THE FLORA OF TIBET OR HIGH ASIA; being a Consolidated Account of the various Tibetan Botanical Collections in the Herbarium of the Royal Gardens, Kew, together with an Exposition of what is known of the Flora of Tibet.

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(With MAP.)

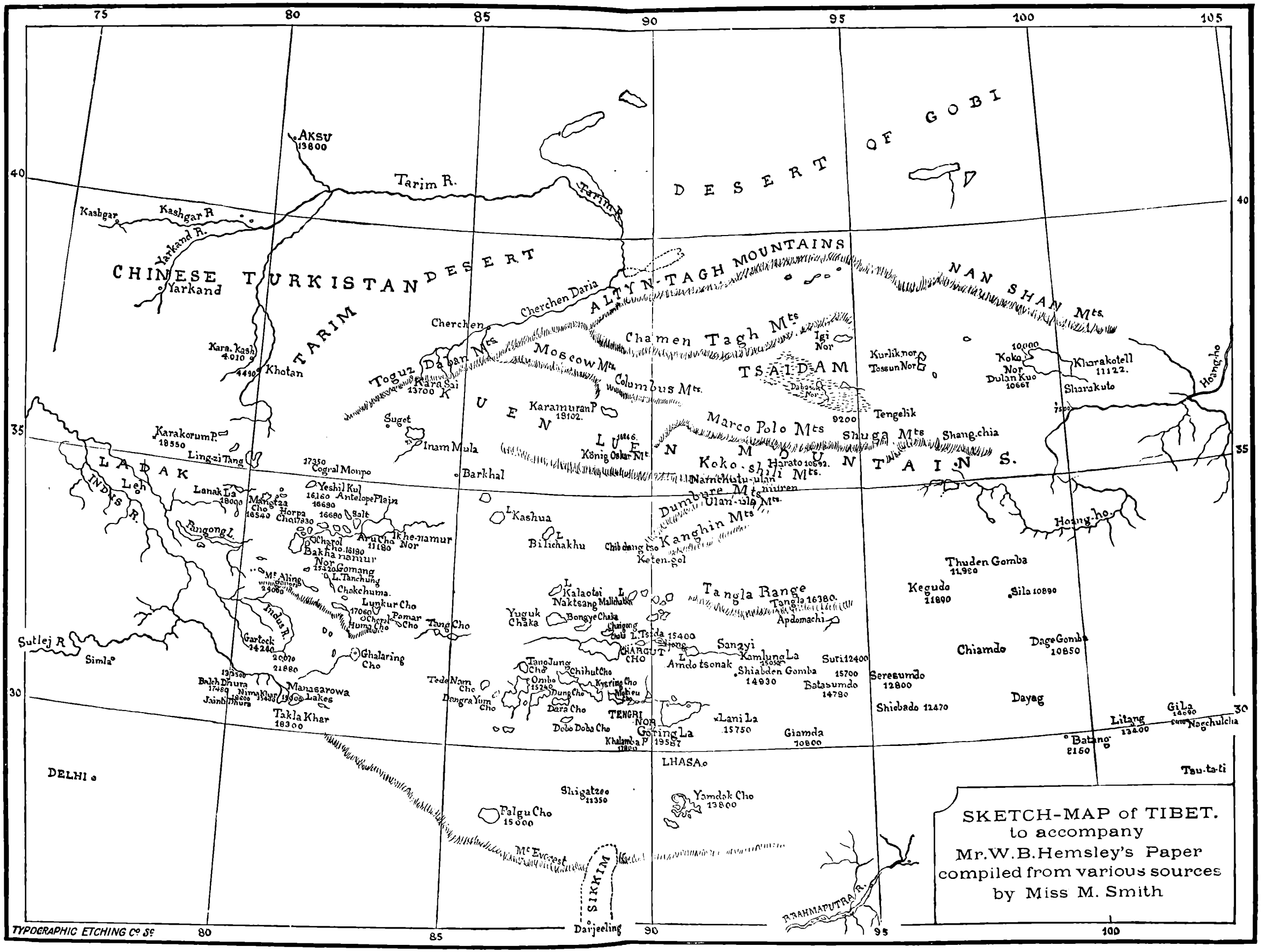
[Read 16th January, 1902.]

INTRODUCTION.

ON June 1, 1899, we* exhibited to the Society a selection of High-level Plants from various parts of the world, and made some remarks on their general characteristics, on the greatest altitudes reached by flowering plants in different latitudes, and on the conditions under which plants exist in such situations. That exhibition was intended as preliminary to an account of several collections of dried plants from high levels in Asia and South America, received at Kew during the last three or four years. Our final account of the Andine collections has already been presented to the Society, and has appeared in the present volume, pp. 78–90; and we now have the honour of reading some portions of a much more extended paper on the Flora of Tibet. Acting on the suggestion of the President on the occasion of our exhibition, we propose treating more in detail of the High-level Plants of the World at some future time.

