*, *Vitis-Idæa*, *Rhododendron chrysanthum*, *Viola biflora*. In swampy areas there were large beds of *Primula nivalis* and of *Trollius asiaticus* and *Euphorbia lutescens*. There appeared to be a succession of floral types on these Alpine meadows which changed as the summer advanced. Thus

Primula and *Trollius* appeared as soon as the snow had gone, but in July the shady forest association began to creep in and apparently constituted a large portion of the vegetation during the autumn.

On the Upper Shabash River forests of *Pinus sibirica* with a variety of *Alnus Alnobetula* grew in dense jungles on the shady sides of the valley. On the valley sides facing the sun, however, the mountain slopes were covered principally with scrub of Birch, Aspen, and Poplar, accompanied by a vigorous flora of *Euphorbia lutescens*, *Paronia anomala*, and *Aconitum septentrionale*. Relics of old forests of *Pinus sibirica* and *Abies sibirica* were to be seen in places. Large logs of these trees littered the mountain-sides up to 4000 feet, and there was considerable evidence that the Pine forest had been replaced by a broad-leaved forest within comparatively recent times.

On the Ulug Tag mountain, an isolated peak between the watershed of the Shabash and Japsa Rivers, I observed the following floral zones typical of the Sayansk system, beginning from the valley bottom upwards.

Zone 1. In the valley bottoms at 3000 feet Larch-forest association predominated, containing *Potentilla fruticosa*, *Betula nana*, *Larix sibirica*, and *Erythronium Dens-canis*. *Erythronium Dens-canis* is of considerable interest, since its roots and tubers are used during the summer as food by the nomad tribes of Urian Hai or Soicts, who wander with reindeer all over these forests. The root is dried in the sun, and eaten with reindeer's milk.

Zone 2, at 4000 feet, consisted of thick forests of *Pinus sibirica* and *Picea obovata* accompanied by *Vaccinium*, *Vitis-Ida* and *Sphagnum*.

Zone 3 began at a height of 4500 feet and consisted of *Pinus sibirica* and *Abies sibirica* in a creeping form.

Zone 4, between 4500 and 5500 feet, consisted of scrub-like *Pinus sibirica* and a widespread distribution of *Rhododendron chrysanthum*.

Zone 5, from 5500 to 8000 feet (the mountain summit), containing only *Betula nana* in a creeping and very stunted form.

Descending the Shabash River from its source, we traversed for a day forests of *Pinus sibirica* with its attending flora. Halfway between its source and its junction with the Bei Kem River, Larch forest with its floral association began. In this typical forest of *Larix sibirica* the trees grew from 10 to 12 feet apart, running from 3 to 6 feet in girth, and averaging about 75 feet in height. The ground flora here was typical of the Larch-forest association throughout the Upper Yenisei plateau and consisted of *Spiraea*, *Euphorbia lutescens*, *Polygonum polymorphum*, *Dracocephalum Ruyschiana*, *Veronica longifolia*, *Bupleurum longifolium* var. *aureum*, *Potentilla nivea*, *Myosotis palustris*, *Achillea impatiens*, *Aster alpinus*, *Galium boreale*, *Valeriana sambucifolia*, *Trifolium Lupinaster*, *Sanguisorba officinale*, *Oxytropis* sp., *Poa altaica*, *Phyllodore taxifolia*, *Rosa acicularis*, *Vaccinium uliginosum*, *Lonicera corrulea*, *Pedicularis uncinata*, *Aconitum septentrionale*. A few areas of *Pinus sylvestris* were to be seen growing on sandy banks by

the river-side. Some of these sandy river-terraces also contained a new and much drier floral association, which began to appear here for the first time. It was represented by *Dianthus versicolor*, *Caragana Bungei* and *C. arborescens*, *Sedum hybridum*, *Thymus Serpyllum*, *Potentilla bifurca*, *Agropyron cristatum*, *Veronica incana*. Higher up the Bei Kem River this steppe-like flora began to enlarge and covered some considerable areas adjoining the river. These areas were largely used as grazing-grounds for the Urian-Hai natives. The steppe-like association here was "sandwiched" in between the Siberian Larch-forest association of the hills and that surrounding the river-banks. There was a large area of this type of steppe association in the neighbourhood of Lake Todju Kul. Descending the Bei Kem River we came to a series of rapids about 50 miles above its junction with the Khua Kem. The plateau valley above the rapids stood at about 2500 feet in altitude and was clothed with dense jungle of *Picea obovata*, *Larix sibirica*, and *Populus suaveolens*.

The mountains surrounding the gorge of the Bei Kem at this point were ascended by Mr. Carruthers, who observed that the forest of *Pinus sibirica* and *Picea obovata* was not so dense as on the Sayansk mountains. He also observed that the ground was covered with deep half-dry moss, as if it were a sponge which had just run dry. The forest-line here was 5800 feet, and *Pinus sibirica* was the last tree on the forest-line. On the summit there was a flat tableland on which there was very little reindeer-moss but much grass. It seems probable that these mountains in the centre of the Upper Yenisei plateau are intermediate in climate between the Sayansk and the Tannu-ola mountains. The more southern latitude brings less snow in winter than on the Sayansk and proportionately more heat in summer, while the altitudes in both cases are the same.

In the valley of Bei Kem below the gorge, which is also continued in the Ulu Kem further to the west, the valley-sides become gradually barer and the dry steppe-like flora begins to creep in, till at last the forest completely disappears.

It is worth noticing that throughout the upper reaches of the Upper Bei Kem Russian traders and settlers have attempted agriculture. Thus, near the junction of the Shabash and Bei Kem (about 3000 feet alt.), rye was grown in patches by the river. It was impossible to grow wheat on account of the short summer, and sometimes even rye failed to ripen. At a point just above the Bei Kem rapids (2800 feet) both rye and wheat were sown, but rye was the only certain crop. Just below the Bei Kem rapids (2000 feet) we found a fur-trader on the steppe growing wheat to perfection. Here the climate was, if anything, too dry, and it was apparently necessary to irrigate during the summer. Water-melons, cucumbers, apples, and pears were also being grown successfully.

B. NORTH-WEST MONGOLIAN PLATEAU.

General Notes on the Floral Zones.

The principal floral associations of North-West Mongolia can be divided into three groups consisting of the following:—1. Plateau-Desert Association; 2. Larch-Forest Association; 3. Alpine Association. Although many species in these groups overlap, still, in general, each association can be said to occur in definite zones, which vary according to the two principal factors, altitude and latitude. Generally speaking, at northern latitudes and at low altitudes the same flora is found as in more southern latitudes at higher altitudes, but the Larch-Forest Association tends to thin out in southern latitudes, leaving the other two converging. Altitude and latitude are the factors which cause temperature, rainfall, and snowfall, and the degree and intensity of these natural conditions vary in almost exact relationship to the altitude and latitude all over the North-West Mongolian Plateau.

1. The Plateau-Desert Association occurs in all the most low-lying parts of the valley-bottoms, plains, and evaporating basins and all districts where the distance from the mountains is great and consequently the rainfall small or non-existent. Round some of the desert lakes a very thin zone of marsh flora is to be found, growing where saline moisture has reached the surface. With the exception of this and a few straggling patches of Larch forest, the whole of North-West Mongolia between the altitudes of 2000 and 7500 feet is covered with the Plateau-desert association. At the last-named altitude the colder climatic conditions and higher rainfall generally enable either the Larch-forest association or the Alpine association to obtain the upper hand. The Plateau-desert association, however, is broken in a few places between 3000 and 7500 feet, for where special sheltered valleys shade the vegetation from the fierce summer sun, there isolated and straggling patches of the Larch-forest association can be seen. Plateau-desert association is perhaps best studied in North-West Mongolia at an altitude of about 6000 feet. It can be said to be sub-divided into two subordinate associations. The first of these is found more on the shady side of the valleys and in parts of the plains less exposed to cold or drying winds, and is characterised by species of the genus *Caragana*. The second subdivision is found in the driest, hottest, and most exposed plateau desert, and is the most widely distributed. The most characteristic species of the latter are:—*Potentilla sericea*, *Arenaria capillaris*, *Chenopodium frutescens*, var., *Stipa capillata*, *Artemisia argyrefolia*, *Oxytropis tragacanthoides*.

2. The Larch-Forest Association is found scattered wherever conditions are suitable between certain altitudes. Thus in the Kemchik valley on the Upper Yenisei plateau, Larch forest is found on scattered areas between 3000 and 6000 feet. Some 80 miles to the south, in the Saklya valley on

the west of Lake Ubsa, the Larch forest occurs between 6000 and 7000 feet. Some 40 miles to the south of this again, on the Kundelun mountains, the Larch forest occurs between 6300 and 7600 feet, while on the right bank of the Upper Kobdo River and round the Kobdo Lakes, the Larch-forest zone occurs between 7000 and 8000 feet. Thus the zone gradually rises in altitude as the southern latitudes are reached. But in the case of the Larch-forest association, latitude and altitude are not the only factors which control its distribution, for it appears that shelter from insolation, and perhaps wind, is a third factor to be taken into consideration. This is suggested from the fact that the Larch-forest association all over the North-West Mongolian plateau is found only on that side of the valley which has a northern aspect, while it reaches its best development in the shady glens of the mountains. Moreover, the complete absence of any Larch forest in the country between Achit Nor and the Kobdo River seems to suggest that a large area of open down country, even though it may be at a favourable altitude and latitude, if too exposed to wind and snow, is unfavourable for the development of Larch-forest association. In this area, therefore, which is drained by the left tributaries of the Kobdo River, namely, the Suok, the Taharty, the Olonor, and the Tsagangol Rivers, the Plateau-desert association merges into the Alpine association without any intermediate Larch-forest association. The following are its most characteristic species:—*Larix sibirica*, *Vaccinium*, *Vitis-Ida*, *Aconitum* sp., *Potentilla bijurca*. *Pinus sibirica* also occurs in this association in the extreme north, and is found as a straggling specimen as far south as the western Tannu-ola mountains, where it reaches the summit. It appears that the excess of sun and light is responsible for its absence in latitudes further south of this.

3. The Alpine Association is distributed in North-West Mongolia in the following areas:—In the Kemchik valley of the Upper Yenisei plateau it is found on several isolated mountain masses between 6000 and 6500 feet. On the Kundelun mountains it begins at an altitude of 7000 feet, and further south still, on the right bank of the Kobdo River, it commences at 8000 feet. It reaches the snow-line at about 11,000 feet in the last two places, wherever there is sufficient soil. The best development of the Alpine association is found on the left tributaries of the Upper Kobdo River, namely, on the Suok, the Taharty, the Olonor, and Tsagangol Rivers. Here a large area of rolling down country between 8000 and 10,000 feet alt. is the geographical feature, and is peculiarly favourable for the development of this flora. It is interesting to know that it is just here that *Ovis ammon*, the great mountain sheep of the Altai, is found in considerable numbers, and its distribution seems to coincide with the widespread distribution of the Alpine association. The characteristic species of the Alpine meadows of North-West Mongolia are:—*Gentiana altaica*, *Gentiana prostrata*, *Saxifraga Hirculus*, *Primula nivalis*, *Trollius asiaticus*, *Papaver nudicaule*, *Betula nana*.

Itinerary of the Expedition on the N. W. Mongolian Plateau.

The Kemchik River is a left tributary of the Upper Yenisei, joining the Ulu Kem just above the gorge, through which it flows to the lowlands of Siberia. The valley of the Kemchik was visited by the expedition during July 1910. Starting from Dja Kul, a frontier trading post (1880 feet) on the Ulu Kem River, the route lay westwards along the Kemchik for 50 miles. Here the mountain mass of the Kizil Taiga was visited, after which the Kemchik valley was crossed south-west to the Tannu-ola mountains.

The plains of the valley bottom on the Kemchik were covered with Plateau-desert association. On alluvial soil were found *Caragana spinosa*, *Urtica dioica*, *Elymus dasystachys*. On northern slopes and in sheltered hollows, patches of the Larch-forest association were to be seen, accompanied by *Potentilla bifurca* and *Aconitum barbatum*.

The mountain mass of the Kizil Taiga, which lay in the centre of the drainage area of the Kemchik, was surrounded by plateau-desert flora up to about 4000 feet. At this point Larch forest commenced in shady places and continued nearly up to the summit. *Pinus sibirica* was found in conjunction with *Larix sibirica*. The former slightly predominated on rocky ground, and the latter in those aspects more open and exposed to the sun. Natural regeneration of both these species was going on, but the Larch appeared to be badly affected by summer frosts. About the forest-line there was a considerable area covered with dead logs of Larch trees, larger than any growing at present below this line. It seemed that the forest at one time extended much higher up the mountain than at the present. The flora of the barren mountain tops (6500 feet) contains a mixture of both Alpine meadow and Larch-forest association apparently in competition with one another. The Larch-forest association was represented by *Potentilla bifurca*, *Spiraea*, *Vaccinium uliginosum*, *Aconitum* sp., and *Veratrum nigrum*. The Alpine association was represented by *Betula nana*, *Gentiana prostrata*, and *Dryas octopetala*. There was a considerable amount also of *Poa* and Fescue grasses mixed in with these floras. In fact it seemed that two floral associations distinctly joined on the summit of the Kizil Taiga.

Leaving the Yenisei basin by a right tributary of the Kemchik, the expedition crossed the Tannu-ola mountains into the plateau which drains into Lake Ubsa. The Tannu-ola mountains form a watershed between the inland drainage of North-West Mongolia and the Arctic drainage of Siberia. In its western end it presents a solid range of rolling downs and is crossed by several passes. The Bovashay Pass, crossed by the expedition at 6854 feet, was covered with forests of stunted Larch and Siberian Pine scattered about in open order, with much dead timber. *Pinus sibirica* was, in the main, dominant, with floral representatives from the Larch-forest association and a few Alpine meadow types. On a peak overlooking the Bovashay Pass, reindeer-moss, *Sphagnum*, *Vaccinium uliginosum*, *Potentilla bifurca*, and

Aconitum sp. were found. This flora continued all the way to the summit. At 6500 feet *Rosa spinosissima* was seen. Both Larch and Siberian Pine reached the summit in a creeping form, and there were many places where dead logs of trees were lying.

The southern slopes of the Tannu-ola mountains between the Mongol guard posts of "Borgitaita" and "Bogdhonholat" were bare, and covered with plateau-desert flora. There were two distinct subdivisions of this association here, one of which was characterised by *Caragana arborescens* and *Cotoneaster melanocarpa*. The other subdivision lay in those parts more exposed to the sun, and was represented by *Potentilla sericea*, *Spiraea hypericifolia*, *Arenaria capillaris*, *Stipa capillata*, *Oxytropis tragacanthoides*, *Chenopodium frutescens*, *Anemone Bungeana*.

The North-West Mongolian plateau between the Tannu-ola mountains and the Great or Chinese Altai range presents a large tableland stretching north and south some 300 miles and averaging some 5000 feet in altitude. Both of these ranges of mountains converge westwards into the complex Siberian Altai system. The level of the plateau is lowest round the evaporating basins, and at Lake Ubsa sinks to 2270 feet, while at Achit Nor it is about 4000 feet. There are many lofty ranges and disjointed mountain masses on this plateau running up to 13,000 feet. The first of these ranges, which the expedition came to after crossing the Tannu-ola mountains, ran from north-west to south-east, and joined the western extremity of the Tannu-ola near the point where it converged into the Siberian Altai system. The river draining from this range into Lake Ubsa was called by the natives the Saklya River, and hence the name of Saklya mountains was given to the range from which it sprang. It was found that the floral association of the plateau-desert in the valley of the Saklya River, between 4000 and 6500 feet, contained plateau-desert type represented by *Artemisia argyrafolia*, *Anemone Regeliana*, *Arenaria capillaris*, and *Caragana spinosa*. Between 6000 and 7500 feet there were patches of Larch forest with its accompanying association, represented by *Aconitum* sp. and *Spiraea*. From 7300 to 9000 feet there was a large development of Alpine meadow with scattered peat-bogs. The characteristic flora here was represented by *Eriophorum Scheuchzeri*, *Dracocephalum imberbe*, *Epilobium hirsutum*, *Saxifraga melaleuca*, *Potentilla nivea*, *Erigeron uniflorus*, *Cerastium lithospermifolium*, *Carex melanantha*, *Senecio aurantiacus*, *Myosotis sylvatica*, *Pedicularis versicolor*, *Primula nivalis*.

Crossing from the Saklya River into the valley of the Kundelun, which is also a western tributary of Lake Ubsa, the expedition traversed stony desert-plateau lying between 5500 and 6500 feet. All the way there was almost a complete absence of vegetation, and the only species met with were *Stipa capillata* and *Agropyron cristatum*. In some places only dry stems of *Stipa capillata* were seen, showing that the herb had grown earlier in the

season, but in summer was shrivelled by heat. There were evidences in the torrent beds of occasional cloud-bursts, but the whole country was waterless and without springs.

Ascending the Kundelun River, a great mountain mass was observed rising to 13,000 feet with many glaciers and snowfields. This system, which the expedition named the Kundelun mountains, is probably the one mentioned by Potanin, who visited its eastern side and called them the Turgun mountains. At "Kunde Kureen," the seat of a Mongol prince, altitude 5900 feet, the flora was of the plateau-desert type containing *Arenaria capillaris* var. *nardifolia* and *Stipa capillata*. At 6300 feet Larch forest commenced in shady places accompanied by *Aconitum* sp. The forest continued up to 7600 feet on the shady side of the valleys only. At 7000 feet the Alpine association began to creep in with *Gentiana prostrata*. At this height good grazing-land was found in the bottoms of the valleys, and the Mongol population grazed their flocks here during the latter part of the summer. Between 7500 and 7600 feet there is an area of dry peat-beds containing old tufts, upon which grass is now growing. Above this there was an area of bog and swamp. There were some indications that the swamps once extended lower down the valley, and that the drier floral association is extending over the area once covered by Alpine meadow. At 8300 feet the expedition came upon the Kundelun glaciers, which descend from the snowfield between 11,000 and 13,000 feet. There were some evidences that these glaciers were retreating, for several recently evacuated moraines were to be seen, upon which vegetation of *Sphagnum*, *Allardia glabra*, and *Sedum quadrifidum* were beginning to appear. In the little glacial lakes *Sphagnum* and *Ranunculus natans* were obtained. Vegetation continued up to 11,000 feet, which can be taken as the line of the summer snow. The specimens found at this altitude were *Allardia glabra* and *Sedum quadrifidum*.

After leaving the Kundelun mountains the expedition visited the basin of Lake Uriu Nor, and, crossing the Barmen mountains to the south, reached the watershed of the Upper Kobdo River. Round Lake Uriu Nor (height 4500 feet) there was a peculiar type of flora, which was found right on the edge of the lake, growing in the marshes and stagnant pools. It was represented by *Artemisia Sierersiana*, *Nepeta botryoides*, *Anabasis brevifolia*, and *Ranunculus Cymbalaria*. There was evidence that the lake had once been at a higher level, for strands of gravel lay at from ten to thirty feet above the present water-level. The lake had no outlet, and therefore indicates in its water-level any variation in the climatic conditions of this part of North-West Mongolia.