Although these collections are small, they are of great value and interest on account of the information accompanying the specimens concerning the altitude at which they were gathered, the colour of their flowers, and other particulars, only obtainable on the spot. They are also valuable as representing, in most

* It should be explained that Mr. Pearson was joint author of this paper in the form it was first presented to the Society, but in consequence of a change in his appointment he was unable to take part in the additional work involved in reconstructing it on the present plan.



SKETCH-MAP of TIBET.
to accompany
Mr. W. B. Hemsley's Paper
compiled from various sources
by Miss M. Smith

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instances, the whole vascular flora of the districts, or rather routes, traversed by the various travellers, whose aim it was to collect a specimen or specimens of all the different kinds of plants observed. It should be borne in mind, however, that the conditions under which these arduous journeys were made prevented systematic botanical exploration beyond a very narrow strip of the country traversed in each case.

History of Botanical Discovery in Tibet.

Before entering into particulars of the collections to be enumerated, we will briefly sketch the history of botanical discovery in Tibet, and we shall perhaps be excused for repeating here some facts that have appeared in the Society's publications of comparatively recent date.

We have happily still among us two of the pioneers in the botanical investigation of Tibet, namely, Sir Joseph Hooker and Sir Richard Strachey. It would be superfluous for us to dilate upon the services to Geographical Botany rendered by Sir Joseph Hooker during his long period of activity; yet we may say that we are greatly indebted to his work in what follows.

As most of the Fellows of our Society are aware, Sir Richard Strachey published so recently as 1900 ('Geographical Journal,' xv.) a Narrative of his journey, in company with J. E. Winterbottom, to Lake Manasarowar, in Western Tibet, upwards of fifty years ago. This Narrative contains relatively more botanical information from direct observation than those of all the other travellers combined. In this connection it may be mentioned, as a curious coincidence, that Winterbottom's own set of his dried plants, together with his original notes, which had lain aside untouched since his death in 1854, was presented in 1900 to Kew, by his relatives Miss J. Pain and Mrs. Gnosspelius.

Strachey and Winterbottom did not penetrate far into Tibet Proper, yet far enough to obtain materials sufficient to afford a very good idea of the character of the flora of this elevated and very dry region. Nothing, so far as we are aware, was published at the time on the plants, though a very elaborate table showing their distribution, altitudes, colour of flowers, and other particulars, was printed and privately circulated. Con-

cerning this collection, Hooker and Thomson ('Flora Indica, Introduction, p. 66) say: "The beautiful preservation of the specimens, and the fulness and accuracy with which they are ticketed, renders this herbarium the most valuable for its size that has ever been distributed from India." All the plants of this collection are taken up in Hooker's 'Flora of British India,' though a number of them are not found within its technical limits. A separate list of them has also been published by Mr. J. F. Duthie, Director of the Botanical Department of Northern India, in E. F. T. Atkinson's work entitled 'Gazetteer of the North-west Provinces of India,' vol. x. 1882; and Sir Richard Strachey himself contributed an abstract of the Tibetan portion of the collection to my paper on Thorold & Bower's and Rockhill's Tibetan plants in the Society's Journal (vol. xxx. pp. 101–140).

The Brothers Schlagintweit should also be mentioned, because, although they collected little in Tibet, and few of their plants have come under our notice, we make use of some of their observations on climate and altitudes and distribution. They travelled in the Karakorum region in 1855 to 1857, and penetrated Tibet, a little to the north of the country visited by Strachey and Winterbottom, passing through Gartok and north-westward, by way of Yarkand, to Kashgar. Their collections and observations were made in the most methodical and detailed manner. We shall discuss more particularly their data on the greatest altitudes attained by Flowering Plants.

Dr. Thomas Thomson, whose book of travels is entitled 'Western Himalaya and Tibet,' did not enter Tibet Proper, not having crossed the Karakorum range of mountains. The explanation of the title is that a part of the North-western Himalaya and Karakorum mountains was formerly designated Tibet, or Little Tibet, or, in part, Baltistan. We shall have something more to say in this connection later on.

Victor Jacquemont, who travelled in the same region between 1828 and 1832, also did not get beyond Little Tibet, or Western Tibet, as it is usually designated in the 'Flora of British India.'

Sir Joseph Hooker crossed into Tibet to the north of Sikkim by way of the Donkia Pass, and reached and ascended Mount Bhomtso, the height of which he estimated to be 18,590 ft. above the level of the sea. Flowering plants were collected almost to the summit.

The writings of the earlier European travellers, Marco Polo, Huc, Turner, Bogle and Holland, as well as the later native Indian travellers, such as Sarat Chandra Das *, contain no definite botanical information.