On the Barmen mountains, 8200 feet, south of Lake Uriu Nor, Alpine meadows with *Betula nana* were discovered. Larch forest was seen in shady places at about 7500 feet. This is also the height above which late summer

and early autumn snow falls. It is probable that the latter determined the limit of the Larch forest.

South of the Barmen mountains on the plains of Achit Nor (4500 feet), which drains into the Upper Kobdo River, concentric rings of vegetation were to be observed. In the marshes and shallow lagoons immediately round the lake were to be seen *Glaua maritima*, *Chenopodium glaucum*, *Suaeda maritima*, *Triglochin palustre*, *Juncus Gerardi*, and *Agrostis vulgaris*. Beyond the marshes on moist, sandy loam, where vegetation was just above the water-table, the following flora was seen: *Salicornia herbacea*, *Carex cespitosa*, *Carex capillaris*, *Hordeum pratense*, and *Iris ensata*. On the stony desert, out of reach of the water-table, were found representatives of the Plateau-desert association, particularly *Stipa capillata*.

Leaving the plain of Achit Nor and ascending the Kobdo River by its affluent tributary the Suok River, the expedition crossed the tableland, averaging 5000 feet alt. and rising in rolling downs to 8000 feet. After crossing the Suok valley, those of the Taharty, Olonor, and T-agangol were each traversed in turn, till finally, the Kobdo Lakes were reached.

Between 7000 and 8000 feet the rolling downs were covered with vegetation of the Plateau-desert association, represented by *Oxytropis tragacanthoides*, *Artemisia argyraefolia*, *Stipa capillata*, *Chenopodium frutescens*, *Tanacetum fruticosum*, *Elymus dasystachys*, *Allium fistulosum*. At 8000 feet Alpine association began to take the place of Plateau-desert association. On that part of the valley with northern and shady aspects this type consisted largely of *Polygonum Bistorta*, *P. viviparum*, and *Betula nana*. In the upper part of the Alpine meadows, between 8300 and 9000 feet, the Alpine association was spread out over a large area of rolling downs in the Upper Olonor valley. The characteristic species here were *Papaver nudicaule*, *Saxifraga Hirculus*, and *Gentiana prostrata*.

On reaching the Kobdo Lakes, which lie just to the north of the Great Altai range, the Plateau-desert association was found between 6300 and 7500 feet, represented by *Stipa capillata*, *Oxytropis tragacanthoides*, *Chenopodium frutescens*. Round the Kobdo Lakes, at 7000 feet, Larch forest again was to be seen in shady places all over the northern slopes of the Great Altai range. The Larch forest contained *Betula nana*, *Potentilla bifurca*, and reached to the height of 8500 feet. Between 8000 and 9000 feet there was a large development of Alpine meadow which reached to 9500 feet. The expedition crossed the Great or Chinese Altai mountains by the Urkhogaitu Pass, 9500 feet, and following the valley of the Kran River on the south side of the range, reached the plains of the Upper or Black Irtysh in Dzungaria. On the Kran River there was a considerable development of Siberian Larch forest between 3000 and 6700 feet in shady places, accompanied by *Aconitum* sp., *Spiraea*, *Vaccinium Vitis-Idaea*, *Rosa acicularis*, *Rosa spinosissima*, *Sambucus racemosa*, *Thalictrum petaloideum*, *Lonicera corulea*, *Cotoneaster melanocarpa*, *Berberis heteropoda*, *Althaea rosea*, and *Potentilla chrysantha*.

C. DZUNGARIA.

Itinerary and General Notes.

South of the North-West Mongolian plateau lies an area of comparative lowland, bounded on the north by the wall of the Great or Chinese Altai, and on the south by the main range of Tian Shan. The average altitude of the plain is about 1500 feet, the highest point being 4000 feet and lowest about 700 feet above the level of the sea. The area is drained in the south by rivers which flow into small evaporating basins, while most of the north is drained by the Upper or Black Irtysh and finds its way ultimately to the Arctic. Towards the north-west, therefore, these plains of Dzungaria merge without any perceptible break into the lowlands of Western Siberia. There are, however, three ranges, namely, the Ala Tau, Barlik, and Sair mountains, which cross the plain from north-east to south-west, but which are disjointed and severed by intervening pieces of lowland, so that they do not form an effective barrier to the drainage northward. Eastwards the steppes merge into the Gobi Desert of Central China. The Great Altai range, which bounds the Dzungarian plains on the north, runs south-eastwards towards the main range of the Tian Shan, which, in turn, runs east and west. A gap of over 100 miles separates the eastern extremities of these ranges, and thus the plains of Dzungaria pass into the plains of Central China without a break through this gap.

Descending from the North-West Mongolian plateau and crossing the Great Altai range, the expedition reached the Chinese town of "Sharasume," or "Tulta," in Sept. 1910, on the southern foothills of the Great Altai mountains. The plains of the Black Irtysh were then crossed, leaving Lake Ulun-gur to the east and reaching the valley of Kobuk. Here the southern offshoot of the Sair mountains was crossed, which is one of the disjointed ranges traversing the Dzungarian plain. Ultimately the Chinese town of "Chuguchak," or "Tarbagatai," was reached on the plains of the Emil, whence the route lay direct south to Kuldja, through the Dzungarian gap and over the Tian Shan.

The floral associations of Dzungaria do not differ widely from those of the North-West Mongolian plateau. During the journey a large number of species were met with common to both districts, but it was found on proceeding southwards that several new species began gradually to creep in. The more southern latitudes, which are exposed to drought and fierce heat of the sun in summer, create conditions favourable for the driest desert floral association.

After leaving the town of "Sharasume," an area of rugged, stony hills was traversed, covered with desert floral association, which was in every way typical of those described in North-West Mongolia. Thus the following species were collected in considerable abundance:—*Artemisia Lercheana*,

Atraphaxis lanceolata, *Echinops Ritro*, *Potentilla Anserina*, *Leonurus lanatus*. The following new types were seen for the first time in their apparently most northerly limit:—*Setaria viridis*, *Cannabis sativa*, *Halimodendron argenteum*, *Haloxylon Ammodendron*, and *Astragalus Pallasii*.

Proceeding southwards, the hills, which lay between 1700 and 2300 feet, were replaced by a plain, which lay between 1500 and 1700 feet. The plain was largely alluvial, with some patches of blown sand near the Black Irtysh River. As the river meandered north-westwards it was covered with breaks of Poplar and Willow. On the alluvial desert there appeared *Halimodendron argenteum*, *Sophora alopecuroides*, *Glycyrrhiza uralensis*, *Eurotia ceratoides*, var., *Artemisia Lercheana*, *Elymus giganteus*, and *Tamarix* sp. Leaving this low-lying plain and proceeding southwards the altitude rose to a plateau, which lay to the north-east of the Sair mountains. This range, which runs roughly east and west, joins on to the offshoots of the Tarbagatai and Barlik mountains and forms part of the disjointed range which runs across Dzungaria from south-west to north-east. The plateau to the south of the Sair mountains, which was drained by the Kobuk River, lay between 2000 and 5000 feet. On it were found *Anemone Bungeana* (the same as in North-West Mongolia), *Anemone patens*, *Iris ensata*, *Artemisia Lercheana*, and *Spiraea hypericifolia*. On rising to 5500 feet on a pass connecting a southern offshoot of the Sair mountains with a northern offshoot of the Barlik, small patches of *Larix sibirica* were seen in places sheltered from the sun. With it were also the accompanying flora, characteristic of Southern Siberia and North-West Mongolia, namely, *Aconitum* sp., *Potentilla bifurca* var. *canescens*, *Rosa spinosissima*, *Anemone Bungeana*, and *Juniperus pseudo-sabina*.

Descending to the plain of the River Emil, which flows westwards into Lake Ala Kul, the altitude was found to lie between 1600 and 2500 feet and largely consisted of alluvium. In the highest and driest parts of the plain *Artemisia Lercheana*, *Stipa capillata*, and *Anemone patens* were predominant; while in the lower parts nearer the water-table the following species predominated: *Glycyrrhiza uralensis* and *Elymus dasystachys*.

South of the plain of the Emil and on the northern slopes of the Barlik mountains were found the most northerly specimens of *Picea Schrenkiana*, accompanied by an association partly characteristic of the Larch forest of North-West Mongolia, but containing also many new species. Unfortunately the expedition reached this point too late in the year to obtain representative specimens of the flora, for the snow had already begun to cover the altitudes which lay between 5000 and 6000 feet. It was observed, however, that the most southerly limit of *Larix sibirica* was on the southern slopes of the Sair mountains, while the most northerly limit of *Picea Schrenkiana* lay on the northern side of the Barlik mountains. Crossing the Ala Tau mountains on the way to Kuldja and the Ili, large forests of *Picea Schrenkiana* were observed rising to an altitude of over 9000 feet, but the snow was too deep to enable any investigation of the ground flora to be made.

II.

ENUMERATION OF THE PLANTS.

By N. D. SIMPSON.

DICOTYLEDONES.

RANUNCULACEÆ.

CLEMATIS LETHUSIFOLIA, Turcz.

No. 489. In sheltered gullies with northerly aspect, chiefly associated with stunted Larch forest, in the Northern foothills of the Tannu-ola Mts. between Dja Kul and Djardan.

Distribution. Mongolia, N. China, and Manchuria.

CLEMATIS ALPINA, Mill., var. *SIBIRICA*, Regel et Til.

No. 291. Moist forest glades near rivers, climbing dead stumps or on basalt rocks, S.E. of Kushabar on the Amil River.

Distribution. Siberia and N. Russia.

THALICTRUM PETALOIDEUM, Linn.

No. 427. Driest parts of open steppe between the flood-line of the river and the Larch-forest zone, Upper Bei Kem and Dora Kem.

Distribution. Siberia, Manchuria, and N. China, *Lecoyer*.

THALICTRUM MINUS, Linn., var. *ELATUM*, *Lecoyer*.

No. 372. Dry slopes up to 900 m., Kushabar Range of the Sayansk Mts.

Distribution. Europe, Asia Minor eastwards through Siberia to Japan, *Lecoyer*.

ANEMONE BUNGEANA, Pritz.

No. 17. Dry mountain summits where not too rocky, Kizil Taiga, Lower Kemchik.

No. 32. Dry desert hill-slopes and upland plateau valleys up to 2150 m., W. Tannu-ola Mts.

Distribution. N. Mongolia and Altai.

ANEMONE REGELIANA, Maxim.

No. 68. Plateau valleys up to 2150 m., Upper Saklya River, W. Tannu-ola Mts.

Distribution. Siberia, Turkestan, N. Mongolia, and China.

ANEMONE sp. (§ *Pulsatilla*).

No. 1. Hilly steppe 270 m. near Borodina.

ANEMONE PATENS, *Linn.*

No. 3. Steppe, Minnusinsk, Siberia.

Distribution. Central Europe, Mongolia, Turkestan, and N. America.

ANEMONE PATENS, *Linn.*, var. *NUTTALLIANA*, *A. Gray*, flore ochroleuco.

No. 267. Edges of cultivated land with Birch and grasses on dry banks, Kushabar.

Distribution. N. Mongolia and N. America.

ANEMONE ALTAICA, *Fisch.*

No. 259 *a.* Damp hollows in the "Taiga" or forest under the shade of *Abies sibirica* and *Populus suaveolens* associated with grasses; alt. above the sea 320 m., in forests round Kushabar, Amil River.

No. 321 *a.* 1000 m. in Spruce Taiga, growing under melting snow, Chukuok Ridge, Amil River.

Distribution. Altai, N. China, and Japan.

ANEMONE BAICALENSIS, *Turez.*

No. 278. Shade of Birch, Pine, Spruce, and Poplar forest where not too marshy; very common and universal forest-shade plant, Kushabar.

Distribution. N. and central China, Manchuria, and westwards to the Yenisei.

ANEMONE CÆRULEA, *DC.*

No. 326. Moist places near rivers and streams and in moist glades of the Spruce forest, Upper Amil River.

Distribution. Central Asia and Altai, N.E. Siberia and Japan.

ANEMONE RANUNCULOIDES, *Linn.*

Distribution. Europe and eastwards as far as the Baikal region.

ANEMONE REFLEXA, *Steph.*

No. 257 *a.* Pine, Birch, Poplar, and Spruce Taiga, in shade, forests round Kushabar, Amil River.

Distribution. Siberia from the River Irtysh eastwards to Kamtchatka.

CALLIANTHEMUM RUTÆFOLIUM, *C. A. Mey.*

No. 340. Moist meadows near rivers, also in alpine meadows in the Upper Pine forest, Sistikem and Japsa Rivers.

Distribution. Southern Europe eastwards through central Asia, Turkestan to Yunnan.

RANUNCULUS AFFINIS, *R. Br.*, var. β . TANGUTICUS, *Maxim.*, forma DASYCARPUS.

No. 65. Upland plateau valleys on dry slopes at about 2150 m. on the W Tannu-ola Mts. at the head of the Saklya River.

Distribution (of var.). Kansu and N. Thibet, *Maxim.*

RANUNCULUS ALTAICUS, *Larm.*

No. 379. Mountain-summits on dry patches and among rocky boulders, alt. 1800 m., Ulug Taiga, Sayansk Mts., Upper Japsa Mts.

Distribution. Turkestan eastwards to the Behring Straits, and in China.

RANUNCULUS CYMBALARIA, *Pursh.*

No. 91. Marshes and lagoons on the dry side of desert lakes and on lake shores where submerged in spring, Uria Nor and Achit Nor.

Distribution. Altai, Tian Shan, and Arctic Siberia.

RANUNCULUS PROPINQUUS, *C. A. Mey.*

No. 328. Sandy gravel of the dry rivers near the Upper Amil River.

Distribution. Southern Siberia and Altai.

RANUNCULUS NATANS, *C. A. Mey.*, spec. sterilia.

No. 80. Small shallow lakes at the foot of Kundelun glaciers with *Sphagnum* and *Eriophorum*.

Distribution. N.W. Mongolia, Baikal region, and North America.

RANUNCULUS RADICANS, *C. A. Mey.*

No. 407. Sandy banks on edges of rivers, Lower Kamsara River.

Distribution. Southern Siberia, Altai, and N. China.

RANUNCULUS SCELERATUS, *Linn.*

No. 438. Swamps at the margin of Lake Todju Kul.

Distribution. Europe eastwards to the Loo Choo Islands, southwards to Annam and in N. Africa.

RANUNCULUS SPHEROSPERMUS, *Boiss. et Blanch.*

No. 105. In marshes and lagoons by the sides of desert lakes, Achit Nor, and mountain lakes on the Yamartu Plateau.

Distribution. Morocco, Mesopotamia, and Persia.

TROLLIUS ASIATICUS, *Linn.*

No. 265 a. On the edges of cultivated land and Pine forest shade, Kushabar.

Distribution. The Altai and Ala Tau Mts. eastwards to Manchuria.

TROLLIUS CHINENSIS, Bunge?

No. 262 a. Moist places where not water-logged, Kushabar and up the Amil River.

This plant according to the keys should be *T. chinensis*, Bunge, but it differs from that plant, however, in having its style passing gradually into the carpel and not abruptly springing from it. This specimen agrees in detail with a cultivated specimen from the garden of M. Vilmorin in Herb. Gay.

AQUILEGIA VULGARIS, Linn.

No. 334. On rocky mountain slopes at 1600 m. in the crevices of boulders, also on the upper valley steppe, Sayansk Mts., White Mt., and Upper Japsa Valley.

It is identical with Wilson's specimen no. 1331, Herb. Kew.

Distribution. Through Europe eastwards to China.

DELPHINIUM MAACKIANUM, Regel.

No. 25. Dry parts of valley bottoms and often with *Larix* shade association, Kindergay Valley and Tulu in the N. Tannu-ola Mts.

Distribution. Manchuria.

ACONITUM AMBIGUUM, Reichb.?

No. 500. High upland meadows where the soil is dry peat, at 1500 m., Lower Kemchik, Kizil Taiga, and shores of Sul Kul.

This plant is *Aconitum Napellus*, Linn., var. *β. alpinum*, lusus a. *ambiguum*, Regel, from Siberia altaica leg. Mardovkin, in the Kew Herbarium. It is near *A. ambiguum*, Reichb., but the hood is more curved. It is an undescribed species, but the material is insufficient for description.

ACONITUM SEPTENTRIONALE, Köll.

No. 371. Dry slopes of mountains up to 900 m., in the Kandart Range, Sayansk Mts.

Distribution. Europe: Norway, Sweden and Russia. Asia: China and Japan.

ACONITUM BARBATUM, Patrin.

No. 485. Shade of Larch forests in shaded valley bottoms and on northern slopes, Northern foothills of Tannu-ola Mts. between Dja Kul and Djardan River.

Distribution. Irkutsk district, Manchuria, and China.

ACTÆA SPICATA, Linn.

No. 304. Shade of Spruce forest, Amil River.

Distribution. Europe, Siberia, Baikal region, Ussuri, China, and Japan.

PÆONIA ANOMALA, *Linn.*, forma *capsulis glabris*.

No. 293. Poplar and Spruce forests in open glades up to 600 m., Amil River.

Distribution. Caucasus Mts., Baikal region, and Turkestan.

BERBERIDEÆ.

BERBERIS HETEROPODA, *Schrenk.*

No. 139. Southern aspects, 900 m. to 1500 m., Southern Great Altai, Upper Kran River in the basin of Black Irtysh.

Distribution. Mongolia and Eastern Turkestan.

BERBERIS SIBIRICA, *Pall.*

No. 335. Crevices of rocks at 1600 m., White Mountain in the Sayansk Mountains.

Distribution. Dzungaria eastwards to Manchuria.

NYMPHÆACEÆ.

NYMPHÆA TETRAGONA, *Georgi.*

No. 439. Todju Kul lake, near the margin in about 1 m. of water.

Distribution. Eastern Europe, Asia, and N. America, *Conard.*

PAPAVERACEÆ.

PAPAYER NUDICAULE, *Linn.*, subsp. *MICROCARPUM*, *Fedde.*

No. 380 *a.* On the summit of the Ulug Taiga on dry patches amongst rocky boulders at altitudes over 2300 m.

Distribution (of subsp.). Arctic and sub-arctic Asia, *Fedde.*

Subsp. *XANTHOPETALUM*, *Fedde.*

No. 380 *b.* The same habitat and locality.

Distribution (of subsp.). Central Asia, throughout Siberia and in N. China, *Fedde.*

CHELIDONIUM MAJUS, *Linn.*

No. 316. Moist open places in forests or Taiga on the Amil River.

Distribution. Europe, Asia, N. America, and N. Africa southwards to Teneriffe.

CORYDALIS BRACTEATA, *Pers.*

No. 255. Moist peaty loam near the bank of the Amil River under shade of *Salix Caprea* bushes. About 100 miles S.E. of Minusinsk near the village of Kushabar.

Distribution. Yenisei and Altai Mts.