For the resumption and continuation of botanical work in Tibet and the adjoining countries, we are largely indebted to Russian explorers and French missionaries, especially during the last quarter of the last century. Foremost among the Russians was the late General N. M. Przewalski. He began his extensive travels in 1871, and between this date and 1885 he crossed Tibet from the north almost to the south and from east to west, besides making many detours; and he systematically collected objects of natural history throughout these journeys. Mr. G. N. Potanin, Dr. P. J. Piasezki, and Mr. A. Regel are other Russian travellers who made large botanical collections in Chinese Turkestan, Mongolia, and China, and, to a lesser extent, in Tibet. The combined collections of the first three travellers were taken in hand by the late Mr. C. J. Maximowicz, and the first part of his elaboration of the Tibetan part appeared in 1889, under the title of 'Flora Tangutica.' Unfortunately the talented author did not live to publish any more. This part contains the Thalamifloræ and Disciflorae; in other words, the natural orders Ranunculaceæ to Rhamnaceæ, in the sequence of Bentham and Hooker's 'Genera Plantarum.' The enumeration is preceded by an Introduction in Russian and Latin, to which we are largely indebted for general information on Tibet and the neighbouring countries. Maximowicz also published the first part of a 'Flora Mongolica,' which is of the same extent and of the same date as the 'Flora Tangutica.' He had previously published a general account of the collections, mainly from a geographical point of view. To this we shall have occasion to refer again.

The history of the collections on which this paper is based is contained in the "Itineraries" and other sections.

* Ugyen Gyatscho, who accompanied Das, made a botanical collection between Phari and Lhasa. It is in the Calcutta Herbarium, and has not yet been published as a whole, but, judging from the number of new Labiatæ from that region published by Dr. D. Prain (Journ. As. Soc. Beng. lix. 2, pp. 294–318), it contains a considerable number of novelties, though perhaps mostly belonging to the Himalayan Flora as distinguished from the Tibetan.

Boundaries and Physical Characteristics of Tibet.

Tibet is a somewhat vague geographical term for a large area in Central Asia, and, under the circumstances, we consider that we cannot do better than follow Maximowicz, except that we take the Himalaya Mountains as the southern boundary. It is remarkable as being on the whole, for its area, the highest country in the world. It is equally remarkable for its extreme dryness, especially in the western, northern, and central parts, and likewise for its high snow-limit, as compared with the southern slopes of the Himalaya Mountains. It forms an unequal-sided quadrangle between 30° and 36° N. latitude in the west, and 28° and 39° in the centre and east, including Tsaidam, and 80° and 102° E. longitude *; but Maximowicz did not include the country south of the thirty-first parallel, where there is a settled population. It is bounded on the east by China Proper; on the south by the Himalaya Mountains; on the west by the Himalaya and Karakorum Mountains; and on the north by the Keria, Toguz Daban or Kuen Luen, Altyn Tag, and Nan Shan Mountains. Chinese or Eastern Turkestan, in the western part, and Mongolia, in the eastern part, are the countries immediately to the north. None of these boundaries is strictly defined. For example, the eastern boundary varies in different latitudes between 99° in the Batang region in the south, and 102° in the Kuku Nor region in the north.

We have already explained some of the discrepancies concerning the western boundary, and the eastern is equally uncertain. For instance, in what we may term the south-eastern corner of Tibet and the adjoining part of China Proper the boundaries vary in different maps; Batang and Litang being sometimes included in Szechuen and sometimes in "Chinese Tibet." And even the more eastern district of Moupine, or Mupin (about 102° 30′ and 30° 30′), where the Abbé David laboured, is termed Chinese Tibet. But here, as well as at Tachienlu, where Mr. A. E. Pratt made a large collection of plants, partly worked out by us, the vegetation is luxuriant and varied, and belongs to the Himalayan or Indo-Chinese Flora.

Maximowicz describes (from the data supplied by the various

* From this point throughout this paper it has been considered sufficient to give the degrees of longitude and latitude in figures, without any further indication, and always, where the two are combined, placing longitude first. One has only to remember that the extremes are: longitude 80°–102°, and latitude 28°–39°.

travellers, he is careful to state) Mongolia and North Tibet as elevated plateaux, forming three terraces, separated from each other by chains of mountains running from west to east. Mongolia, the lowest of these terraces, is from 2000 to 4000 ft. above the level of the sea, followed by a second at 10,000 ft., and separated from Mongolia by the Nan Shan chain, which is called Tsaidam. The third is separated from the second by the Tan La chain, and rises to a height of 15,000 ft. This is North Tibet, properly so-called; but Tsaidam is commonly included in Tibet, as it partially is in the present paper, though we have few plants from that part. The Tibetan plain at 14,000–15,000 ft. and upwards above sea-level may be divided into two unequal parts by an imaginary diagonal line from the desert of Odontala in the north to Tengri Lake in the south. The rivers and rivulets to the west of this line drain into numerous, often large salt-lakes. To the east of this line, as well as the country south of Lhasa, the drainage is to the sea, chiefly to the east by the feeders of the Hoangho and the Yangtze and the upper Brahmaputra, while a relatively small south-western portion is drained by the Sutlej and Indus. The western plain or plateau consists of vast wide valleys between lofty parallel mountain-chains running from the west to the east, and rising to 20,000 ft. and upwards. With few exceptions the mountain-chains are naked and arid in the extreme; but some of the higher peaks are permanently covered with snow. The valleys and inequalities of the plain are largely filled or covered with a deposit called loess, the product of erosion, wind-borne to its present position. In places the loess deposit is of great thickness, the result of centuries of almost incessant dust-storms, and intersected by streams and rivers, more especially in North China; and where there is sufficient moisture it is exceedingly fertile. The composition of loess varies, but it is more or less calcareous and argillaceous and of a friable nature. In some districts it is mixed with sand; in others gravel predominates. We sometimes find the word loess translated by mud, but it would be mostly dry mud within our limits, and loam is perhaps a more intelligible rendering of the word.