CORYDALIS SOLIDA, *Sw.*

Kushabar, Minusinsk Division.

Distribution. Central Europe, Asia Minor, throughout Turkestan and Mongolia, Manchuria, Korea, Northern China, and in Japan.

CRUCIFERÆ.

NASTURTIUM PALUSTRE, *DC.*

No. 435. Swamps at the edge of Todju Kul.

No. 446. On dry sandy banks by the River Bei Kem, under the flood-mark, so only growing in midsummer.

Distribution. Europe, Asia, N. Africa, N. and S. America.

ARABIS INCARNATA, *Pall.*

No. 434. Dry steppe near the Upper Bei Kem.

Distribution. Asia Minor, Southern Siberia, and the Altai.

ALYSSUM FISCHERIANUM, *DC.* ex descript.

No. 480. On very dry rocky slopes in an almost desert flora, Ulu Kem, Dja Kul.

Distribution. Dauria.

This specimen is the same plant as the specimen in Herb. Kew. "*A. lenense*, Adams. No. 411. Plantæ Dahuriæ, leg. Karo."

DRABA NEMORALIS, *Linn.*, var. *α. BREVIPES*, *DC.*

No. 342 *a.* Dry banks in the Sistikem Valley, in the moist *Larix* association, Vrianhai country.

Var. *NEMORALIS*, *Ehrh.* (pro specie).

No. 342 *b.*

Distribution. Europe, N. America, Turkestan, and the Altai eastwards to Manchuria.

CARDAMINE PRATENSIS, *Linn.*, forma *C. PARVIFOLIA*, *Wimm. et Grab.*

No. 273. Edges of swamps associated with scrub Birch and *Caltha*, Kushabar.

Distribution. Western Siberia, *O. Schultz.*

HESPERIS MATRONALIS, *Linn.*, var. *γ. SIBIRICA*, *DC.*

Found near Kriloff.

Distribution. Altai.

SMELOWSKIA CALYCINA, *C. A. Mey.*

No. 118 *a.* Stony desert on hill-sides and in plateau valleys up to 2450 m.

under the driest vegetative conditions ; southern Tannu-ola Mts., Achit Nor basin, Suok Valley, and on the N. side of the Altai Mts.

Distribution. N. Mongolia, Altai, and the Rocky Mts. of N. America.

ERYSIMUM ALTAICUM, *C. A. Mey.*, var. *γ*. *HUMILLIMUM*, *Ledeb.*

No. 33. Dry desert hill-slopes and upland valley plateaus up to 2150 m., Bodhon Valley, W. Tannu-ola Mts.

Distribution (of variety). North and West Mongolia and Dahuria.

ERYSIMUM CHEIRANTHOIDES, *Linn.*

Distribution. Europe, N. Asia, and N. America.

LEPIDIUM LATIFOLIUM, *Linn.*, var. *AFFINE*, *C. A. Mey.*

No. 494. Driest hill-slopes and valley-bottoms, sandy and gravelly places, Dja Kul and Djardan valleys.

Distribution. N. and E. Mongolia, and China.

RAPHANUS SATIVUS, *Linn.*

No. 42. Cultivated in Chinese gardens, the root is eaten, Bogdo-ola.

Distribution. Wherever there is cultivation.

VIOLACEÆ.

VIOLA ALTAICA, *Pall.*

No. 337. Rocky places on the White Mountain, Sayansk Mts., 1800 m. ; also in meadows near rivers on well-drained land, Arguiak River.

No. 365, flore albo. Marshy meadows up to 1200 m. (mid-season growth), Upper Japsa, Shabash, and Kandart systems.

Distribution. Asia Minor, Turkestan, southern Siberia, and the Altai.

VIOLA BIFLORA, *Linn.*

No. 360. Dry mountain summits, Sayansk Mts., Upper Kandart and Japsa systems.

Distribution. Europe, Turkestan, N.W. Mongolia, Kamtchatka, China and Japan, extending southwards into northern Thibet.

VIOLA CANINA, *Linn.*

No. 266. Edges of cultivated land and shade of forests, Kushabar

Distribution. Northern temperate regions, extending southwards to Kashmir and N. India.

VIOLA UNIFLORA, *Linn.*

No. 262 b. Sayansk Mts. in Upper Kandart and Japsa systems.

This is the typical plant as figured in Gmelin's 'Flora Sibirica,' tab. 48. fig. 5.

Distribution. Western and southern Siberia and northern Mongolia.

POLYGALACEÆ.

POLYGALA VULGARIS, *Linn.*

No. 288. Dry banks under shade of Pine and Birch, in forests round Kushabar ; and barren and dry hill-slopes, Kemchik basin, Tannu-ola Mts.

Distribution. Europe, Asia Minor, southern Siberia, and Altai, *Chodat.*

CARYOPHYLLACEÆ.

DIANTHUS SUPERBUS, *Linn.*

No. 451. Larch association type, Sabieff, Lower Bei Kem.

Distribution. Europe, south and east ; Asia, in Mongolia, China, and Thibet, *F. N. Williams.*

DIANTHUS VERSICOLOR, *Fisch.*

No. 413. River-terraces and desert parts of open steppe between flood-line of rivers and the Larch-forest zone, Kamsara and Bei Kem Rivers.

No. 447. On dry sandy banks by the River Bei Kem, under flood-mark, so only growing in midsummer.

Distribution. Mongolia and Dahuria, *F. N. Williams.*

GYPSOPHILA DESERTORUM, *Fenzl.*

No. 481. Very dry rocky hill-slopes, almost desert flora, Dja Kul, Ulu Kem.

Distribution. N. and N.W. Mongolia.

SILENE REPENS, *Patrin.*

No. 443. On dry sandy banks by the River Bei Kem, under flood-mark, so only growing in summer.

Distribution. Russia, Siberia, Mongolia, Manchuria, China and Japan, *Rohrbach.*

LYCHNIS SIBIRICA, *Linn.*

No. 405. Driest floral type of open steppe in valley-bottoms or on a dry river terrace, Upper Bei Kem.

Distribution. Baikal region, Dahuria, and Amur province.

STELLARIA DICHOTOMA, *Linn.*, var. *β. HETEROPHYLLA, Ledeb.*

No. 450. Larch association type, Sabieff, Lower Bei Kem.

Distribution. Turkestan, N. Mongolia, and Baikal region.

STELLARIA NEMORUM, *Linn.*

No. 300. Shade of Spruce, Birch and Poplar forests, very common and universal, Amil River.

Distribution. Europe.

This appears to be the true European species.

CERASTIUM DAVURICUM, *Fisch.*

No. 124. Southern aspects of the Great Altai, Upper Kran River, in the basin of Black Irtysh, 900 to 1700 m.

Distribution. Turkestan and Mongolia; Siberia from the Caucasus to the Amur River, extending southwards to Kashmir and N.W. India.

CERASTIUM LITHOSPERMIFOLIUM, *Fisch.*

No. 57. Dry shady slopes where some soil has accumulated, mountain-sides 2600 m., Tannu-ola Mts., head of Saklya River.

Distribution. Turkestan and N. Mongolia.

ARENARIA sp. nov.?

No. 375. Highest mountain-tops 1950 m., also open steppe valley-bottoms with dry flora, range of Sayansk Mts., steppes of Shabash Valley, Kamsara River.

ARENARIA CAPILLARIS, *Poir.*, *ε. FORMOSA*, *Fisch.*, *lusus a. ALPINUS*, *Regel.*

No. 36. Dry desert hill-slopes and upland valley plateaus up to 2100 m., Bodhon Valley, W. Tannu-ola Mts.

ARENARIA CAPILLARIS, *Poir.*, *ζ. NARDIFOLIA*, *Ledeb.*

No. 55. Dry valley bottoms, rocky hill-slopes and desert flora 1200 to 2750 m., in alpine meadows on mountain-sides, W. Tannu-ola Mts.

Distribution (of species). The Ural Mts. eastward to British Columbia and Western United States and extending northwards into the Arctic Circle, *F. N. Williams.*

TAMARISCINEÆ.

TAMARIX sp.

No. 164. Alluvial and sandy plains at 760 m. and under. Medium dry conditions near dry watercourses and occasionally moist hollows, Kemchik River.

No. 199. Alluvial and gravel deserts, Borotella plains and south of Dzungarian Gap.

It is probable that these two specimens are the same species, perhaps *T. Pallasii*, Desv.

REAUMURIA SOONGARICA, *Marim.*

No. 200. Alluvial desert, Borotella plains (often where saline).

Distribution. Turkestan, Altai, western Mongolia, and northern Thibet.

PORTULACACEÆ.

CLAYTONIA ARCTICA, *Adams.*

No. 378. Summit of Mount Ulug Taiga, dry patches on rocky boulders over 1800 m., Sayansk Mts.

Distribution. Siberia, N. Mongolia, and Hall Island in the Behring Sea.

MALVACEÆ.

ALTHÆA ROSEA, *Cav.*

No. 123. Southern aspects, 900 to 1700 m., southern Great Altai Mts., Upper Kran River, basin of Black Irtysh, Dzungaria.

Distribution. South-eastern Europe, Asia Minor, Cyprus, Kashmir, N.W. India, southern China, and Japan.

LINACEÆ.

LINUM PERENNE, *Linn.*, *β.* SIBIRICUM, *Schiede.*

No. 461. Dry valley steppe near rivers, when occasionally flooded, Ulu Kem.

Distribution. N.W. Mongolia, Dahuria, and southern China.

ZYGOPHYLLACEÆ.

NITRARIA SCHOBERI, *Linn.*

No. 198. Alluvial and gravel deserts, Borotella plains and south of Dzungarian Gap.

Distribution. Southern Russia, Caspian Sea, Turkestan and Mongolia, Persia and Afghanistan ; N. Africa as far south as Senegal.

GERANIACEÆ.

OXALIS ACETOSELLA, *Linn.*

No. 298. Shade of Spruce and Larch and Pine forest, where the soil is wet, associated with mosses, ferns, and lycopodiums, Amil River.

Distribution. Europe, North America, Kashmir, northern Himalayas, and Amur River.

GERANIUM ALBIFLORUM, *Ledeb.*

No. 297. Shade of Spruce, Birch, and Poplar forests on the Amil River. Very common and universal.

Distribution. Siberia, Yenisei and Baikal, southwards through northern Mongolia to Dzungaria and Turkestan.

The flowers of this species are purple in the bud, but are pale when fully expanded.

RUTACEÆ.

PEGANUM HARMALA, *Linn.*

No. 203. Desert on the Chuguchak plain, Dzungarian Gap, and Borotella plains.

Distribution. Southern Europe, northern Africa, tropical Arabia, Persia, Afghanistan, extending eastwards through N.W. India into southern China.

LEGUMINOSÆ.

THERMOPSIS LANCEOLATA, *R. Br.*

No. 113. Dunes of blown sand in the desert in the Achit-Nor basin.

Distribution. Southern Siberia, Mongolia, western China, and northern Thibet.

TRIFOLIUM LUPINASTER, *Linn.*

No. 393. Steppe of valley-bottoms, Shabash and Kamsara Rivers.

No. 431. Shade of Larch forest, Upper Bei Kem and Doro Kem Rivers.

Distribution. Russia eastwards to Japan.

LOTUS CORNICULATUS, *Linn.*

No. 456. Driest part of valley steppe, Ulu Kem.

Distribution. World-wide.

HALIMODENDRON ARGENTEUM, *DC.*

No. 163. Alluvial and sandy plains at 760 m. and under. Medium dry conditions, near dry watercourses and occasionally moist hollows, Kemchik River.

Distribution. The Caucasus Mts., Dzungaria, and N. Mongolia.

CARAGANA ARBORESCENS, *Lam.?*

No. 414 a. Terraces of Kamsara and Upper Bei Kem Rivers and desert parts of open steppe, between the flood-line of the river and the Larch-forest zone.

Distribution. Turkestan and Tomsk eastwards to Manchuria.

The material is poor, there being no flowers or fruit.

CARAGANA BUNGEI, *Ledeb.*

No. 414 b.

Distribution. N. Mongolia.

CARAGANA PYGMÆA, *DC.*

No. 2. Steppe near Minnusinsk at 270 m.

No. 202. Alluvial and gravel desert on the Borotella plains.

Distribution. Southern Siberia, Mongolia, Turkestan, N. China, and western Thibet.

CARAGANA SPINOSA, *DC.*

No. 479. Dry alluvial steppe, Ulu Kem, Dja Kul.

Distribution. Southern Siberia, Mongolia, and N. China.

CARAGANA sp.

No. 179. Medium dry sandy places in the plains of the Upper Irtysh, 460 to 550 m.

This plant agrees with *C. conferta*, Benth., as regards stipules, spines, and pubescence, but the bark is totally different.

ASTRAGALUS ALPINUS, *Linn.*

No. 445. On dry sandy banks by the River Bei Kem. Under flood-mark and only growing in summer.

Distribution. Alpine regions of Europe, Asia, and N. America.

ASTRAGALUS DASYGLOTTIS, *Fisch.*

No. 458. Driest part of the Ulu Kem Valley steppe.

Distribution. The Altai and Turkestan.

ASTRAGALUS PALLASII, *Fisch.*

No. 181. Dry stony desert hills at 600 m., Karin Nairn Hills, Upper Irtysh basin.

Distribution. Turcomania and Turkestan.

ASTRAGALUS sp., § Phaca, *Bunge.*

No. 401. Sandy banks near the Lower Kamsara River.

OXYTROPIS sp. cf. *O. platysema*, *C. A. Mey.*

No. 52. Mountain-sides above 2150 m. where the soil is either moist and peaty and covered with alpine meadows, or dry shady slopes where some soil has accumulated. W. Tannu-ola Mts. at the head of the Saklya River.

This specimen differs from *O. platysema* in having calyx-teeth one-third the size of the tube, teeth 2 mm., tube 7 mm., instead of being equal in size. The vexillum also is emarginate, and not entire as in *O. platysema*.

OXYTROPIS sp. cf. *O. sulfurea*, *Fisch.*

No. 395. Open steppe valleys of the Shabash and Kamsara Rivers.

OXYTROPIS TRAGACANTHOIDES, *Fisch.*

No. 115. Stony desert on hill-sides and in plateau valleys up to 2450 m. under the driest vegetative conditions in the S. Tannu-ola Mts., Achit-Nor basin, and Great Altai Mts., north side, in the Suok Valley.

Distribution. The Altai region.

This plant is used for fuel by the Mongols.

GLYCYRRHIZA URALENSIS, *Fisch.*

No. 175. Alluvial plains where slightly moist or sand dunes above water-level. Irrigated fields near Dja Kul and sandy plains of Upper Irtysh basin.

G. uralensis differs considerably from *G. glandulifera*. In the Herbarium, however, there is some confusion, and there appear to be intermediate forms between this plant and the true *G. glandulifera* of Waldstein and Kitaibel, which is a European plant.

ALHAGI KIRGHISORUM, *Schrenk.*

No. 204. Alluvial flats between Ala Kul and Ulu Nor, Dzungarian Gap.

Distribution. Dzungaria.

LATHYRUS FROLOWII, *N. D. Simpson*, sp. nov. (Pl. 21. figs. 8-14.)

Ab *Orobo verno* L., foliis mucronatis nec acuminatis, foliorum rachi sæpe dilatata, foliolis in margine minutissime papilloso-denticulatis, racemis paucifloris et calycis dente inferiore lanceolato acuto nec lineari-lanceolato acuminato distinguendus.

Caules glabri, canaliculati. *Folia* 3-4-juga; rachis glabra, sæpe dilatata; foliola 2-4 cm. longa, 0.6-1 cm. lata, membranaceo-chartacea, anguste oblonga, mucronata nec acuminata, margine papilloso-denticulata, nec ciliolata; stipulæ semisagittatæ, superiores foliolis duplo breviores usque ad 2 cm. longæ, inferiores multoties minores 0.7 cm. longæ. *Flores* purpurei, pedicellati; pedunculi pauciflori 6 cm. longi, 1-4-flori nec pluriflori. *Calyx* 1 cm. longus, dentibus supremis abbreviatis mucronatis 0.2 cm. longis, infimo 0.5 cm. longo tubum subæquante, lanceolato, acuto. *Corolla* calyce duplo longior; vexillum circiter 1.8 cm. longum, 0.9 cm. latum; alæ 1.4 cm. longæ, 0.4 cm. latæ, carina breviores; carina 1.5 cm. longa, obtusa. *Ovarium* sessile, 14-15-ovulatum; stylus lateraliter compressus 0.6 cm. longus. *Legumen* compressiusculum, glabrum.—*Orobus Frolowii*, *Fisch. MSS.*

No. 269. On cultivated or semi-cultivated land and in the shade of forests near Kushabar and Amil River.

Distribution. Altai, *Ledebour!* ex *Herb. Besser!* *Prescot!* Siberia, Yenisei, Torgaschina, *H. Willh. Arnell!* in *Herb. Kew.*

LATHYRUS LINNÆI, *Rouy*, var. ORIENTALIS, *N. D. Simpson*, comb. nov.

No. 303. Open spaces in Poplar, Birch, and Spruce forests on the Amil River.

Orobis luteus, L., var. *orientalis*, Fisch. et Mey. Index 3 Sem. horti Petrop. p. 42.

L. luteus, Peterm. Deutschl. fl. p. 155 (1849), non Munby, Fl. Alger. p. 78 (1847).

Distribution. Turkestan and N. Mongolia.

LATHYRUS PRATENSIS, *Linn.*

No. 422. On the edges of half-dried swamps in open steppe valley-bottoms, Upper Bei Kem.

Distribution. North temperate regions.

SOPHORA ALOPECUROIDES, *Linn.*

No. 147. In the cultivated part of valleys near irrigation canals, Sharasume, Upper Irtysh basin.

Distribution. Asia Minor, Afghanistan, Baluchistan, Dzungaria, and the Altai.

ROSACEÆ.

PRUNUS PADUS, *Linn.*

No. 281. A shrub under Birch and Spruce, very common up to 600 m., Amil River.

Distribution. Europe, N. and Central Asia, and Thibet.

SPIRÆA HYPERICIFOLIA, *DC.*

No. 41. Barren and dry hill-slopes. Desert floral types in the Kemchik Basin, Minusinsk steppe, and southern slopes of the Tannu-ola Mts.

No. 140. Southern aspects from 1370 m. to open stony desert valleys at 760 m., Kran River near Sharasume.

Distribution. Dahuria, Mongolia, Turkestan, extending westwards to the Caucasus and southern Russia, *C. K. Schneider*.

SPIRÆA MEDIA, *Schmidt*, var. *c. SERICEA*, *Regel.*

No. 295. Open glades in forests and on hill-slopes near the Amil River.

Distribution. Northern Mongolia, Manchuria, and Sachalin, *C. K. Schneider*.

RUBUS ARCTICUS, *Linn.*

No. 347. Drying swamps amongst moss, or open steppe in valleys where it is dry, Sistikem, Upper Yenisei, and Japsa Rivers.

Distribution. Subarctic Europe, Asia, and America. Europe, southwards to the Baltic; Asia, southwards to the Himalayas; N. America, Canada and British Columbia, *Focke*.

RUBUS CHAMÆMORUS, *Linn.*

Drying swamp association, Petropolowsk on the Amil River.

Distribution. In subarctic Europe, Asia, and America. In Europe southwards to the Riesen-Gebirge. In America down to the Rocky Mts., and in northern Japan, *Focke*.

RUBUS PURPUREUS, *Bunge*.

No. 467. Associated with stunted Larch and *Pinus* forests on dry rocky slopes, Japsa Mts. near Bei Kem rapids.

Distribution. N. China and Japan and west temperate Himalayas.

DRYAS OCTOPETALA, *Linn.*

No. 9. Dry summit of Kizil Taiga, where it is not too rocky and where the surface is even.

Distribution. Temperate arctic and alpine regions in the Northern hemisphere.

POTENTILLA FRUTICOSA, *Linn.*, var. *VULGARIS*, *Willd.*

No. 350. Open steppe in bottom of the valleys of the Sistikem and Chuguchak Rivers.

Distribution (of sp.). Throughout Europe and Asia extending as far south as the Himalayas, also in N. America down to California, *Th. Wolf*.

POTENTILLA BIFURCA, *Linn.*, var. *TYPICA*, *Th. Wolf*.

No. 418. River terraces and desert parts of open steppe between flood-line of river and Larch-forest zone, Kamsara and Upper Bei Kem Rivers.

Distribution. From Russia and Greece eastwards through Asia Minor and Persia into Turkestan and Mongolia and the Himalayas, *Th. Wolf*.

POTENTILLA BIFURCA, *Linn.*, var. *CANESCENS*, *Ledeb.*

No. 184. On a low sandy plain in the valley of the Upper Irtish.

Distribution (of variety). Central Asia, *Th. Wolf*.

POTENTILLA SERICEA, *Linn.*, var. *DASYPHYLLA*, *Ledeb.*

No. 37. Dry desert hill-slopes of the western Tannu-ola Mts. and upland valley plateaus up to 2150 m.

Distribution. From Russia extending eastwards to Kamchatka and the Behring Straits, *Th. Wolf*.

POTENTILLA VISCOSA, *Donn.*

No. 465. Dry valley steppe near Ulu Kem when occasionally flooded.

Distribution. Central Asia from the Ural Mts. to Manchuria, *Th. Wolf*.

POTENTILLA NIVEA, *Linn.*, var. *ELONGATA*, *Th. Wolf.*

No. 53. Mountain-sides at the head of the Saklya River, above 2100 m., where the soil is moist or in peaty meadows or dry shady slopes where some soil has accumulated.

No. 387. Open dry steppe in valley-bottoms and sandy slopes near the Shabash River.

Distribution. Turkestan, N. Mongolia, and Pamir, *Th. Wolf.*

POTENTILLA CHRYSANTHA, *Trev.*, var. *ASIATICA*, *Th. Wolf.*

No. 128. Southern aspects from 900 to 1700 m., southern Great Altai Mts., Upper Kran River in the basin of the Black Irtish, Dzungaria.

Distribution (of variety). Turkestan, the Altai, and western Mongolia, *Th. Wolf.*

POTENTILLA ELEGANS, *Cham. et Schlecht.*

No. 373. Highest mountain-tops 1950 m., very dry conditions. Also open steppe valley bottoms with dry flora in Shabash Valley, Kamsara, and Kandart Mt. Range, Sayansk Mts.

Distribution. Kamtchatka, Baikal region, Altai, N.W. Mongolia, *Th. Wolf.*

POTENTILLA GELIDA, *C. A. Mey.*

No. 252 *a.* Edges of cultivated land bordering the Birch and Pine forest, on very friable peaty sand, rolling hills, 350 m. above sea, Kalmakof, 40 versts W. of Minusinsk.

Distribution. Arctic and alpine regions in Norway, Lapland, the Caucasus, Armenia, Turkestan, and southern Siberia, *Th. Wolf.*

POTENTILLA SUBACaulis, *Linn.*

No. 252 *b.* Habitat and locality the same as the preceding.

Distribution. Throughout Russia and Siberia to the Amur River, southwards to Mongolia, northern Thibet, and extending into western China, *Th. Wolf.*

POTENTILLA FRAGARIOIDES, *Linn.*

No. 265. Cultivated land and shade of Pine forests, Kushabar.

Distribution. Throughout Siberia extending eastwards to Korea and Japan, and in N. Mongolia, the Altai, northern China, and Manchuria, *Th. Wolf.*

POTENTILLA ANSERINA, *Linn.*

No. 454. Driest part of valley steppe, Ulu Kem River.

No. 484. Very dry areas in river valleys, both in sand and flint desert, Dja Kul and Ulu Kem.

Distribution. Temperate regions and alpine parts of warmer countries all over the world except in southern Africa, *Th. Wolf.*

SIBBALDIA PROCUMBENS, *Linn.*

No. 356. On dry glacial moraines, Japsa River, Sistikem.

Distribution. Arctic and temperate regions.

SIBBALDIA TETRANDRA, *Bunge.*

No. 71. Alpine meadows above 2150 m. and rocky slopes and screes even up to 3000 m., W. Tannu-ola and on mountains south of Saklya River.

Distribution. Altai, Alatau, and Tian-Shan Ranges.

CHAMÆRHODOS ALTAICA, *Bunge.*

No. 64. Upland plateau valleys or dry steppe at about 2150 m., W. Tannu-ola Mts.

Distribution. Altai region.

ALCHEMILLA VULGARIS, *Linn.*

No. 120. Shade of higher Larch forest from 1800 to 2100 m., Great Altai Range.

No. 321 *b.* In Spruce Taiga at 1000 m. growing under melting snow, Chuguchak range, Amil River.

Distribution. Temperate regions of the Northern hemisphere.

SANGUISORBA OFFICINALIS, *Linn.*

No. 394. Steppe valleys, natural meadows, shade of Larch forests. Shabash, Kamsara, and Upper Bei Kem Rivers; also Kemchik and N. slopes of W. Tannu-ola Mts.

Distribution. Northern temperate and arctic regions.

SANGUISORBA ALPINA, *Bunge.*

No. 121. Shade of higher Larch forest 1800 to 2150 m., southern parts of the Great Altai Range, Upper Kran River, and the basin of Black Irtish.

Distribution. Temperate Asia, China and Japan.

ROSA SPINOSISSIMA, *Linn.*

No. 27. On mountain slopes of the Tula Mts. at 2150 m., where the ground is stony.

Distribution. Throughout Europe and in the Altai region, *Lindley.*

ROSA ACICULARIS, *Lindl.*

No. 400. Shade of Larch forests and dry valley slopes chiefly in shade, Lower Shabash and Kamsara Rivers.

Distribution. China, Japan, and in the Amur province and parts of India, *Lindley.*

SORBUS TIANSHANICUS, *Rupr.*

No. 142. Stony valley-bottoms near the Kran River near Sharasume in the southern Great Altai.

Distribution. Turkestan.

CRATÆGUS SANGUINEA, *Pall.*

On the banks of the Kran River.

Distribution. Siberia.

COTONEASTER MELANOCARPA, *Lodd.*

No. 138. Southern aspects at 900 to 1500 m., Great Altai, basin of the Black Irtysh, Upper Kran River.

No. 499. Dry hill and mountain slopes associated with a desert flora on the southern side of Kizil Taiga on the Lower Kemchik River.

Distribution. Mongolia, Tian Shan, and Tannu-ola Mts.

SAXIFRAGACEÆ.

SAXIFRAGA MELALEUCA, *Fisch.*

No. 51. Mountain-sides above 2150 m. where the soil is moist and peaty, in alpine meadows, or on dry shady slopes where soil has accumulated, Western Tannu-ola Mts.

No. 376. Mountain summits over 1800 m. where there are dry patches amongst rocky boulders, Ulug Taiga, Sayansk Mts.

Distribution. Altai, Baikal, and Dahuria, *Engler.*

SAXIFRAGA OPPOSITIFOLIA, *Linn.*

No. 54. Mountain-sides above 2150 m. where the soil is moist and peaty, forming alpine meadows, or dry shady slopes where some soil has accumulated, W. Tannu-ola and mountains at the head of the Saklya River, both N. and S. slopes.

Distribution. Northern and alpine Europe; Asia southwards to Thibet; N. America southwards to the Rocky Mts., *Engler.*

These specimens have very large flowers.

SAXIFRAGA SIBIRICA, *Linn.*

No. 324. Rocks on shores of the Amil River, altitude 670 m.

Distribution. Caucasus to Irkutsk, W. Thibet, and N.W. Himalayas, *Engler.*

SAXIFRAGA CERNUA, *Linn.*

No. 81. Scree and rocky steep slopes on mountain-sides from 2450 to 3350 m., Kundelun Mts.

Distribution. Europe, arctic Siberia down to western Thibet, and arctic North America, *Engler.*

SAXIFRAGA HIRCULUS, *Linn.*

No. 496. High upland meadows and in the shade of Larch forests, on moist peat soil and shady slopes up to 3000 m., Kizil Taiga, Kemchik Valley, and Bogdon and Saglig Valleys.

Distribution. Northern and central Europe; Asia southwards to the Himalayas and arctic North America, *Engler*.

SAXIFRAGA CRASSIFOLIA, *Linn.*

No. 322. Crevices in dry slate and schistose rocks, Chukuok Ridge, Amil River.

Distribution. Siberia, Baikal region, the Altai, and N. Mongolia.

CRASSULACEÆ.

COTYLEDON SPINOSUS, *Linn.*

No. 442. Dry sandy slopes on sides of valleys of the Upper Bei Kem.

Distribution. South and eastern Siberia, Turkestan, N. Mongolia, and eastwards through N. China to Manchuria.

SEDUM FASTIGIATUM, *Hook. fil. et Thoms.*

No. 69. Alpine meadows above 2100 m. and rocky slopes and screes up to 3000 m., Western Tannu-ola and mountains south of Saklya River.

No. 83. Screes and steep rocky slopes on mountain-sides from 2050 to 3350 m. and over, and glacial moraines, Kundelun Mts.

Distribution. Kashmir and Thibet.

SEDUM HYBRIDUM, *Linn.*

No. 416. River terraces and driest parts of open steppe between the flood-line of rivers and the Larch-forest zone, Kamsara and Upper Bei Kem Rivers.

Distribution. Turkestan eastwards to Okhotsk, extending southwards into northern China.

SEDUM QUADRIFIDUM, *Fisch. et Mey.*

Distribution. The Altai and North Mongolia, Kashmir, Thibet, and northern India.

SEDUM RHODIOLA, *DC.*

No. 366. Wet places under snow-drifts on the sides of the Sayansk Mts. in Upper Kandart and Japsa systems.

Distribution. Throughout Europe, northern Asia, and in North America, southwards to the Rocky Mts. in North America and the Himalayas in Asia.

SEDUM sp. nov.?

No. 30. Dry peat in valley bottoms, Kindergay Valley.

DROSERACEÆ.

DROSERÆ INTERMEDIA, *Hayne*.

Drying swamp type of vegetation, Petropolowsk, Amil River.

Distribution. North America, Europe, and the West Indies, *Diels*.

DROSERÆ ROTUNDIFOLIA, *Linn.*

Drying swamp type of vegetation, Petropolowsk, Amil River.

Distribution. North America, arctic and temperate Europe, Siberia, and Asia Minor eastwards to Japan, *Diels*.

HALORAGÆÆ.

HIPPURIS VULGARIS, *Linn.*

No. 88. Marshes and stagnant pools or lagoons near Lakes Uryu and Achit Nor and sluggish streams.

Distribution. North temperate regions.

MYRIOPHYLLUM VERTICILLATUM, *Linn.*

Specimina sterilia, no. 5. Lake Sul-kul, Lower Kemchik.

Distribution. North temperate regions.

ONAGRACEÆ.

TRAPA NATANS, *Linn.*

No. 172. Stagnant backwaters on the Upper Irtysh River.

Distribution. Central and southern Europe, the Caspian region, and Asia Minor.

EPILOBIUM HIRSUTUM, *Linn.*

No. 46. By mountain streams between 2150 and 2450 m., head-waters of the Saklya River.

Distribution. Temperate and arctic regions in the Old World, excluding Australia and New Zealand, *Haussknecht*.

UMBELLIFERÆ.

BUPLEURUM LONGIFOLIUM, *Linn.*, var. β . AUREUM, *H. Wolff*.

No. 386. Dry steppe valleys, Shabash River.

Distribution. Southern Russia, Turkestan, southern Siberia, N. China, and Amur, *H. Wolff*.

BUPLEURUM MULTINERVE, *DC.*

No. 49. Sides of the Tannu-ola Mts. above 2150 m., where the soil is

either moist and peaty, forming alpine meadows, or dry shady slopes where some soil has accumulated.

Distribution. From eastern Russia through central Asia to Manchuria and Japan, extending southwards to Turkestan and N. Thibet, *H. Wolff*.

BUPLEURUM FALCATUM, *Linn.*, var. *λ. BICAULE*, *Wolff*.

No. 34. Dry desert hill-slopes and upland valley plateaus up to 2150 m., Bodbon Valley, W. Tannu-ola Mts.

Distribution. Altai region and Dahuria, *H. Wolff*.

CARUM CARVI, *Linn.*

No. 325. Sandy banks near the Amil River and streams.

Distribution. Northern and central Europe, Persia and Afghanistan, throughout Siberia, and in Canada.

MYRRHIS ODORATA, *Scop.*

No. 299. Shade of Spruce, Birch, and Poplar forests, Amil River.

Distribution. Throughout Europe and Asia Minor.

SCHULTZIA CRINITA, *Spreng.*

No. 381 *a*. Summit of Ulug Taiga, dry patches on rocky boulders over 1800 m.

Distribution. Southern Siberia, Altai Mts., and N.W. Mongolia.

LIGUSTICUM MUTELLINA, *Crantz.*

No. 381 *b*.

Distribution. South-eastern Europe and S. Siberia.

PEUCEDANUM PRICEI, *N. D. Simpson*, sp. n. (Plate 23. figs. 1-3.)

Ab affine *P. vaginato*, Turcz., radice non repente, involuero oligophyllo, involucelli foliolis acuminatis quam umbellulis brevioribus, fructibus obcordatis non orbiculato-ellipticis, valleculis bi- vel trivittatis, commissura 6-vittata recedit.

Herba glaberrima, radice crassa; caulis solitarius, glaber, circiter 45 cm. altus, teres, striatus, apice sulcatus, basi foliorum fibrosis rudimentis obtectus, parce foliosus. *Folia* basalia 6-12 cm. longa, subbipinnata, 3-juga, pinnis 3- vel 2-sectis vel summis simplicibus basi lacinia extus addita, laciniiis anguste lanceolato-linearibus acutis 1-1.5 (raro 2) cm. longis, 0.1-0.2 cm. latis; petiolus ad 2.8 cm. longus, inferne in vaginam ampliatus; folia caulina similia, sed superne gradatim reducta, summum trisectum, petiolo in vaginam commutato. *Umbellæ* 2, altera terminalis, altera ex axilla folii supremi orta, minor; terminalis 10-15-radiata; radii sulcati, longitudine inæquales, ad 3.2 cm. longi; involucrum 1- vel rarius 2-phyllum; phylla filiformia, 0.4 cm. longa; umbellulæ multifloræ, involucella polyphylla,

phyllis linearibus longe acuminatis margine membranaceis inæqualibus 0.45 cm. longis; pedicelli ad 1 cm. longi. *Flores* sicco albi; petala late spatulata, apice inflexa. *Mericarpiæ* obcordata, 0.55 cm. longa, 0.4 cm. lata; alæ albidæ, 0.1 cm. latæ; valleculæ bi- vel trivittatæ, commissura 6-vittata; stylopodium et styli persistentes.

No. 108. On moist well-drained alluvial soil, not far from lakes and streams, Achit Nor, N.W. Mongolia.

HERACLEUM SIBIRICUM, *Linn.*

Distribution. South-eastern Europe and N. Asia.

CAPRIFOLIACEÆ.

SAMBUCUS RACEMOSA, *Linn.*

No. 318. Shade of Spruce and other "Taiga," also above the Spruce line, near the Amil River.

Distribution. Central and southern Europe, Siberia south and east, China, Japan, and Korea.

LINNÆA BOREALIS, *Linn.*

No. 26. Dry peat in valley-bottoms and often with Larch shade association, northern Tannu-ola Mts.

No. 136. Shade of Larch forest 1700 m. to 1800 m., on northern aspects down to 1200 m., southern Great Altai Mts., Upper Kran River, basin of Black Irtish.

Distribution. Throughout Europe, Siberia and Japan, and in N. America.

LONICERA MICROPHYLLA, *Willd.*

No. 40. Common desert bush in stony places, especially in shaded gullies or northern aspects when too dry for the Larch association. Kemchik River, south slope of the Tannu-ola Mts., and Upper Kobdo River.

Distribution. Afghanistan, Turkestan, Altai Mts., Mongolia. In Kansu and Thibet and in Kashmir, *A. Rehder*.

LONICERA CÆRULEA, *Linn.*, var. *ALTAICA*, *Sweet.*

No. 135. Shade of Larch forest 1700 m. to 1800 m., and on northern aspects down to 1200 m. Southern Great Altai Mts., Upper Kran River and the basin of Black Irtish.

Distribution (of var.). N. Europe and N. Asia to Japan, *A. Rehder*.

LONICERA CÆRULEA, *Linn.*

No. 276 a. Forms a small shrub in the shade of Birch and Poplar forest and on dry slopes. Kushabar, south slopes of the Sayansk Mts., and the north slopes of the Tannu-ola Mts.

Distribution. North America : south to Pennsylvania, Wisconsin, Wyoming to California. Northern Asia : south to Hondo and Thibet. Turkestan and Asia Minor. N. and middle Europe and mountains in the South of Europe. *A. Rehder.*

LONICERA TATARICA, *Linn.*

No. 137. Southern aspects 900 to 1700 m. on the Great Altai Mts., Upper Kran River, and in the basin of the Black Irtysh, Dzungaria.

Distribution. Central Asia to south Russia : from the Altai to the Ural Mts. and the Volga. *A. Rehder.*

RUBIACEÆ.

GALIUM BOREALE, *Linn.*

No. 391. Open steppe valley-bottoms, dry type of flora, Shabash and Kamsara Rivers.

Distribution. North and central Europe, Turkestan, Mongolia, China and eastern Siberia, extending down to Kashmir and northern India, and in North America.

GALIUM CRUCIATA, *Scop.*, var. *β. CHERSONENSE*, *DC.*

No. 296. On dry banks of the Amil River in open glades of Birch and Poplar and Spruce forest.

Distribution. Central Europe, the Caucasus, and Asia Minor.

GALIUM TRIFIDUM, *Linn.*

No. 436. Swamps at the edges of Lake Todju Kul.

Distribution. N. Europe, eastern Siberia, Japan, N. America, and Mexico.

GALIUM ULIGINOSUM, *Linn.*

No. 437. Swamps at the margin of Lake Todju Kul.