Climate *.

The data concerning the climate of Tibet are very incomplete, but sufficient to give an idea of the general characteristics. In

* Temperatures have throughout been converted to Fahrenheit's thermometer, and the + and − refer to the zero, and not to the freezing-point.

the first place we give a free translation of Maximowicz's account, relating chiefly to the Eastern and Northern parts.

The winter in Tibet, observed three times in different years and months, and therefore the best known season, is cold, practically snowless, and characterized by a very dry, tempestuous atmosphere. The mean temperature of December and January is between +6°·6 and +2°·3 Fahr., but the nocturnal temperature in October falls to −9°·4, in November and December to −22°·0. In January the lowest temperature was observed, −28°·3, and soon afterwards the mercury froze; at 1 P.M. it varied from −0°·4 to +11°·6, and even higher; on sunny days occasionally +39°·0 was reached, and once even +46°·0 in consequence of the presence in the air of a copious dust heated by the sun's rays. During the day the wind, often violent, always blew from the west. Thus, both in October and November there were ten stormy days, in December fourteen, in January eighteen. Swamps and rivulets were frozen in October; the larger rivers in November; the lakes are so salt that they never become ice-bound. Later on, on account of the extreme dryness of the air, the ice on the swamps evaporates, the greater part of it disappears, and they are dried up; similarly the rivers become waterless. Herbs also become so dried up that they crumble when touched and are ground to powder beneath the feet. The Yak and other wild animals were observed to lick up their food rather than detach it by their teeth.

Snowstorms are very frequent, and always tempestuous on account of the west wind. Nevertheless, snow falls sparingly and in very small quantities and usually disappears on the following day, dissipated by the wind-blast and the heat of the ground. Hence level places and the flanks of the mountains looking south were destitute of snow, and only on the northern slopes did the snow remain for any length of time. The inhabitants state that in some years the snowfalls are heavy, but they do not remain long, or all the animals would perish.

The limit of perpetual snow in Tibet seems to correspond to the lowest limit of the glaciers, and lies at 16,500–17,000 ft.; it is evidently much higher than in Amdo around the upper Hoangho and on the south side of Nan Schan, where perpetual snow begins at 15,700 ft., whilst on the northern slope of the same range it descends to 14,700 ft.

Spring in Tibet is cold and tempestuous, and disturbed by frequent snowstorms.

As in spring, so in summer, frequent and sudden changes of the weather occur—from heat to cold, from clear to cloudy; and the state of the weather is so changeable that the inhabitants assert that each village in Tibet has its own weather. For instance, in the desert of Odontala (35° N. lat.), on the second of June, after a warm day, there arose a tempest with a heavy fall of snow, and after this the temperature fell to −9°·4. On other days, at 1 P.M. the air-temperature in the shade was 33°·2, and later 69°·6. In the open it was very hot, but any cloud rising in the clear sky caused a lowering of temperature and often snow or hail. On clear nights in July the temperature falls to 22°·5. The sky is usually cloudy. Rain or snow falls every day; thunderstorms occur frequently. With the constantly falling rain the streams are quickly swollen. A river which in winter is scarcely 60 ft. wide, in summer spreads to a breadth of 300 ft.; the Murussu, with a bed 650 ft. wide in winter, becomes swollen in summer to 4800 ft., and at the same time the water, which in winter is clear and limpid, becomes thick and muddy. All Tibet becomes, as it were, an immense swamp. No journey whatever can be undertaken, because the only material by which, in these regions, a fire is kindled for cooking food, drying wet garments, and warming men numbed with cold—the dried dung of oxen—is softened and dissolves.

Autumn is calm, dry, and rather warm; tempests are rare, but when they do occur they arise in the west. The characteristics of summer seem to prevail throughout Tibet; but in the alpine region of the Keria range rains were observed at least daily, and the mountains were enveloped in clouds.

The province of Amdo, on the north-eastern boundary of Tibet, where the plains are more than 12,000 ft. high, rising above the course of the upper Hoangho and its affluent streams, has almost the same climate as Tibet. During the month of June, for instance, snow falls every day—indeed, according to the inhabitants, on some plains it never rains throughout the summer, but snows. Cold and storms prevail at the same time that spring is flourishing in the depth of the valleys. Nevertheless a temperature of 80° was observed in July even on these elevated plains. In the deep river-valleys the air-temperature is cooler. A calm winter has a fairly copious snowfall, but even then only the northern slopes of the mountains are covered with snow for any length of time; recent snow, even in February,

quickly disappears. At the end of November the Hoangho was frozen; the ice, however, was not permanent and was already melted in February. The temperature at 1 P.M. in February was 54°·9, March and April 77°·5. During the night in February it fell to −11°·2, in April to 19°·4.

The dryness of the air, the violent winds, and the cold nights much retard the growth of herbs and trees. In Amdo, in the valley of the stream Rako Gol, flowing into the Sining, the first herb, the dwarf *Gentiana squarrosa*, opened its flowers at the beginning of April, and the leaves of trees and shrubs began to unfold about the same time. In the highest gorge of the River Yedsin so late as June 1st only ten species of flowering plants were collected; and in elevated exposed places at that date not even traces of vegetation were visible. In the zone of alpine meadows flowers were produced from the end of June to the end of August. On the Nan Schan Mountains the thickets and, by the middle of August, the meadows have an autumnal appearance.

In the desert of Odontala, North-east Tibet, the first flowers opened in the beginning of June, but in a cautious manner, as they scarcely appear above ground; indeed, up to this time they have been covered by their leaves. In the Mur-ussu valley flowering herbs are found in the middle of June, but shrubs are still naked, and only in the beginning of July do they begin to put forth leaves.

Tsaidam, situated 3000–4000 ft. lower, has a much less severe climate; the temperature is warmer, the snow and rain less abundant, the sky usually clear and storms less frequent, but the air is often full of dust as in Mongolia. In the summer clouds of obnoxious insects appear, and to such an extent that the whole region becomes a desert and the inhabitants, with their flocks and herds, go up into the mountains.

Maximowicz, to whom we are indebted for the greater part of the foregoing remarks on the topography and climate of Tibet, refers, as already mentioned, more particularly to the north-eastern part—the part from which we have the least material. For the west we have Strachey and Schlagintweit's observations and data, besides the results obtained by the more recent travellers. We may here quote a few sentences from General Sir R. Strachey (Journ. Linn. Soc., Bot. xxx. (1894) p. 101):—

"The climate of these parts of Tibet is very extreme. The air

is very dry, and the sun's power in the rarefied and usually cloudless sky very great. The vegetation is meagre in the last degree; and in the tract that I visited, which, being much nearer to the Himalaya than the region through which Capt. Bower passed, is no doubt better supplied with moisture, I estimated that not one-twentieth part of the surface was covered with vegetation. The comparison of Mr. Thorold's collection of plants with that made by Mr. E. Winterbottom and myself in 1847 will be of considerable interest."

Messrs. Schlagintweit's meteorological observations did not cover more than two or three seasons, and in many districts less; but they afford some idea of the climate of Western Tibet and the adjoining countries. They calculated the annual mean temperature at 16,500 ft. as follows:—

Outer Himalaya, southern slopes	32°	Fahr.
Inner Himalaya, southern slopes	29·5°	„
Western Tibet, and northern slopes of the Himalaya and Karakorum chains	31°	„
Kuen Luen, both sides of the crest	20·5°	„

The mean decrease of temperature for altitude, the result of a great number of observations, was 1° Fahr. for 390 ft. The decrease of temperature in latitude is analogous to that in Central Europe, namely 2° Fahr. for 1° of latitude; but in High Asia, when the isothermal lines are reduced to the level of the sea, there is a decided decrease of temperature from west to east. The conditions of atmospheric moisture are exceedingly irregular over the different parts of High Asia. In Tibet the annual amount of rain varies between two and six inches only, whilst in Sikkim, in the eastern Himalaya, it exceeds 120 inches a year. This is of special importance with regard to the vegetation. The difference in the relative humidity of the atmosphere was found to be much greater in Tibet than previous data might have led us to expect. The dryness was frequently so great that only 1 to 1½ per cent. of relative humidity was obtained

In a comparatively recent summary of the rainfall of the earth, Supan gives the total amount of precipitation in the Pamirs, at Leh, and at Urga. The observations in the Pamirs were made at a Russian military post, near the confluence of the rivers Murghab and Ak Baital, in about 73° 6′ and 38° 8′, at an altitude of a little over 12,000 ft., and extended over one year only. The total for the year was rather less than 1·9 inch.

During the months of August and October there was no precipitation whatever, and during three other months less than a millimetre per month. The relative humidity for the year was 39; the lowest, 19, in August, and the highest, 56, in January. The mean temperature for the year was 30°·02 Fahr. January was the coldest month, with a mean of −12°·8; and July the hottest, with a mean of +62°·2. The extreme highest temperature was +81°·5, and the lowest −47°·2, giving a range of 128°·7 Fahr.

The annual rainfall at Leh, in about 77° 30′ and 34° 25′, at an altitude of 11,278 ft., is given as 81 millimetres, equal 3·1 inches.

Urga is in north-west Mongolia, in about 107° and 48°, and a degree south of Kiachta, at an altitude of 4376 ft. Here the average fall of five years' observations is a trifle over 7·5 inches.

The average annual rainfall of Kashgar (1894–6) was 4·45 inches. This is in about 76° 2′ and 39° 27′, at an altitude of 4000 ft.

Captain M. S. Wellby's 'Through Unknown Tibet,' pp. 429–431, contains some Meteorological Observations, which we reproduce in a condensed form. Wellby and Malcolm's route across Tibet was between 34° and 36° of latitude and then by the north shore of lake Koko Nor, and was accomplished between May and October. During nearly four months they were at an average elevation of 16,000 ft. The distance traversed between Leh, in Ladak, and Tankar on the Chinese frontier was nearly 2000 miles, and it took nearly five months and a half.