Distribution. Throughout Europe and in N.W. America.

GALIUM VERUM, *Linn.*, var. *LEIOCARPUM*, *Ledeb.*

No. 421. Open meadows in valleys, shade of Larch forest. Dry hill-slopes with desert flora, Kamsara and Upper Bei Kem, Kemchik, and W. Tannu-ola Mts.

Distribution. Europe, Asia Minor, Persia, and Japan.

ASPERULA ODORATA, *Linn.*

No. 301. Shade of Spruce, Birch and Poplar forests, Amil River.

No. 315. Shade of *Abies*, Poplar, and Birch forests, Amil River.

Distribution. Europe, Asia Minor, Persia, N.W. India, and Japan.

VALERIANACEÆ.

PATRINIA SIBIRICA, *Juss.*

No. 14. Dry mountain summits when not too rocky and when the surface is even, Kizil Taiga.

No. 361. Dry summits of Sayansk Mts., Upper Kandart and Japsa systems : associated with Reindeer Moss.

Distribution. Siberia and northern Mongolia.

VALERIANA SAMBUCIFOLIA, *Mikan.*

No. 392. Open steppe valley-bottoms, Shabash and Kamsara Rivers.

Distribution. Europe, Siberia, and Manchuria.

DIPSACEÆ.

SCABIOSA OCHROLEUCA, *Linn.*

No. 468. Dry valley steppe near the Lower Bei Kem where it is occasionally flooded.

Distribution. Southern Europe, and S. Siberia and N. Mongolia.

COMPOSITÆ.

ASTER ALPINUS, *Linn.*

No. 13. Dry summit of Kizil Taiga when not too rocky.

No. 28. Mountain slopes and dry steppe valleys from 1200 to 2900 m. Tula Mt. at 2100 m., W. Tannu-ola Mt.

No. 390. Open steppe valley-bottoms, dry type of flora, Shabash and Kamsara Rivers.

Distribution. Europe, Siberia, Turkestan, and China.

ERIGERON UNIFLORUS, *Linn.*

No. 56. Dry shady slopes where some soil has accumulated, sides of W. Tannu-ola Mts. at 2600 m.

Distribution. Alpine and arctic regions of the Northern Hemisphere.

ANTENNARIA DIOICA, *Gärtn.*

No. 349. Open steppe in bottoms of the valleys of the Japsa and Sistikem Rivers.

Distribution. Throughout Europe, Siberia, Asia Minor, and Turkestan, also in Japan and North America.

LEONTOPODIUM ALPINUM, *Cass.*

No. 21. Dry steppe on terraces and screes near the Upper Djardan and Kundergay. Dry plateau valley, Bogdon, W. Tannu-ola Mts.

Distribution. Central and southern Europe, Turkestan extending eastwards to China and in northern India.

HELICHRYSUM ARENARIUM, *DC.*

No. 195. Alluvial downs on N.W. Barlik Range near Dzungarian Gap.

Distribution. Eastern Europe, the Altai, Turkestan, and southwards into Afghanistan.

INULA BRITANNICA, *Linn.*

No. 463. Dry valley steppe near the River Ulu Kem, where it is occasionally flooded.

Distribution. Europe, Turkestan eastwards to Japan.

ACHILLEA IMPATIENS, *Linn.*

No. 389. Open and dry steppes in valley-bottoms, Upper Shabash River.

Distribution. Siberia and the Altai region.

ACHILLEA MILLEFOLIUM, *Linn.*

No. 127. Southern aspects from 900 to 1700 m. Southern Great Altai Mts., Upper Kran River, basin of Black Irtish, Dzungaria.

FORMA. No. 424. Driest parts of the open steppe between the flood-line of river and the Tomsk forest zone, Upper Bei Kem and Dora Kem.

Distribution. Temperate and alpine regions of the Northern hemisphere.

ALLARDIA GLABRA, *Decne.*

No. 82. Scree and steep rocky slopes on mountain-sides from 2450 to 3350 m. and on recently evacuated glacial moraines, Kundelun Mts.

Distribution. Turkestan and northern Mongolia southwards into Thibet and the Himalayas.

TANACETUM BOREALE, *Fisch.*

No. 19. Shade of the Larch forests, Middle Bei Kem and Kundergay Rivers.

Distribution. Norway, Turkestan, throughout Siberia and North America.

TANACETUM FRUTICULOSUM, *Ledeb.*

No. 110. Stony desert in Achit Nor basin under driest conditions and on the dry mountain-sides of the Great Altai (north side) up to 2450 m.

Distribution. Turkestan, northern Mongolia, the Altai, and Pamir.

ARTEMISIA ARGYROPHYLLA, *Ledeb., ex icon. et descript.*

No. 67. Upland plateau valleys when very dry, with desert flora, Bogdon and Saklya Valleys, Turgun Valley; also upland valleys on the north side of the Great Altai Mts.

Distribution. Altai, *Ledebour.*

ARTEMISIA CAMPESTRIS, *Linn.*

No. 194. Alluvial and gravel-desert, Dzungarian Gap.

Distribution. Throughout Europe, Asia Minor, southern Siberia, Turkestan, eastwards to China and Manchuria.

ARTEMISIA FRIGIDA, *Willd.*

No. 38. Dry desert hill-slopes in the Bodhon Valley and upland valley plateaus up to 2150 m.

Distribution. Southern Siberia, Mongolia, Turkestan, and North America.

ARTEMISIA LERCHEANA, *Weber.*

No. 174. Medium dry conditions, sand-dunes and sandy silt deposits just above the water-table. Sandy plains of the Upper Irtysh basin.

No. 185. Plateau steppe, north of Chugu-ola Pass, Dzungaria.

No. 188. Alluvial plains on the Chuguchak Steppe.

Distribution. Asia Minor, Siberia, Mongolia, and Turkestan.

ARTEMISIA LERCHEANA, *Weber*, var. HUMILIS, *Ledeb.*

No. 143. Stony desert on hill-sides at 750 m. in the Kran River Valley in the Sharasume district.

ARTEMISIA SERICEA, *Weber*, var. β . GRANDIFLORA, *DC.*

No. 131. Southern aspects from 900 to 1700 m. in the Great Altai Mts., Upper Kran River, and the basin of the Black Irtysh.

Distribution (of the species). Turkestan, Altai, N. Mongolia, and Dahuria.

ARTEMISIA SIEVERSIANA, *Willd. non Ehrh.*

No. 85. Stony desert under driest vegetative conditions, N.W. Mongolia, Khanofski Haslum.

Distribution. Altai and northern Mongolia.

TUSSILAGO FARFARA, *Linn.*

No. 314. Sandy banks by the side of streams at 600 m. On the Chukuok Ridge, N. of Sayansk Mts., and near the Amil River.

Distribution. Arctic and temperate regions of the Northern hemisphere.

PETASITES LÆVIGATUS, *Reichb.*

No. 310. Sandy island in the Amil River, often flooded.

Distribution. Tomsk and the Altai.

DORONICUM ALTAICUM, *Pall.*

Northern side of the Sayansk Mts.

Distribution. Altai, Mongolia, and Yunnan.

SENECIO AURANTIACUS, *DC.*, *δ. CAPITATUS, DC.*

No. 60. Boggy alpine meadows on the sides of the W. Tannu-ola Mts. at the head of the Saklya River.

Distribution. Central and south-eastern Europe, Altai, North Africa.

SENECIO NEMORENSIS, *Lin.*, *β. OCTOGLOSSUS, Koch.*

No. 20. Shade of Larch forest, Middle Bei Kem and Kundergay Rivers.

Distribution. Southern Europe, throughout Siberia, northern Russia, and Turkestan.

SENECIO PALUSTRIS, *DC.*

No. 96. Mud flats on the edges of shallow desert lakes such as Achit Nor; the plant is half-submerged.

Distribution. Europe, Siberia, N. Mongolia, and N. America.

SENECIO LIGULARIA, *Hook. f. et Thoms.*

No. 12. Dry summit of Kizil Taiga where the surface is even and not too rocky.

Distribution. Southern and eastern Europe, Turkestan, the Altai and Irkutsk eastwards to Japan.

Ligularia sibirica, Cass.

SENECIO TURCZANINOWII, *DC.*

No. 61. Boggy alpine meadows on sides of Western Tannu-ola Mts.

Distribution. Dahuria.

SENECIO PRICEI, *N. D. Simpson*, sp. n. (Pl. 22. figs. 8-12.)

Cremanthodii habitus, affinitate dubia, foliis ficarioideis, caule superne copiose floccoso-lanuginoso.

Herba rhizomate brevi præmorso, 10-12 cm. alta; caulis simplex, monocephalus, canaliculatus, dense floccoso-lanatus. *Folia* radcailia longe petiolata, lamina rotundata, basi breviter cuneata, crenata, ad 2 cm. longa, 1-1.7 cm. lata, supra laxe floccoso-lanata, lana detersea, subtus glabra, laxe tenuiter reticulata; petioli ad 5 cm. longi, glabri, late membranaceo-alati; folia caulina sessilia, late lanceolata, acuta, integra. *Capituli involucrium* hemisphæricum, ad 3 cm. diametro; bractæ 6-seriatæ, 1.3 cm. longæ, anguste lineares, acuminatæ, purpurascens, extus albido vel fusco-floccoso-lanatæ. *Flores radii* ultra 20; corollæ tubus glaber, 0.4 cm. longus; limbus lineari-ligulatus, apice tridentatus, vix 2 cm. longus, 0.25 latus, 4-nervis; achenium cylindricum, glabrum, 0.25 cm. longum; pappi setæ barbellatæ, 0.6 cm. longæ; styli rami 0.1 cm. longi. *Flores disci* numerosi; corollæ tubus 1.4 cm. longus, supra medium ampliatus, glaber, dentibus ovato-acutis; antheræ acutæ, 0.3 cm. longæ, loculis basi brevissime productis acutis; pappi

setæ barbellatæ, 1·2 cm. longæ; achenium cylindricum, glabrum, striatum, 0·4 cm. longum; styli rami 0·1 cm. longi.

No. 50. On mountain-sides above 2150 m. where the soil is moist and peaty, forming alpine meadows, or on dry shady slopes, Western Tannu-ola Mts. and the north and south slopes of the mountains at the head of the Saklya River.

ECHINOPS RITRO, *Linn.*

No. 146. Stony desert on hill-sides at 750 m. in the Kran River valley.

Distribution. Southern Europe, Persia, Turkestan, and the Altai.

CARDUUS ARCTIOIDES, *Linn.*?

No. 449. A member of the Larch association, Sabieff on the Lower Bei Kem.

Distribution. Southern Europe and Russia.

CNICUS IGNIARIUS, *Benth. & Hook. f.*

No. 206. Low desert hills, Kara Daba Pass.

Distribution. Throughout Siberia.

CNICUS SERRATULOIDES, *DC.*

No. 125. Southern aspects from 900 to 1700 m., southern Great Altai Mts., Upper Kran River, and basin of Black Irtysh.

Distribution. Northern Mongolia, the Altai, and Turkestan.

SAUSSUREA PRICEI, *N. D. Simpson*, sp. n. (Pl. 21. figs. 1-7.)

Affinis *S. canæ*, Ledeb., sed caulibus pygmæis, foliis supra laxè araneosis subtus dense albo-tomentosis, capitulis latioribus, corollæ tubo supra medium asymetricè dilatato distincta.

Herba perennis, pygmæa, 1-2 caulibus e rhizomate lignescente, foliorum pristinorum rudimentis fuscis obtectis: caules erecti, 6-7 cm. alti, apice polycephali, dense cano-tomentosi. *Folia* lanceolata, sinuato-dentata, longitudine 2-4 cm., latitudine 0·5-1 cm., subtus dense albo-tomentosa supra leviter incano-araneosa, margine revoluta. *Capitula* pedunculata, erecta, 5-7 vel plura, dense congesta; involucrium oblongo-turbinatum, parce lanatum, phyllis 5-7-seriatis, exterioribus ovatis submucronatis, interioribus lanceolatis acuminatis apice atroviolaceo margine membranaceo colorato; receptaculum longe setiferum. *Flosculi* rosei; corollæ tubus supra medium asymetricè inflatus, 1·4 cm. longus; limbus 0·2 cm. longus; antherarum caudæ basi floccoso-lanatæ. *Achenia* obscure striata, glabra, 0·3 cm. longa. *Pappus* duplex; pappi setæ exteriores achenium æquantès, barbellatæ, interiores 1 cm. longæ, albida, plumosæ.

No. 35. On dry desert hill-slopes and on upland valley plateaus up to 2150 m., Bodhon and western Tannu-ola Valleys.

SAUSSUREA PSEUDO-ALPINA, *N. D. Simpson*, sp. n. (Pl. 22. figs. 1-7.)

Affinis *S. alpinæ*, DC., sed foliis margine subrevolutis, sæpe fere integris, non acuminatis, corymbo polycephalo, involuero elongato angustiore, phyllis angustis præter margines fere glabris distincta.

Herba perennis, rhizomate gracile; caulis 15-30 cm. longus, canaliculatus, laxe arachnoideus, apice parce lanatus. *Folia* inferiora late lanceolata, acuta, longe pedunculata, minute eroso-dentata, circiter 8 cm. longa, 1-2 cm. lata, margine sæpe revoluta, subtus dense, supra laxe arachnoideo-tomentosa; folia caulina pauca, similia, nisi minora, integra, anguste lanceolata. *Corymbus* dense congestus, polycephalus. *Capitula* breviter vel brevissime pedunculata; involucrum oblongum, 1 cm. altum, fere glabrum, phyllis 6-seriatis in margine violaceis ciliatisque, inferioribus ovatis acutis; receptaculum longe setiferum. *Flosculi* rosei; corollæ 1.3 cm. longæ; tubus supra medium ampliatus, infra constrictus, non basi dilatatus; limbus 0.4 cm. longus; antherarum caudæ basi multisetosæ. *Achenia* 0.2 cm. longa, obscure striata, glabra. *Pappus* duplex; pappi setæ exteriores 0.5 cm. longæ, setoso-barbellatæ, interiores plumosæ, 1.2 cm. longæ.

Locality unknown.

HIERACIUM PRENANTHOIDES, *Vill.*

No. 126. Southern aspects from 900 to 1700 m., southern Great Altai, Upper Kran River, and the basin of the Black Irtysh.

Distribution. Europe, Siberia, Persia, and the Himalayas, *Coste*.

TARAXACUM sp.

No. 457. Driest parts of the Ulu Kem valley steppe.

LACTUCA TATARICA, *C. A. Mey.?*

No. 109. Stony desert of the Achit Nor basin under driest conditions and on the dry mountain-sides of the Great Altai up to 2450 m. (on the north side).

Distribution. Southern Europe eastwards to northern Mongolia and in Persia and Thibet.

SCORZONERA AUSTRIACA, *Willd.*

No. 11. Dry summit of Kizil Taiga where the surface is even and not too rocky.

Distribution. Turkestan, Mongolia, Daburia, and N. China.

SCORZONERA HUMILIS, *Linn.*

No. 345. Dry ground under Larch forest, Kriloff, Sistikem.

Distribution. Southern and central Europe and Siberia.

CAMPANULACEÆ.

CAMPANULA GLOMERATA, *Linn.*

No. 257 b. Pine, Birch, Poplar, and Spruce forests on Taiga round about Kushabar and Amil River.

Distribution. Europe, Asia Minor, Siberia, and the Altai.

CAMPANULA ROTUNDIFOLIA, *Linn.*

No. 411. Shade of Larch forest and natural meadows by the sides of Rivers Kamsara and Bei Kem. Up to 1800 m. under Larch, chiefly on northern aspects of the western Tannu-ola Mts.

Specimen without a number. Larch forest shady association, Upper Yenisei basin.

Distribution. Throughout Europe, N. Asia, and N. America.

CAMPANULA SILENEFOLIA, *Fisch.*

No. 59. Mountain-sides above 2150 m. in alpine meadows, where the soil is moist and peaty, or on the dry shady slopes of the western Tannu-ola Mts. and the north and south slopes of the mountains at the head of the Saklya River.

Distribution. Siberia, from the Olenek River and the Baikal region westwards.

ADENOPHORA LAMARCKII, *Fisch.*

No. 490. In sheltered gullies with northerly aspects, chiefly associated with stunted Larch forest. Northern foothills of the Tannu-ola, between Dja Kul and Djardan.

Distribution. Transylvania and Turkestan.

ADENOPHORA MARSUPIIFLORA, *Fisch.*

No. 462. Dry valley steppe near the River Ulu Kem where it is occasionally flooded.

Distribution. Dahuria and Amur.

VACCINIACEÆ.

VACCINIUM MYRTILLUS, *Linn.*

No. 311. In the typical flora of a drying-up swamp encroaching on the *Vaccinium* association, Petropolowsk, Amil River.

Distribution. Europe and North America.

VACCINIUM OXYCOCCUS, *Linn.*

No. 284. In Heath association on half-dried swamps under Birch and Pine, Kushabar, and in the drying swamp association near Petropolowsk on the Amil River.

Distribution. The Northern Hemisphere.

VACCINIUM VITIS-IDÆA, *Linn.*

No. 254. In open Pine and Birch forest or "Taiga." Kalmakop, 40 versts W. of Minusinsk.

No. 344. Dry rocky slopes and on moss in the shade of the forest, Sistikem River.

Distribution. The Northern hemisphere.

ERICACEÆ.

CASSANDRA CALYCVLATA, *D. Don.*

No. 283. In Heath association on half-dried swamps under Pine and Birch, Kushabar. Rare.

Distribution. Finland, Siberia, Japan, and North America.

ANDROMEDA POLIFOLIA, *Linn.*

Drying swamp association near Petropolowsk, Amil River.

Distribution. N. Europe, Siberia, Japan, and N. America.

PHYLLODOCE TAXIFOLIA, *Salisb.*

No. 397. On the sides of the Sayansk Mts. from 1200 to 1800 m. in the Upper Japsa and Kandart valleys.

Distribution. Europe, the Baikal region, Kamtchatka, China and Japan, and in North America.

LEDUM PALUSTRE, *Linn.*

No. 282. In Heath association on half-dried swamps under Pine and Birch, Kushabar. Rare.

No. 338. Crevices of rocks on the slopes of the White Mountain; also in half-dried swamps in the Amil River Valley associated with *Pinus*.

Distribution. Europe, south and eastern Siberia, China, Japan, and N. America.

RHODODENDRON CHRYSANTHUM, *Pall.*

No. 333. Above 1600 m. in the Upper *Pinus* and *Abies* forest zone, White Mountain, Sayansk Range, Tashkel Mts., and Great Japsa Range.

Distribution. Greenland, southern and eastern Siberia.

RHODODENDRON DAURICUM, *Linn.*

No. 354. In open Pine and Birch forest or "Taiga," Kalmakop, 40 versts W. of Minnusinsk.

Distribution. Southern and eastern Siberia.

PYROLA ROTUNDIFOLIA, *Linn.*

No. 346. Dry slopes under Larch on the Sistikem River.