The meteorological data are for the months of May to October:

May: Fourteen fine days; five snow or sleet. North winds prevailed till the middle of the month; thenceforward west and south-west. Minimum night temperature 10° Fahr.

June: Twenty-six fine days. Snow on four days. Winds variable throughout. Coldest night 7° Fahr.; warmest 33°. Maximum in sun 110°; in tent 78°.

July: Twenty-one fine days. Snow, sleet, or rain on ten days. Prevailing wind north-west. Coldest night (10th) 6° Fahr. Warmest night 1° of frost. Average night minimum 21° Fahr.

August: Eleven fine days and eighteen on which rain or snow fell. Winds variable. Several severe storms. Coldest night 18° Fahr.; warmest 40°; average night 34°.

September: Twenty fine days and ten cloudy with snow or rain. Prevailing wind west. Coldest night 7° Fahr.;

warmest 35°. Average frost at night 12°. Temperature at 7 P.M. on the 27th reached 64° Fahr.

October: Bayan Gol, camp 127, to Tankar, camp 141; about 97° 45′ and 36°. From here the course was north-east and around the north coast of Koko Nor. Twenty-seven fine days; two cloudy; two with snow. Coldest night 5° Fahr.; warmest 30°; average night 22°. Cultivation is practised in long. 101°.

Mr. Rockhill, whose route in 1892 was between 90° and 102° and 29° and 37°, compiled a table of mean monthly temperatures reproduced below. The Tibetan part of the journey was made during the months of February to September, and the general direction was southward. See "Itineraries," p. 148.

Mean corrected Monthly Temperatures from January to October, 1892. Fahrenheit.

	7 A.M.	2 P.M.	7 P.M.	Mean.
	°	°	°	°
January	1·2	30·4	17·7	6·4
February	17·5	39·0	27·0	27·8
March	18·9	39·0	26·3	28·1
April	28·1	52·4	32·5	37·1
May	40·9	61·5	44·3	48·9
June	35·7	56·2	38·3	43·4
July	42·6	54·6	44·2	47·1
August	41·7	63·8	49·5	51·6
September	50·7	64·0	50·8	51·1
October	47·3	48·0	47·5	47·7

Some further information on climatology will be found in the extracts from the narratives of the various travellers whose itineraries are sketched below. These, we may add, are limited to the travellers whose botanical collections have been investigated by ourselves, or whose observations we have repeated.

I cannot conclude this introductory part without a few words respecting the authorship and the assistance received from various persons. Although Mr. Pearson is not responsible for

any part of the paper in its present form, except for the approximate correctness of many of the statistics, and for the translation of Maximowicz's data relating to vegetation and climate, he is really joint author of the enumeration of the plants. I am also greatly indebted to him for collecting data embodied in various other parts of this paper. Thanks are due to Miss Hemsley and Mr. S. A. Skan for help in transcribing, in constructing the lists and tables, and in checking the figures and calculations. I also thank the Trustees of the Bentham Fund for reimbursing me with the sum expended on clerical assistance.

ITINERARIES.

Captain (Lieut.-General Sir) Richard Strachey and Mr. James Edward Winterbottom. 80°—81° 40′; 30° 30′—31° 5′. 1848.

Left Almora August 8, 1848, travelling by way of Milam (80° 8′ and 30° 25′), which is at an altitude of 11,400 ft. Thence their route lay through Shelong, Unta Dhura, Jainti Dhura (18,600 ft.), Topidhunga, Kyungar, and Laptel to the Balch Dhura Pass, 17,490 ft. From Balch Dhura they proceeded in a north-easterly direction, through Tisum, as far as the Sutlej river (80° 24′ and 31° 4′), and then in a south-easterly direction across the plain of Gugé by way of Gam, Ligchephu, Nima Khar, and Jungbwa Tol to Lagan Tunkang, the south-eastern extremity of lake Rakas Tal, in about 81° 17′ and 30° 36′. Thence northward, between the lakes, to Ju Kiuo (81° 21′ and 30′ 46′), the north-west point of lake Manasarowar, where the lakes are connected by a narrow channel. The altitude of these lakes, which are the source of the Sutlej, is 15,000 feet. The return journey was by the same route as far as the south-western angle of lake Rakas Tal; thence southward to the valley of the Karnali river, and north-westward to Sing Lapcha, Lama Chorten, Tazang, and south-westward to Chirchun (80° 14′ and 30° 40′) across the Jainti Dhura and southward to Milam, where they arrived September 26, 1848.

General Strachey's Narrative contains so much of interest to the botanist, that we extract freely and somewhat copiously from it; partly in his own words, partly very much condensed, and partly isolated facts. A few of the names of plants employed by him may designate species which we have under different names, though we have endeavoured to secure uniformity.

As an introduction to the flora of the drier region of Tibet Proper we reproduce his list of plants collected in the neighbourhood of Milam :—

Plants found at and near Milam at 11,000 to 13,000 ft.

Clematis orientalis.
Thalictrum platycarpum.
Ranunculus sp.
Aconitum Napellus.
,, heterophyllum.
Berberis vulgaris.
Draba lasiophylla.
Sisymbrium himalaicum.
Brassica campestris.
Lepidium capitatum.
Silene inflata.
Stellaria decumbens.
Arenaria serpyllifolia.
,, holosteoides.
Impatiens Thomsoni.
Thermopsis barbata.
Caragana crassicaulis.
Guldenstædtia himalaica.
Astragalus himalayensis.
,, multiceps.
Cicer songaricum.
Potentilla fruticosa.
,, ambigua.
,, bifurca.
Rosa Webbiana.
,, sericea.
Pyrus Aucuparia.
Cotoneaster microphylla.
Saxifraga flagellaris.
,, Stracheyi.
Ribes Grossularia.
,, glaciale.
Sedum asiaticum.
,, trullipetalum.
,, Ewersii.
Epilobium latifolium.
,, roseum.
,, origanifolium.
Pituranthos nudus.
Seseli trilobum.
Pleurospermum Candollei.
,, stellatum.
Heracleum Brunonis.
Lonicera glauca.
,, obovata.
,, alpigena.
Galium triflorum.
Nardostachys Jatamansi.
Erigeron alpinus.
Anaphalis Royleana.
Allardia tomentosa.
Tanacetum tibeticum.
Artemisia scoparia.
,, biennis.
,, sacrorum.
Cousinia Thomsoni.
Crepis glauca.
Lactuca rapunculoides.
Campanula cashmiriana.
,, aristata.
Androsace Chamæjasme.
Gentiana cachemerica.
Pleurogyne carinthiaca.
Polemonium cæruleum.
Eritrichium strictum.
Verbascum Thapsus.
Scrophularia lucida.
Veronica ciliata.
,, biloba.
Pedicularis megalantha.
,, tubiflora.
Orobanche Epithymum.
Elsholtzia eriostachya.
Origanum vulgare.
Nepeta spicata.
,, discolor.
Scutellaria prostrata.
Axyris amaranthoides.
Polygonum islandicum.
,, aviculare.
,, tubulosum.
,, glaciale.
,, polystachyum.
Rheum Webbianum.

Hippophaë rhamnoides.
Parietaria debilis.
Ephedra vulgaris.
Juniperus communis.
,, Pseudo-Sabina.
,, macropoda.
Allium Victorialis.
Potamogeton pectinatus.
Scirpus setaceus.
Scirpus Caricis.
Hierochloa laxa.
Deyeuxia scabrescens.
Avena ænea.
Danthonia cachemyriana.
Bromus tectorum.
Agropyron longearistatum.
,, semicostatum.
Elymus sibiricus.

As the distance from Milam was increased, the vegetation became more and more scanty and the last bushes worthy of the name (*Juniperus communis*) were passed a few miles south of Shelong, 12,800 ft. The height of the Pass of Unta Dhura is 17,530 ft.; and vegetation reappeared on the north face, after a descent of about 500 ft., with *Cheiranthus himalayensis*, *Elsholtzia eriostachya*, and dense, cushion-like masses of *Thylacospermum rupifragum*, a foot or more in diameter. The vegetation of the ascent to the Pass of Kyungar (17,500 ft.) was very sparse, but a few plants were noticed almost to the very top, namely, *Eritrichium spathulatum*, *Microula Benthami*, *Urtica hyperborea*, *Taraxacum officinale*, *Ranunculus hyperboreus*, *Arabis alpina*, and *Thalictrum minus*. The only fern of these regions is *Cystopteris fragilis*. The Balch ridge rises to upwards of 18,000 ft.; but this range hardly comes within the limits of perpetual snow, and phænogamous vegetation exists to the very summit, within a few feet of which *Allardia tomentosa* was growing freely. Here also were found two species of *Saussurea* (so numerous at high elevations), namely, *S. Hookeri* and *S. bracteata*, and *Nepeta bracteata* and *Arenaria musciformis*. On the descent from the Balch Dhura Pass, which we take as the entry into Tibet Proper, at about 17,000 ft., vegetation reappeared somewhat freely; and by the side of a small stream, which to the north of the Indian watershed is essential to any approach to vigorous vegetation, several new plants were found, among them: *Gentiana nubigena*, *Draba lasiophylla*, *Pedicularis versicolor*, *P. rhinanthoides*, *P. cheilanthifolia*, and some grasses and sedges, including *Trisetum subspicatum*, *Deschampsia cæspitosa*, and *Carex ustulata*. At Tisum (14,690 ft.) *Stracheya tibetica* was discovered, and among other new plants were the following:—*Alyssum canescens*, *Stellaria graminea*, *Potentilla Anserina*, *Saussurea glanduligera*, *Crepis glomerata*, *Parnassia ovata*, *Scopolia prœalta*, *Salsola Kali*, and a few grasses, such as *Stipa purpurea*, *S. orientalis*, *S. sibirica*,