No. 432. Moist shady places on the shores of Todju Kul.

Distribution. Europe, Asia Minor, southern and eastern Siberia, China and Japan, extending southwards into N. India, and in N. America.

PLUMBAGINEÆ.

STATICE GMELINI, *Willd.*, var.

No. 452. Driest part of valley steppe on the Ulu Kem River.

Distribution. South-eastern Europe, Asia Minor, southern Siberia, and Turkestan.

STATICE SPECIOSA, *Linn.*

Dry sandy banks round Lake Todju Kul, Upper Yenesei basin.

Distribution. S.E. Russia, Asia Minor, southern Siberia, N.W. Mongolia, and Turkestan.

PRIMULACEÆ.

PRIMULA ELATIOR, *Jacq.*, var. *δ. PALLASII*, *Pav.*

No. 259 b. Damp hollows in the "Taiga" or forest under the shade of *Abies sibirica* and *Populus suaveolens*, associated with grasses which had not begun to grow. Altitude 320 m., Kushabar.

Distribution (of var.). Ural and Caucasus Mts. to Armenia and N. Persia, *Pav* & *Knuth*.

PRIMULA ELATIOR, *Jacq.*

No. 469. Associated with stunted *Larix* and *Pinus* forests on dry rocky slopes, Japsa River, near the Bei Kem Rapids.

The flowers of this specimen agree with *P. Pallasii*, but the leaves, which are detached, do not agree with the Herbarium material. *P. Pallasii*, however, is poorly represented at Kew.

Distribution. England, central Europe to southern Russia.

PRIMULA ALGIDA, *Adams*, α. *SIBIRICA*, *Pav.*

No. 253. Peat bog at 300 m., Kalmakop, 40 versts W. of Minnusinsk.

PRIMULA ALGIDA, β . ARMENA, *Pav.*

No. 119. Alpine meadows and lake-shores above 2150 m., Lake Dolmo Kul, Upper Kobdo River, Great Altai Mts.

Distribution (of species). The Caucasus Mts., N. Persia, Turkestan, the Altai region, and Japan, *Pav & Knuth.*

PRIMULA NIVALIS, *Pall.*

No. 72. Boggy alpine meadows and by mountain-streams from 2450 to 2750 m., western Tannu-ola Mts. at the head of Saklya River.

Distribution. Caucasus Mts., Afghanistan, S. Siberia, Turkestan, and the Himalayas eastwards to Yunnan, *Pav & Knuth.*

ANDROSACE FILIFORMIS, *Retz.*

No. 294. Dry slopes in Poplar, Birch, and Spruce forests, Amil River.

Distribution. Eastern Europe throughout Siberia and in western North America, *Pav & Knuth.*

ANDROSACE SEPTENTRIONALIS, *Linn.*

No. 341. Dry banks in the Sistikem Valley, Vrianhai country.

Distribution. North-eastern Europe, northern Asia, and in N. America, *Pav & Knuth.*

CORTUSA MATTHIOLI, *Linn.* forma BROTHERI, *R. Knuth.*

In the shade of *Pinus sibirica* forest, Japsa River.

Distribution. Turkestan and the N.W. Himalayas, *Pav & Knuth.*

LYSIMACHIA THYRSIFLORA, *Linn.*

No. 440. In lakes in about 1 m. of water. Margin of Lake Todju Kul.

Distribution. Europe, throughout Siberia, and in temperate N. America. *Pav & Knuth.*

TRIENTALIS EUROPÆA, *Linn.*

No. 287. In swamps near Kushabar with *Sphagnum* and Birch; a true bog association.

Distribution. N. and central Europe, S. Siberia, Manchuria, and Japan, western N. America to Oregon, *Pav & Knuth.*

GLAUX MARITIMA, *Linn.*

No. 89. Marshes and lagoons on the dry side of desert lakes and also on lake-shores where submerged in spring, Uryu Nor and Achit Nor.

No. 428. Driest parts of open steppe between the flood-line of River Bei Kem and the Larch-forest zone.

Distribution. N. and central Europe, temperate Asia, and N. America, *Pav & Knuth.*

GENTIANEÆ.

GENTIANA ALGIDA, *Pall.*

No. 16. Dry summit of Kizil Taiga where the surface is even and not too rocky.

Distribution. The Altai, Mongolia, and Turkestan, *Kusnezow*.

GENTIANA ALTAICA, *Pall.*

No. 15. Dry summit of Mt. Kizil Taiga where not too rocky.

No. 336. From 1700 m. to the summit of the White Mountain in the Sayansk Mts. and near the River Arjanak.

Distribution. The Altai, N. Mongolia, and Turkestan, *Kusnezow*.

GENTIANA BARBATA, *Fröhl.*

No. 24. Dry peat in valley bottoms, Kindergay and Tula Rivers.

Distribution. Asia Minor, throughout Siberia and Turkestan.

GENTIANA DECUMBENS, *Linn.*

No. 478. Dry steppe at Dja Kul near the Ulu Kem and Djardan Rivers, on medium dry alluvium.

Distribution. S. and E. Siberia, N. Mongolia, the Himalayas and Thibet, *Kusnezow*.

GENTIANA PROSTRATA, *Hornke.*

No. 495. High upland meadows and shade of higher Larch forests at 1500 m. on dry peaty soil, Kizil Taiga.

Distribution. Eastern Alps in Europe, Siberia, Mongolia, and Turkestan and N.W. America, *Kusnezow*.

GENTIANA VERNA, *Linn.*, *α. ANGULOSA*, *Wahlenb.*

No. 348. Dry open places in forest or dry shady places associated with the surrounding steppe flora, Japsa and Sistikem Rivers.

Distribution. W. Europe, the Caucasus region, Siberia and Turkestan, *Kusnezow*.

PLEUROGYNE ROTATA, *Grisch.*

No. 106. Medium moist, well-drained alluvial silt, not far from streams or lakes, Achit Nor.

Distribution. Southern Siberia, Mongolia, Turkestan, China, Japan, and N. America.

SWERTIA OBTUSA, *Ledeb.*

Larch-forest shady association, Upper Yenisei Basin.

Distribution. The Altai, Mongolia, and Turkestan.

MENYANTHES TRIFOLIATA, *Linn.*

No. 271. Swamps and bogs on clumps of *Sphagnum*, Kushabar.

Distribution. Europe, N. Siberia, Japan, N. India, and N. America.

LIMNANTHEMUM NYMPHOIDES, *Link.*

No. 171. Stagnant backwaters of the Upper Irtysh River.

Distribution. Europe, S. Siberia, Manchuria, China, N. Mongolia, and southwards into N.W. India.

POLEMONIACEÆ.

POLEMONIUM CERULEUM, *Linn.*

No. 406. Dry slopes in the open and steppe in the valley bottoms, Lower Kamsara River.

Distribution. Europe, southern and eastern Siberia, Turkestan, China, Japan, Kashmir, and in N. America.

BORAGINÆÆ.

HELIOTROPIMUM EUROPEUM, *Linn.*

No. 182. Dry stony desert hills at an altitude of 600 m., Karin Nairn Hills, Upper Irtysh basin.

Distribution. Southern Europe, N. Africa and the Canaries and Azores, Asia Minor and Persia, Australia, and in the south of the United States of America.

ECHINOSPERMUM LAPPULA, *Lehm.*

No. 488. On the edges of small streams and oases where not dried up in desert steppe, between Dja Kul and Djardan.

Distribution. Very widespread.

ANCHUSA MYOSOTIDIFLORA, *Lehm.*

No. 264. Universal and very common. Shade of Birch, Poplar, and Pine Forests and under Birch shade at the edges of cultivated land where not too swampy, near Kushabar in the Amil River forests.

Distribution. The Altai region.

PULMONARIA MONTANA, *Lej.*

No. 260. In the shade of Pine forests. Damp hollows in Pine and Birch groves on edges of cultivated land, river-banks under Willow scrub. Widely distributed all over the Amil River basin. One of the earliest spring plants.

Distribution. Central and southern Europe and southern and western Siberia, *Kerner.*

MYOSOTIS PALUSTRIS, *With.*

No. 388. Open steppe in valley bottoms and half-dried bogs, Shabash River.

Distribution. Europe, throughout Siberia, Persia, Afghanistan, and Turkestan, in Madeira and N. and Central America.

MYOSOTIS SYLVATICA, *Hoffm.*

No. 62. Mountain-sides from 2100 to 2900 m. where the soil is moist and peaty forming alpine meadows, or dry shady slopes where some soil has accumulated at the head of Saklya River.

No. 313. Open glades in *Pinus* and *Picea* forests, Petropolowsk.

Distribution. Very widespread throughout the Northern hemisphere.

ARNEBIA GUTTATA, *Bunge.*

No. 183. Dry stony desert hills at an altitude of 600 m., Karin Nairn Hills, Upper Irtysh basin.

Distribution. Chinese Turkestan.

CONVOLVULACEÆ.

CONVOLVULUS ARVENSIS, *Linn.*, *c. SAGITTATUS*, *Ledeb.*

No. 473. Dry steppe association near rivers on alluvium, Dja Kul on the Ulu Kem.

Distribution (of species). In temperate regions of both the New and Old World.

SOLANACEÆ.

SOLANUM PERSICUM, *Willd.*

No. 474. Dry steppe association near rivers, on alluvium near Dja Kul on the Ulu Kem.

Distribution. Asia Minor, Persia, southern Siberia, and in the Amur region.

SCROPHULARINEÆ.

LINARIA VULGARIS, *Mill.*

No. 472. Dry steppe association near rivers, on alluvium near Dja Kul on the Ulu Kem.

Distribution. Europe, N. Asia, and N. America.

DODARTIA ORIENTALIS, *Linn.*

No. 165. On alluvial and sandy plains at 750 m. and under. Medium dry conditions, near dry water-courses, and occasionally in moist places, Kemchik River near Sharasume.

Distribution. Asia Minor, Afghanistan, Turkestan, and Mongolia.

VERONICA INCANA, *Linn.*

No. 252 c. Edges of cultivated land bordering Birch and Pine forest. Soil very friable peaty sand, on rolling hills at 370 m., Kalmakof, 40 versts W. of Minnusinsk.

No. 420. Very common dry steppe plant. Dry sandy terraces of Bei Kem River and barren hill-sides, near the Ulu Kem and Kemchik Rivers, with southern aspect, and on almost desert plains.

Distribution. S. Europe, S. Siberia, N. Mongolia, and Turkestan.

VERONICA LONGIFOLIA, *Linn.*

No. 385. Open and dry steppe in valley bottoms, Upper Shabash River.

Distribution. N. and E. continental Europe, Siberia, Turkestan, Manchuria, and China.

VERONICA SERPYLLIFOLIA, *Linn.*

No. 290. Open meadows near Kushabar.

Distribution. Europe, the Azores, Kamtchatka, and Sachalin.

PEDICULARIS LONGIFLORA, *Rudolph.*

No. 23. In half-dry forest bogs, in valley bottoms, Kindergay and Tula valleys, and on mountain-sides, Bovashay Pass, Western Tannu-ola Mts.

Distribution. Baikal region and the Himalayas and Western Thibet, *Maximowicz.*

PEDICULARIS RESUPINATA, *Linn.*

No. 430. Shade of Larch forest near Upper Bei Kem and Dora Kem Rivers.

Distribution. Russia, throughout Siberia, Mongolia, N. China, Japan, and Korea and Sachalin, *Maximowicz.*

PEDICULARIS UNCINATA, *Steph.*

No. 370. Dry slopes of mountains in the Kandart Range up to 900 m.

Distribution. Siberia, *Maximowicz.*

PEDICULARIS COMOSA, *Linn.*, var. with red flowers.

No. 359. Moist alpine meadows (mid-season growth) or early growth on mountain-tops below snow and on southern slopes of the Sayansk Mts. and Upper Japsa systems.

Distribution. S.E. Europe, southern and eastern Siberia, N.W. Mongolia, and Manchuria, *Maximowicz.*

PEDICULARIS VERSICOLOR, *Wahlenb.*

No. 63. Mountain-sides above 2150 m. where the soil is either moist and peaty, forming alpine meadows, or dry shady slopes where some soil has

accumulated. Western Tannu-ola Mts. and the mountains at the head of the Saklya River.

Distribution. N. and central Europe, Siberia, Turkestan, China and W. Himalayas, and N.W. America, *Mavimoricz*.

LENTIBULARIÆ.

UTRICULARIA VULGARIS, *Linn.*

No. 92. Meadows and lagoons by the side of Achit Nor.

Distribution. Europe, Asia, N. Africa, and N. America.

SELAGINEÆ.

LAGOTIS GLAUCA, *Gärtn.*

No. 377. Summit of Mt. Ulug Taiga, dry patches on rocky boulders over 1800 m.

Distribution. Northern and southern Siberia, N. and N.W. Mongolia, and Turkestan.

LABIATÆ.

MENTHA SYLVESTRIS, *Linn.*, var.

No. 148. Cultivated parts of valleys near irrigation canals, Sharasume.

Distribution. Temperate regions in the Northern hemisphere.

THYMUS SERPYLLUM, *Linn.*

No. 417. Dry slopes in open and steppe in valley-bottoms, Lower Kamsara River.

Distribution. Very widespread.

NEPETA BOTRYOIDES, *Ait.*

No. 86. Stony desert under the driest vegetative conditions. Desert hills and barren valley-slopes of N.W. Mongolia.

Distribution. The Altai region and Western Thibet.

Some parts of the plant are covered by a white felt formed by a fungus.

NEPETA GLECHOMA, *Benth.*

No. 289. Open meadows near Kushabar.

Distribution. Europe, N. Asia, Asia Minor, and Persia.

DRACOCEPHALUM GRANDIFLORUM, *Linn.*

On the Sayansk Mts.

Distribution. N. Mongolia, Altai, Turkestan, and Baikal region.

DRACOCEPHALUM IMBERBE, *Bunge*.

No. 45. Mountain-sides above 2150 m. where the soil is either moist and peaty forming alpine meadows, or dry shady slopes where some soil has accumulated. Western Tannu-ola Mts. and the mountains at the head of the Saklya River.

Distribution. Turkestan, the Altai, and N. Mongolia.

DRACOCEPHALUM NUTANS, *Linn.*

No. 403. Dry slopes in the open, and steppes in valley bottoms, Lower Kamsara River.

Distribution. Southern Siberia, Turkestan, Kashmir, and northern India.

DRACOCEPHALUM RUYSCHIANA, *Linn.*

No. 384. Open and dry steppe in valley bottoms and on dry hill-slopes with desert flora, often in shade of Leguminous bushes. Upper Shabash and Bei Kem, also Kemchik basin and the south side of the western Tannu-ola Mts.

Distribution. Central Europe, the Caucasus, Irkutsk, the Altai, and Turkestan.

LEONURUS LANATUS, *Pers.*

No. 486. Flint and gravel desert between Dja Kul and Djardan in the Lower Kemchik basin.

Distribution. The Altai, Transbaikal region, S. Mongolia, and China.

LAMIUM ALBUM, *Linn.*

No. 302. In the open glades and in the shade of Spruce and Birch forests on the Amil River.

Distribution. Europe, southern Siberia, N. Africa, Persia, Asia Minor, China, Japan, and N. India.

PHLOMIS TUBEROSA, *Linn.*

No. 402. Dry slopes in the open and steppes in valley bottoms on the Lower Kamsara.

Distribution. S.E. Europe, Irkutsk, Dahuria, Turkestan, and Kashmir.

PLANTAGINEÆ.

PLANTAGO MAJOR, *Linn.*

No. 460. Driest part of valley steppe, Ulu Kem.

Distribution. Europe, Asia, N. America, and has spread with civilization.

PLANTAGO MARITIMA, *Linn.*

No. 459. Habitat the same as the preceding.

Distribution. Europe, Asia Minor, eastwards to Afghanistan, N. Asia, N. Africa, and in N. America.

CHENOPODIACEÆ.

CHENOPODIUM FRUTESCENS, *C. A. Mey.*

No. 84. In stony deserts under the driest vegetative conditions, Djardan Valley, Kemchik; also on the desert hills of N.W. Mongolia.

Distribution. Altai region.

CHENOPODIUM GLAUCUM, *Linn.*

No. 90 a. Marshes and lagoons by desert lakes and on lake-shores where submerged in spring, Uriu Nor and Achit Nor.

Distribution. World-wide.

EUROTIA CERATOIDES, *C. A. Mey.*, var. *β. LATIFOLIA*, *Bunge.*

No. 173. Medium dry conditions, sand-dunes and sandy silt-deposits just above the water-table in the Upper Irtysh basin.

Distribution (of variety). Asia Minor and Turkestan.

CERATOCARPUS ARENARIUS, *Linn.*

No. 144. Stony desert on hill-sides at 750 m., Kran River Valley.

Distribution. S.E. Europe, Asia Minor, Persia, Altai. N. Mongolia, Afghanistan, and N.W. India.

CHENOLEA DIVARICATA, *Hook. f.*

No. 111. Dunes of blown sand in desert in the basin of Achit Nor.

Distribution. Mongolia, Kashmir, and western Thibet.

KOCHIA PROSTRATA, *Schrad.*, forma.

No. 39. Dry desert hill-slopes and upland valley plateaus up to 2150 m., western Tannu-ola Mts.

Distribution. S.E. Europe, Asia Minor, extending eastwards to China, from Transbaikal region southwards to Kashmir.

KALIDIUM ARABICUM, *Moq.-Tand.*

No. 191. Alluvial and gravel desert, Dzungarian Gap, Borotella plains.

Distribution. Transcaspian region and the Caucasus.

KALIDIUM FOLIATUM, *Moq.-Tand.?*

No. 93. Dry alluvial silt and sand-beds near the shore of Achit Nor, generally just above water-level.

Distribution. S. Russia, S. Siberia, and Turkestan.

KALIDIUM sp.?

No. 95. The same habitat and locality as the preceding.

SALICORNIA HERBACEA, *Linn.*

No. 94. Habitat the same as the preceding.

Distribution. Europe, temperate Asia and China.

SUÆDA MARITIMA, *Dumort.*

No. 90 *b*. Marshes and lagoons near Uriu Nor and Achit Nor and on lake-shores where submerged in spring.

Distribution. Europe, throughout Asia, and in Australia.

SUÆDA MICROPHYLLA, *Pall.*

No. 205. Low desert hills near Kara Daba Pass.

Distribution. Asia Minor, Transylvania, and Turkestan.

SALSOLA CRASSA, *Bieb.*, var. *γ. SUBGLABRA*, (*γ.*) *A. Mey.?*

No. 180. Dry stony desert hills at 600 m., Karin Nairn Hills, Upper Irtysh basin.

Distribution. Asia Minor, Transylvania, S.E. Persia, and Turkestan.

SALSOLA KALI, *Linn.*

No. 112. Dunes of blown sand in desert in the basin of Achit Nor.

No. 167. Stony and sandy desert under driest vegetative conditions, between 450 and 700 m., Kemchik and Kran Valleys, plains of Upper Irtysh basin, and Dzungarian Gap.

Distribution. Europe, eastwards into China and Japan, Afghanistan, N. India, and Australia.

SALSOLA SPISSA, *Bieb.*

No. 169. Stony and sandy desert under driest conditions between 450 and 700 m., Kemchik and Kran Valleys, plains of Upper Irtysh basin.

Distribution. Persia and Turkestan.

HALOXYLON AMMODENDRON, *Bunge.*

No. 168. Stony and sandy desert under driest conditions between 460 and 700 m.; plains of Kemchik and Kran Valleys and Upper Irtysh basin.

No. 190. Open and stony desert, dry water-courses in desert hills from 300 to 900 m., near to Barlik on the east side of Dzungarian Gap, Karadaba Pass of Alatau Mts. and stony parts of Borotella plains.

Distribution. Transylvania, Altai, Turkestan, Afghanistan, and Baluchistan.

ANABASIS APHYLLA, *Linn.*

No. 201. Stony desert in the Dzungarian Gap.

Distribution. Southern Russia, Asia Minor, S.E. Persia, Turkestan, and Mongolia.

ANABASIS BREVIFOLIA, *C. A. Mey.*

No. 87. Stony desert under driest vegetative conditions, desert hills and barren valley steppes of N.W. Mongolia.

Distribution. Altai, western Mongolia, and Turkestan.

ANABASIS PHYLLOPHORA, *Kar. et Kir.*

No. 166. Stony and sandy deserts under the driest conditions between 450 and 700 m., Kemchik and Kran Valleys and on the plains of the Upper Irtysh basin.

Distribution. Dzungaria and the Altai region.

NANOPHYTON CASPICUM, *Less.*

No. 209. Driest desert above irrigated land on the Borotella plains and near Dja Kul.

Distribution. Altai, N. Mongolia, and Turkestan.

HALOGETON ARACHNOIDEUS, *Moq.-Tand.*

Desert regions of N.W. Mongolia.

Distribution. Altai, N. Mongolia, and Turkestan.

POLYGONACEÆ.

ATRAPAXIS LANCEOLATA, *Meisn.*

No. 487. Flint and gravel desert between Dja Kul and Djardan.

Var. *DIVARICATA* (*Ledeb.*), *Meisn.*

No. 145. Stony desert on hill-sides at 760 m. in the Kran River Valley.

Distribution (of species). Dahuria, Altai, Mongolia, and Turkestan.

POLYGONUM BISTORTA, *Linn.*

No. 47. Mountain-sides above 2100 m. where the soil is moist and peaty, forming alpine meadows, or on dry shady slopes where some soil has accumulated; at the head of the Saklya River.

No. 367. Highest mountain-tops 1950 m., very dry, Kandart Mts., also open steppe of Shabash Valley with dry flora.

Distribution. N. Europe and alpine regions in central Europe, eastwards through northern and central Asia to China and Japan, and N. America.

POLYGONUM POLYMORPHUM, *Ledeb.*, var. *δ. UNDULATUM*, *Ledeb.*

No. 383. Open and dry steppes in valley bottoms, Upper Shabash River.

Distribution (of variety). Southern Siberia.

POLYGONUM VIVIPARUM, *Linn.*

No. 48. Mountain-sides above 2150 m. where the soil is moist, forming alpine meadows, or on dry shady slope where some soil has accumulated. Western Tannu-ola Mts. at the head of the Saklya River.

Distribution. N. Europe, alpine districts throughout Siberia, Thibet, N.W. India, and N. America.

THYMELÆACEÆ.

DAPHNE MEZEREON, *Linn.*

No. 258. Damp hollows in the "Taiga" or forest associated with grasses under the shade of *Abies sibirica* and *Populus suaveolens*. Forests round Kushabar at 320 m.

No. 309. Shade of Poplar and Spruce on the Amil River.

Distribution. Europe and Asia Minor.

No. 309 has neither flowers nor fruit, but is most probably *D. Mezereon*.

ELÆAGNACEÆ.

HIPPOPHÆ RHAMNOIDES, *Linn.*

No. 498. On sandy shingle by the banks of the Lower Kemchik River associated with *Populus suaveolens*.

Distribution. Europe and temperate Asia.

EUPHORBIACEÆ.

EUPHORBIA ALPINA, *C. A. Mey.*

No. 320. Above 600 m. in open glades and meadows of *Abies sibirica* forest on the Amil River.

Distribution. The Caucasus and Altai regions and Irkutsk.

EUPHORBIA LUTESCENS, *C. A. Mey.*

Distribution. The Altai and Dzungaria.

EUPHORBIA near *E. SUBCORDATA*, *C. A. Mey.*

No. 78. Barren desert hills at 1500 m., Kundi Kureen and Kundi Kalan Rivers.

URTICACEÆ.

ULMUS TURKESTANICA, *Regel.*

No. 187. Gardens and streets, Chuguchak.

Distribution. Turkestan.

There are probably other forms which may be placed under *U. turkestanica*, in which case the distribution would be somewhat wider.

CANNABIS SATIVA, *Linn.*

No. 162. Cultivated and irrigated fields, Sharasume.

Distribution. Cultivated in many parts of the world.

URTICA DIOICA, *Linn.*

No. 466. Associated with stunted Larch and Pine forest on dry rocky slopes, Japsa Mts. near the Bei Kem rapids.

Distribution. Very widespread.

CUPULIFERÆ.

BETULA GLANDULOSA, *Mich.*

No. 358. Half-dry steppe-like valley bottoms and mountain-slopes up to the snow-line where it is not moist. Japsa Valley, Tashkel Mts., and Upper Kandart Range.

Distribution. N. America : Greenland southwards to New California ; N.E. Siberia and the Altai, *H. Winkler.*

BETULA PUBESCENS, *Ehrh.*, var. *δ. TORTUOSA*, *Winkl.*

No. 73. By river-sides on shingle and sand associated with Larch and Poplar, Lower Bogdhon River.

Distribution. Altai.

ALNUS ALNOBETULA, *Hartig*, var. *β. FRUTICOSA*, *Winkl.*

No. 323. On gravelly banks of the River Amil above Chuknok Ridge.

Distribution. Throughout Siberia, Japan, N. America, *H. Winkler.*

SALICINEÆ.

SALIX ARBUSCULA, *Linn.*

No. 352. Open steppe in the bottom of the Japsa River Valley.

Distribution. Europe, alpine regions in Scandinavia, Scotland and Switzerland, Asia Minor, Dauria, Altai, and Greenland.

SALIX BERBERIFOLIA, *Pall.*

No. 399. Mountain-sides from 1200 to 1800 m., Sayansk Mts., Upper Japsa and Kandart Valleys.

Distribution. Dauria and the Altai region.

SALIX CAPRÆA, *Linn.*

No. 319. Upper part of the Spruce forest and on the sides of the Sayansk Mts., also on the banks of the Amil River.

Distribution. Europe, central and northern Asia, Asia Minor, Persia extending eastwards to the Himalayas in N.W. India, *Anderson.*

SALIX PENTANDRA, *Linn.*

No. 107. By the streams and lagoons round Achit Nor.

Distribution. Europe ; Asia : Turkestan, Dahuria and Kamtchatka, *Anderson*.

SALIX PURPUREA, *Linn.*

No. 483. By streams and irrigation canals on dry steppe and alluvial soils, Dja Kul and Ulu Kem.

Distribution. Europe, Asia Minor, N. Africa, Altai, and Turkestan.

SALIX SIBIRICA, *Linn.*, var. β . *SERICEA*, *Ledeb.*?

North-West Mongolia.

Distribution. Altai and Dzungaria.

SALIX VIMINALIS, *Linn.*

No. 22. Banks of the Djardan River.

No. 256 ♂. "Taiga" or open Pine forest in the shade on hill-slopes associated with grasses at 320 m. above sea-level, near Kushabar.

No. 261 ♀. Rivers and streams near Kushabar.

Distribution. Throughout Europe and Siberia and in Dzungaria.

POPULUS ALBA, *Linn.*, var. β . *NIVEA*, *DC.*

No. 177. On the banks of the Upper Irtysh River.

Distribution. Central and S. Europe eastwards to the Caucasus and in W. Central Asia, *C. K. Schneider*.

POPULUS SUAVEOLENS, *Fisch.*

No. 292. On the banks of the Amil River and wet places near Kushabar.

Distribution. W. Siberia, Turkestan, Mongolia, and Manchuria, *C. K. Schneider*.

GNETACEÆ.

EPHEDRA spp.

No. 412 *a*. Dry sandy river terraces on the Kamsara River, also on the Upper Bei Kem.

This plant is probably *E. monosperma*, G. S. Gmel., but there is insufficient material for determination.

No. 412 *b*. This specimen may be *E. distachya*, Linn., but there are no flowers and fruit on this specimen.

CONIFERÆ.

JUNIPERUS COMMUNIS, *Linn.*

No. 133. Larch-forest zone from 1800 to 1950 m., Great Altai Mts. and Kran River.

No. 329. Rocky slopes at an altitude of 900 m. with southern aspect on the Sayansk Mts. at the source of the Amil River.

Distribution. Europe, Siberia, Mongolia, Kashmir, N.W. India, and N. America.

JUNIPERUS PSEUDO-SABINA, *Fisch. et Mey.*

No. 75. Dry rocky mountain-slopes at 2450 m., western Tannu-ola Mts. at the head of the Saklya River.

Distribution. Turkestan and Thibet.

JUNIPERUS SABINA, *Linn.*

No. 134. Mountain-sides from 1800 to 2900 m., Great Altai Mts., Kran River, and Upper Irtysh.

Distribution. Asia Minor and Turkestan.

PICEA OBOVATA, *Ledeb.*

No. 132. Shade of Larch forest (sub-dominant) 900 to 1950 m., Kran River, Gt. Altai Mts.

No. 279. Specimens from young tree [glabrous]. Moist but not water-logged hollows near rivers, Kushabar.

No. 280. Specimens from old tree [stem hairy]. Hab. as the preceding.

Distribution. The Altai and the Amur region.

PICEA SCHRENKIANA, *Ant.*

No. 207. Talki Pass, Tian Shan.

Distribution. Dzungaria.

PINUS CEMBRA, *Linn.*, var. *SIBIRICA*, *Loud.*

No. 263. Northerly shaded slopes of hills associated with *Populus suaveolens*, Birch, and *Abies sibirica*. In the Upper Amil River basin near Kushabar.

No. 305. Half-swampy or well-drained land associated with *Picea obovata*, *Abies sibirica*, Mosses, Lichens, and *Lycopodium*; Amil River between Kushabar and Petropolowsk.

Specimen with no number. W. Tannu-ola Mts.

Distribution (of variety). The Altai region.

Pinus sibirica, *Mayr.*

ABIES SIBIRICA, Ledeb.

No. 270 *a*. Moist sunless hollows or shade under Pines in forests, Kushabar.

Distribution. The Altai Mts. and Turkestan eastwards to China, from Irkutsk province southwards to Thibet.

LARIX SIBIRICA, Ledeb.

No. 343. Sistikem River.

No. 355. Shade of *Picea* and *Pinus* forest from 900 to 1200 m., Upper Japsa River, Sistikem. Also from the Kobdo River.

Distribution. The Altai Mts., Okhotsk region, and Manchuria.

MONOCOTYLEDONES.

ORCHIDACEÆ.

CYPRIPEDIUM MACRANTHON, Sw.

No. 409. Natural meadows by the side of the Lower Kamsara River and under the shade of scattered Larch.

Distribution. S. and E. Siberia and in China.

ORCHIS MILITARIS, Linn.

No. 368. Dry slopes of Kandart Range up to 900 m.

Distribution. Throughout Europe and western and southern Siberia.

IRIDEÆ.

IRIS ENSATA, Thunb.

No. 114. Medium dry loam in valley bottoms and shores of lakes, Achit Nor basin.

No. 178. Edges of marshes and oases in plateau desert, Kobdo Valley.

No. 475. Dry steppe association near rivers on alluvium, Dja Kul and Ulu Kem.

Distribution. Dahuria, Mongolia, and Afghanistan eastwards to China.

IRIS RUTHENICA, Lit.

No. 272. Shade of *Pinus* forests, medium moist soil, Kushabar.

Distribution. Throughout central Asia from Transylvania to Japan.

LILIACEÆ.

MAIANTHEMUM BIFOLIUM, DC.

No. 317. Shade of *Pinus*, *Picea*, Birch and Poplar "Taiga," and also open glades, Amil River.

Distribution. Europe, N.E. Siberia, Mongolia, China, Japan, and N America.

HEMEROCALLIS FLAVA, *Linn.*

No. 464. Dry valley steppe near the Ulu Kem River where the ground is occasionally flooded.

Distribution. Europe, the Tyrol ; Asia : Irkutsk, China, and Japan.

ALLIUM MONADELPHUM, *Turcz.*

No. 43. Mountain-sides above 2150 m. where the soil is either moist and peaty, forming alpine meadows, or on dry shady slopes where some soil has accumulated. North and south slopes of the western Tannu-ola Mts. at the head of the Saklya River.

Distribution. S. Siberia and Turkestan, *Regel.*

ALLIUM SCHÆNOPRASUM, *Linn.*

No. 423. In the moist shady places of the forest on both sides of the Sayansk Mts., from Kushabar to the Bei Kem.

Distribution. Europe, central Asia, and N. America, *Regel.*

ALLIUM FISTULOSUM, *Linn.*

No. 117. Between 2150 and 2450 m. on sandy slopes with alpine vegetation or on plateau deserts along torrent water-courses, Kundelun Mts. and Suok and Upper Kobdo Valleys.

Distribution. The Altai, Dahuria and Baikal regions, in Siberia and Turkestan, *Regel.*

ALLIUM SALESOWI, *Regel* in Act. Hort. Petrop. iii. II (1875), p. 140, sub *A. senescente*, *Linn.*, *δ. brevipedicellato*, *Regel.*

Herba bulbis elongatis-ovoideis rhizomati repenti insidentibus tunicis membranaceis integerrimis. *Folia* anguste linearia, obtusa, 3–8 cm. longa, 0.15 cm. lata, margine papilloso-scaberula. *Scapi* erecti, 4–6 cm. alti, angulati ; spatha bivalvis ; valvæ rotundæ, 0.4 cm. longæ, membranaceæ ; umbellæ ad 1.5 cm. latæ, hemisphæricæ, capsuliferæ ; pedicelli ad 0.4 cm. longi, basi nudi. *Perigonii phylla* sicco rosea, oblonga, obtusa, ad 0.5 cm. longa, 0.25 cm. lata, subdenticulata. *Filamenta* 0.7 cm. longa, perigonium multo superantia, simplicia, basi dilatata.

A. sessiliflorum, *Fisch.* in herb. Stephan. ex *Regel*, l. c.

No. 18. Mountain-tops and slopes of the Kizil Taiga where the peaty or gravelly soil is moist or dry, Lower Kemchik River, N.W. Mongolia.

Regel appears to have seen incomplete specimens of this plant collected by *Salesov* in the Altai. He places them under *A. senescens*, *Linn.*, var. *δ. brevipedicellatum*, but mentions that they may constitute a distinct species, for which he suggests the name *A. Salesovi*.

ALLIUM STELLERIANUM, Willd.

No. 493. On driest hill-slopes and valley bottoms, sandy and gravelly places, Dja Kul and Djardan.

Distribution. Altai, Baikal, and Turkestan, *Regel*.

ALLIUM SZOVITSII, *Regel*.

No. 66. Mountain-sides above 2150 m. where the soil is either moist and peaty, forming alpine meadows, or dry shady slopes where some soil has accumulated. Western Tannu-ola Mts. at the head of the Saklya River.

Distribution. The Caucasus and Altai Mountains, *Regel*.

ALLIUM VICTORIALIS, Linn.?

No. 332. In the shade of the *Abies* forest up to 1400 m. on mountains; also lower Taiga in moist places. N. and S. Sayansk Mts. and Kushabar.

Distribution. Southern and central continental Europe, Siberia, Japan, N.W. China, mountains in N.W. India and in N.W. America, *Regel*.

There are no flowers or fruit to this specimen, the leaves and root however match *A. Victorialis*.

LILIUM MARTAGON, Linn.

No. 369. Dry slopes of the Kandart Range up to 900 m.

Distribution. Central and southern Europe, Siberia and Japan, *Wagh.*

TULIPA UNIFLORA, Bess.

No. 251. One of the earliest steppe plants, Minnusinsk.

Distribution. Altai and Dzungaria.

ERYTHRONIUM DENS-CANIS, Linn.

No. 353. Dry steppe in open valley bottoms, Japsa and Sistikem Rivers.

Distribution. Central and southern Europe, Siberia, Korea and Japan.

The native name is "*Kandick*"; it is used for food by the Urian-Hai tribes or Soicts in the Upper Yenisei basin.

LLOYDIA SEROTINA, *Griseb.*

No. 363 *b.* Dry summits of Sayansk Mountains in Upper Kandart and Japsa systems, associated with Reindeer Moss.

Distribution. Alpine districts in Europe, N. Asia, China, N.W. India, Thibet, and N. America, *Berger*.

PARIS QUADRIFOLIA, Linn., var. *OBOVATA*, *Regel et Til.*

No. 274. Shade of Birch, Spruce, and Poplar forests on slopes near Kushabar and Amil River.

Distribution (of variety). Southern Siberia, China, Japan, and Manchuria, *Franchet*.

VERATRUM ALBUM, *Linn.*

No. 357. Moist alpine meadows up to 1800 m. just under the snow-line, moist forest-glades and edges of swamps. Very common. Amil River from Kushabar to the Sayansk Mts., also southern slopes of these mountains.

Distribution. Switzerland, N. Russia, Siberia, China, Japan, and Canada.

VERATRUM NIGRUM, *Linn.*

No. 433. Dry rocky slopes round Lake Todju Kul.

Distribution. Central and S. Europe, Dahuria, E. Thibet, China, Japan, and Manchuria.

JUNCACEÆ.

JUNCUS GERARDI, *Loisel.*

No. 99. Marshes and natural water-meadows by rivers, streams, and lakes, Achit Nor.

Distribution. Europe, central Asia to China, N.W. Africa, and N. America, *Buchenau.*

ALISMACEÆ.

BUTOMUS UMBELLATUS, *Linn.*, var. β . MINOR, *Turez.*

No. 471. Dry steppe association near rivers, on alluvium near Dja Kul on the Ulu Kem.

Distribution (of var.). Asia : Kashmir and Transbaikal, *Buchenau.*

NAIADACEÆ.

TRIGLOCHIN MARITIMUM, *Linn.*

No. 196. Alluvial desert, Dzungarian Gap.

Distribution. Northern hemisphere and S. America to Tierra del Fuego, *Buchenau.*

TRIGLOCHIN PALUSTRE, *Linn.*

No. 98. Marshes and natural water-meadows by rivers, streams and lakes, Achit Nor.

Distribution. Northern hemisphere and S. America, *Buchenau.*

POTAMOGETON PECTINATUS, *Linn.*

No. 4. On the shores of lakes, Sul Kul, Lower Kemchik.

Distribution. Europe, Asia, N. and S. America, Africa, and Australia, *Ascherson & Græbner.*

CYPERACEÆ.

SCIRPUS CÆSPITOSUS, *Linn.*

No. 398. Mountain-sides from 1200 to 1800 m. of the Sayansk Range, Upper Japsa and Kandart systems.

Distribution. Europe, Sachalin and Japan, N. and S. America.

ERIOPHORUM GRACILE, *Koch.*

No. 275. Tops of *Sphagnum* tufts in swamps near rivers, Kushabar.

Distribution. Europe, Japan, and N. America, *C. B. Clarke.*

ERIOPHORUM SCHEUCHZERI, *Hoppe.*

No. 44. Bogs on mountain-sides from 2100 to 2740 m., W. Tannu-ola Mts. and on the mountains at the head of the Saklya River.

Distribution. N. and central continental Europe, arctic Siberia, Turkestan, Kashmir, Japan, and arctic N. America, *C. B. Clarke.*

ERIOPHORUM VAGINATUM, *Linn.*

No. 285. In Heath association on half-dried swamps under Birch and Pine, Kushabar.

No. 364. Swampy places on the sides of the Sayansk Mts. in the Upper Japsa and Kandart systems.

Distribution. Europe, Siberia, Turkestan, Japan, and N. America, *C. B. Clarke.*

CAREX RIGIDA, *Gooden.*

No. 8. Dry mountain-summits where not too rocky and where the surface is even, on the Kizil Taiga.

Distribution. Arctic and alpine regions in Europe, N. Asia, and arctic America, *Kükenthal.*

CAREX CÆSPITOSA, *Linn.*, var. MAGIS-BRACTEATA, *C. B. Clarke*; cf. Bull. Misc. Inf., Add. Ser. viii. p. 70.

No. 102. Medium moist, well-drained alluvial silt not far from streams or lakes, Achit Nor.

Distribution. Dahuria, Amur, and Ussuri, *C. B. Clarke.*

CAREX MELANANTHA, *C. A. Mey.*

No. 58. Mountain-sides above 2150 m. where the soil is either moist and peaty, forming alpine meadows, or dry shady slopes where some soil has accumulated. Western Tannu-ola Mts. at the head of the Saklya River, especially in alpine meadows.

Distribution. Alpine regions in central Asia, Turkestan, Altai, Baikal, Pamir, Kashmir, and Afghanistan, *Kükenthal.*

CAREX ATRATA, *Linn.*

No. 382. Summit of Ulug Taiga, dry patches on rocky boulders over 1800 m. alt.

Distribution. Arctic alpine Europe, N. coast and inland mountain-ranges in Siberia, Altai, and Tian Shan and N. America, *Kükenthal*.

CAREX PEDIFORMIS, *C. A. Mey.*

No. 257 c. "Taiga" or forests of Pine, Birch, Poplar, and Spruce round Kushabar, and the Amil River.

No. 306. Shade of Poplar, Birch, and Spruce, rather dry habit, not common.

Distribution. Throughout Siberia, Manchuria, and N. China, *Kükenthal*.

CAREX CAPILLARIS, *Linn.*

No. 7. Dry mountain-summit of Kizil Taiga where it is not too rocky and the surface is even.

No. 103. Medium moist, well-drained alluvial silt not far from streams or lakes, Achit Nor.

Distribution. Europe, alpine and sub-alpine regions: Asia, Turkestan, Siberia, Kamtchatka, and Manchuria; North America, *Kükenthal*.

CAREX REGELI, *B. et O. Fedtsch.*; *cf. Bull. Misc. Inf., Add. Ser. viii. p. 151.*

No. 101. Medium moist, well-drained alluvial silt not far from streams or lakes, Achit Nor.

Distribution. Mongolia, Turkestan, Dahuria, Pamir, Kashnir, and N.W. India, *C. B. Clarke*.

CAREX sp.

No. 441. Margin of Lake Todju Kul.

There are no ripe nuts on this specimen.

GRAMINEÆ.

PANICUM MILIACEUM, *Linn.*

No. 497 a. Grown on irrigated land in Djardan Valley.

SETARIA GLAUCA, *Beaur.*

No. 149. Cultivated part of valleys near irrigation canals, Sharasume.

Distribution. World-wide.

SETARIA ITALICA, *Beaur.*

No. 160. Cultivated and irrigated fields, Sharasume, Kran River, and Upper Irish.

Distribution. Tropical and subtropical regions and cultivated.

SETARIA VIRIDIS, *Beaur.*

No. 161. Cultivated and irrigated fields, Sharasume, Kran River, and Upper Irtish.

No. 470. Associated with stunted *Larix* and *Pinus* forests on dry rocky slopes, Japsa Mts. near Bei Kem rapids.

Distribution. World-wide.

ANDROPOGON ISCHÆMUM, *Linn.*

No. 150. Cultivated part of valleys near irrigation canals, Sharasume.

Distribution. Temperate and tropical regions of Europe, Asia, and Africa, N. America and Western Australia.

HIEROCHLOA ALPINA, *Roem. & Schult.*

No. 363 *a.* Dry mountain-summits associated with Reindeer Moss, Sayansk Mts. and in Upper Kandart and Japsa systems.

Distribution. Arctic and alpine regions in the Northern hemisphere and in New Zealand.

STIPA CAPILLATA, *Linn.*

No. 76. Barren desert hills under the driest floral conditions from valley bottoms up to the desert plateaus at 2100 m. It is the commonest grass and is grazed by Mongol flocks. Deserts of N.W. Mongolia.

No. 186. Medium dry alluvial plains at 490 to 600 m., Dzungarian plains near Chuguchak.

No. 197. S. side of Dzungarian Gap.

No. 491. Common in sandy or gravelly valleys, Dja Kul and Djardan.

Distribution. E. and central Europe, Turkestan, Dahuria, Altai, N. China, and N.W. Himalayas.

STIPA SPLENDENS, *Trin.*

No. 477. Dry steppe near rivers where rarely flooded, very common grass-food for Soiot herds, Dja Kul.

Distribution. S. Siberia, Turkestan, Mongolia, W. Thibet, and Kashmir.

CLAMAGROSTIS EPIGEIOS, *Roth.*

No. 254 *b.* In open Pine and Birch forest or "Taiga," Kalmakof, 40 verst. W. of Minusinsk.

Distribution. Temperate Europe and Asia from the Mediterranean to the Arctic regions.

AGROSTIS VULGARIS, *Linn.?*

No. 100. Marshes and natural water-meadows near rivers, streams, Achit Nor.

Distribution. Europe, Asia Minor, and N. America.

AGROSTIS ALBA, *Linn.*

No. 455. Driest part of the Ulu Kem valley-steppe.

Distribution. Europe, N. Asia, N. Africa, N. and S. America, Australia and New Zealand.

DEVEUXIA LAPPONICA, *Kunth.*

No. 6. Dry mountain-summit of the Kizil Taiga where the surface is even and not too rocky.

Distribution. Arctic Europe, Altai, Baikal and Yenisei regions, and in N. America.

PHRAGMITES COMMUNIS, *Trin.*

No. 97. Fresh-water lagoons on edges of desert lakes. Achit Nor.

No. 129. Southern aspects from 900 to 1700 m. in the neighbourhood of streams and under rather moist conditions, southern Great Altai Mts., upper Kran River.

Distribution. World-wide.

CATABROSA AQUATICA, *Beaur.*

No. 31. Margins of swamps or small lakes. Immersed in water, Tula River.

Distribution. Temperate regions of the N. hemisphere and in S. America.

MELICA NUTANS, *Linn.*

No. 327. Upper Amil River.

Distribution. Europe and N. Asia, extending southwards into Asia Minor and Kashmir.

POA ALTAICA, *Trin.*

No. 396. Shade of Larch and Scotch Pine in valley bottoms of Shabash and Kamsara Rivers.

Distribution. The Altai region.

POA PRICEI, *N. D. Simpson*, sp. n. (Pl. 23. figs. 4-12.)

Affinis *P. macrocalyci*, Trautv. et Mey., sed panicula compactiore, glumis minoribus nec acuminatis, pedicellis lævibus, foliis supra subtusque glabris distincta.

Culmi 35 cm. alti, geniculati, rigidi, læves, glauci, basi vaginis vetustis obtiti. *Foliorum* laminæ subglaucae, lineares, acutæ, curvatæ, rigidæ, 4-5 cm. longæ, 0.5 cm. latæ, præter margines et carinam asperulas læves, plius vel explanatæ; ligulæ ovatæ 0.1-0.3 cm. longæ, hyalino-scariosæ; vaginæ quam foliorum caulnorum laminæ multo longiores, superne carinatæ, glabræ, læves, valde striatæ. *Panicula* erecta compacta, 7 cm. longa: ram

læves; spiculæ ellipticæ, 3-7-floræ, 0·7 cm. longæ; pedicelli 0·1 cm. longi. *Glumæ* ovatæ, acutæ, læves, inferior sub-2-nervis, superior paullo longior 3-nervis, inferne ciliata. *Valvæ* oblongæ, acutæ, rigidæ, 5-nerves, basin versus in dorso et ad margines lanato-pilosæ. *Paleæ* quam valvas paullo breviores, carinis scabris.

No. 74. In oasis meadows in the desert-plateau valley of the Saklya River, Mongolia.

DACTYLIS GLOMERATA, *Linn.*

No. 130. Southern aspects from 900 to 1700 m. in South Great Altai Mts., Upper Krasnaya River.

Distribution. World-wide.

FESTUCA OVINA, *Linn.*

No. 210. Desert hills above 900 m. and downs at 2750 m., Borotella Pass, Tian Shan.

Distribution. Arctic and temperate regions of the Northern hemisphere.

BROMUS INERMIS, *Leyss.*

No. 492. Common desert plant on driest hill-slopes and valley-bottoms, sandy or gravelly, Dja Kul and Djardan Valleys.

Distribution. Continental Europe, N. Asia, and as far south as N.W. India.

AGROPYRON CRISTATUM, *Roem. & Schult.*

No. 77. Barren desert hills where driest floral conditions prevail, from valley-bottoms at 1500 m., N.W. Mongolia.

No. 419. River terraces and driest parts of open steppe between flood-line of Kamsara and Upper Bei Kem Rivers and the Larch-forest zone.

Distribution. S.E. Europe, Asia Minor, Persia, Afghanistan, the Altai, and Turkestan.

TRITICUM VULGARE, *Linn.*

No. 497 b. Grown on irrigated land in the Djardan Valley.

HORDEUM PRATENSE, *Linn.*

No. 104. Medium moist, well-drained alluvial silt not far from streams and lakes Achit Nor.

No. 426. Driest parts of the open steppe between the flood-line of the river and the Larch-forest zone, Upper Bei Kem and Dora Kem.

Distribution. Europe, N. Asia, N. America, and the Cape of Good Hope.

HORDEUM VULGARE, *Linn.*

No. 497 c. Grown on irrigated land in the Djardan Valley.

ELYMUS DASYSTACHYS, *Trin.*

No. 116. Stony deserts on hill-sides and in plateau valleys up to 2050 m. under the driest vegetative conditions. In the Suok Valley and on the N. side of the Great Altai Range.

No. 453. Dry valley steppe, alluvial soil often where flooded and where there is a little moisture, on the banks of the Ulu Kem.

No. 453 agrees in structure with *E. dasystachys*, but the plant is remarkable for its slender form and its one-flowered spikelets.

Distribution. Siberia, Mongolia, Turkestan, China, Japan, Pamir, and N.W. India.

ELYMUS GIGANTEUS, *Vahl.*

No. 176. Medium dry conditions, sand dunes and sandy silt deposits just above the water-table; sandy plains of the Upper Irtysh basin.

Distribution. Russia and the Altai region.

PTERIDOPHYTA.

FILICINEÆ.

NEPHRODIUM SPINULOSUM, *Desv.?*

No. 308 *a.* *Picea* and *Pinus* forests under the wettest conditions, belonging to the typical Amur River flora.

This specimen and the following are too young for certain identification.

NEPHRODIUM SPINULOSUM, *Desv.*, var. *DILATATUM*, *Hook.?*

No. 308 *b.*

Distribution (of species). Europe, Asia, Eastern Himalayas, and N. America, *Christensen*.

CYSTOPTERIS FRAGILIS, *Linn.*

No. 312. On a basalt cliff, Amur River, Petrapolowsk. Used by the Russians for medicinal purposes.

Distribution. Arctic, antarctic, and temperate regions and alpine tropical regions, *Christensen*.

POLYPODIUM DRYOPTERIS, *Linn.*

No. 308 *c.*

Distribution. Europe, Asia, W. America, arctic and temperate regions, *Christensen*.

LYCOPODIACEÆ.

LYCOPODIUM ANNOTINUM, *Linn.*

No. 308 *d.*

Distribution. Arctic zones and mountains of the N. temperate zone in both hemispheres, *Baker.*

SELAGINELLACEÆ.

SELAGINELLA SANGUINOLENTA, *Spring.*

No. 482. Very dry rocky hill-slopes, in an almost desert flora, Dja Kul.

Distribution. E. Siberia, *Baker.*

BRYOPHYTA.

MUSCINEÆ.

SPHAGNUM ACUTIFOLIUM, *Ehrh.*

No. 286 *a.* In Heath-association in half-dried swamps under Birch and Pine, Kushabar.

Distribution. Arctic, subarctic, and temperate Europe, subarctic America and Atlantic N. America, Siberia, Japan, and Sikkim Himalayas, *Warmstoff.*

LICHENES.

PLATYSMA JUNIPERARUM, *Nyl.*

No. 70. Alpine meadows above 2100 m. and rocky slopes and screes up to 3000 m., W. Tannu-ola Mts. south of the Saklya River.

Distribution. Northern parts of the Northern hemisphere.

STICTA PULMONARIA, *Ach.*

No. 286 *b.* In Heath-association in half-dried swamps under Birch and Pine, Kushabar.

Distribution. Very widespread.

USNEA LONGISSIMA, *Ach.*

No. 270 *b.* Moist sunless hollows or in shade under Pines in forests near Kushabar.

Distribution. Widespread in the Northern hemisphere.

EXPLANATION OF THE PLATES.

PLATE 20.

Sketch-Map showing the route taken by Mr. Price through N.W. Mongolia and Dzungaria and the localities mentioned in the paper; based upon the map in the Geographical Journal, vol. xxxix. (June 1912), by permission of the Royal Geographical Society.

PLATE 21.

Figs. 1-7. *SAUSSUREA PRICEI*, N. D. Simpson.

1. Plant (nat. size). 2. Floret, $\times 4$. 3. Anthers, $\times 5$. 4. Stigma, $\times 15$. 5 and 6. External and internal involucre scales, $\times 2$. 7. Seta from the receptacle, $\times 6$.

Figs. 8-14. *LATHYRUS FROLOWII*, N. D. Simpson.

8. Plant (nat. size). 9. Vexillum, $\times 3$. 10. Ala, $\times 3$. 11. Carina, $\times 3$. 12. Stamens and ovary, $\times 3$. 13. Calyx, $\times 3$. 14. Leaf-margin, highly magnified.

PLATE 22.

Figs. 1-7. *SAUSSUREA PSEUDO-ALPINA*, N. D. Simpson.

1. Plant (nat. size). 2. Floret, $\times 3$. 3. Anthers, $\times 5$. 4. Stigma, $\times 5$. 5 and 6. Internal and external involucre scales, $\times 3$. 7. Seta from the receptacle, $\times 3$.

Figs. 8-12. *SENECIO PRICEI*, N. D. Simpson.

8. Plant (nat. size). 9. Disc floret, $\times 4$. 10. Ray floret, $\times 2$. 11. Anthers, $\times 10$. 12. Stigma, $\times 25$.

PLATE 23.

Figs. 1-3. *PRUCEDANUM PRICEI*, N. D. Simpson.

1. Plant (nat. size). 2. Fruit, $\times 5$. 3. Transverse sections of mericarp, $\times 6$.

Figs. 4-12. *POA PRICEI*, N. D. Simpson.

4. Plant (nat. size). 5. Spikelet, $\times 7$. 6 and 7. Glumes. 8. Valve and palea, $\times 5$. 9. Half a valve. 10. Palea. 11. Caryopsis. 12. Ovary with stigmas.
-

EXPLANATION OF THE PLATES.

PLATE 20.

Sketch-Map showing the route taken by Mr. Price through N.W. Mongolia and Dzungaria and the localities mentioned in the paper; based upon the map in the *Geographical Journal*, vol. xxxix. (June 1912), by permission of the Royal Geographical Society.

PLATE 21.

Figs. 1-7. *SAUSSUREA PRICEI*, N. D. Simpson.

1. Plant (nat. size). 2. Floret, $\times 4$. 3. Anthers, $\times 5$. 4. Stigma, $\times 15$. 5 and 6. External and internal involucre scales, $\times 2$. 7. Seta from the receptacle, $\times 6$.

Figs. 8-14. *LATHYRUS FROLOWII*, N. D. Simpson.

8. Plant (nat. size). 9. Vexillum, $\times 3$. 10. Ala, $\times 3$. 11. Carina, $\times 3$. 12. Stamens and ovary, $\times 3$. 13. Calyx, $\times 3$. 14. Leaf-margin, highly magnified.

PLATE 22.

Figs. 1-7. *SAUSSUREA PSEUDO-ALPINA*, N. D. Simpson.

1. Plant (nat. size). 2. Floret, $\times 3$. 3. Anthers, $\times 5$. 4. Stigma, $\times 5$. 5 and 6. Internal and external involucre scales, $\times 3$. 7. Seta from the receptacle, $\times 3$.

Figs. 8-12. *SENECIO PRICEI*, N. D. Simpson.

8. Plant (nat. size). 9. Disc floret, $\times 4$. 10. Ray floret, $\times 2$. 11. Anthers, $\times 10$. 12. Stigma, $\times 25$.

PLATE 23.

Figs. 1-3. *PEucedANUM PRICEI*, N. D. Simpson.

1. Plant (nat. size). 2. Fruit, $\times 5$. 3. Transverse sections of mericarp, $\times 6$.

Figs. 4-12. *Poa PRICEI*, N. D. Simpson.

4. Plant (nat. size). 5. Spikelet, $\times 7$. 6 and 7. Glumes. 8 Valve and palea, $\times 5$. 9. Half a valve. 10. Palea. 11. Caryopsis. 12. Ovary with stigmas.
-

West, Newman imp.

N.D. Simpson del.
J.N. Fitch lith.

1-7, *SAUSSUREA PRICEI*, N.D. Simpson.
8-16, *LATHYRUS FROLOWII*, N.D. Simpson.

West, Newman imp

N.D. Simpson del.
J.N. Fitch lith.

1-7, *SAUSSUREA PSEUDO-ALPINA*, N.D. Simpson.
8-12, *SENECIO PRICEI*, N.D. Simpson.

N.D. Simpson del.
J.N. Fitch lith.

1-3, *PEUCEDANUM PRICEI*, N.D. Simpson.
4-12, *POA PRICEI*, N.D. Simpson.

West. lev. man imp.