Festuca valesiaca, *F. nitidula*, *F. sibirica*, and *Elymus sibiricus*. In the valley which they descended, *Triglochin palustre* was met with, and this was afterwards found at an elevation of 15,000 ft. associated with *T. maritimum*, *Crambe cordifolia*, *Glaux maritima*, and *Eurotia ceratoides*. At the head of a ravine near the Sutlej (14,820 ft.) they found *Chamærhodos sabulosa*, *Aster molliusculus*, *Deyeuxia compacta*, *Stipa Eversii*, *E. mongholica*, *Oryzopsis æquiglumis*, and *Lasiogrostis mongholica*. Lower down (13,350 ft.) the largest shrub was *Myricaria elegans*, here growing to a height of five or six feet with stems often three or four inches in diameter. The dama (*Caragana pygmæa*) was usually luxuriant, rising to three feet or more. *Clematis graveolens*, *Crepis glauca*, *Tanacetum gracile*, *Artemisia salsoloides*, *A. sacrorum*, *A. Roxburghiana*, and *Christolea crassifolia* were also collected here. On the banks of a stream near Ligchephu *Hippophaë Rhamnoides* occurred full of berry. At Gyanima (Nima Khar), near a small lake at a lower elevation, the soil was covered with green turf, intersected by numerous small streams; and *Ranunculus aquaticus*, *R. Cymbalariæ*, *Hippuris vulgaris*, two species of *Gentiana*, and *Primula tibetica*, not exceeding an inch in height, were found in abundance. In the ravines near the lake of Rakas Tal (15,000 ft. and upwards) a small willow, *Salix sclerophylla*, was not uncommon, and *Rheum Moorcroftianum*, *Gentiana nubigena*, *Lagotis glauca*, *Arenaria Stracheyi*, and *Pleurospermum* were collected or observed. The vegetation along the southern shore of Rakas Tal and between the lakes was excessively meagre, and no novelties were added to the collection. *Caragana pygmæa*, *Potentilla sericea*, *Thylacospermum rupifragum*, *Silene Moorcroftiana*, *Dracocephalum heterophyllum*, *Nepeta tibetica*, *N. supina*, *Oxytropis Stracheyana*, *Aster molliusculus*, *Senecio coronopifolius*, *Artemisia Stracheyi*, *Tanacetum* sp., *Lactuca Lessertiana*, *Androsace villosa*, *Sedum fastigiatum*, *Draba lasiophylla*, *Delphinium cæruleum*, and *Allium Jacquemontii*, together with a few grasses and sedges, would nearly complete the flora of this desert region. In the valley of the Karnali river there was a comparatively luxuriant vegetation. Descending from Gunda Yaukti, *Biebersteinia Emodi*, *Euphorbia tibetica*, *Scirpus Caricis*, and *Agropyron longearistatum* were added to the collection. Between Chirchun and Shelong, *Urtica hyperborea* was found, probably above 17,500 ft.

The foregoing extracts and excerpts embody all the important

botanical data, to which we may add a short note by General Strachey on the general character of the vegetation, written in connection with our account of Captain Bower and Dr. Thorold's collection :—

"The time during which we were there was little more than a month, and the area we traversed was comparatively limited; but I think the collections were fairly complete. We were, however, rather late in the year, and we may have lost some of the earlier flowering plants. The total number of flowering-plants collected in Tibet consisted of forty-one natural orders, of which thirty-three were exogenous and eight endogenous; the exogenous genera being ninety-six with 173 species, and the endogenous genera twenty-four with forty-five species, of which thirty were grasses and sedges. A single fern (*Cystopteris fragilis*) was found and three or four mosses. The lichens were obtained exclusively, I think, from rocks. The country in which our collections were made is between the eightieth and eighty-second meridians, extending from Niti to Manasarowar Lake." Niti here should probably be Balch; and the statistics of the flora are probably higher than they would be within our limits; but it is difficult to obtain an exact verification of all the details.

The following characteristic plants not in our Enumeration were found by Strachey and Winterbottom between Milam and Balch Dhura, or at least eastward of the eightieth meridian:— *Arenaria glanduligera*, Edgw., *Geranium pratense*, L., *Viola kunawarensis*, Royle, *Lychnis brachypetala*, Hort. Berol., *Epilobium palustre*, L., *Lonicera glauca*, Hook. f. & Thoms., *Artemisia biennis*, Willd., *Lindelofia Benthami*, Hook. f., *Pedicularis versicolor*, Wahlenb., *Euphorbia Stracheyi*, Boiss., *Carex Lehmani*, Drejer, and *Poa bulbosa*, L. Had we included the foregoing plants in our Tibet list, it would have added two natural orders, namely Violaceæ and Onagraceæ, not otherwise represented; but as they do not occur in any of the other collections, we have, for reasons given elsewhere, left them out.

Dr. Thomas Thomson. *Little Tibet* or *Baltistan*. 1847–48.

Although Thomson did not extend his travels into Tibet Proper, he explored the western extension of the same botanical region and the adjacent countries in which there is a transition to the rich flora of the humid Himalayas, and his work, 'Western Himalaya and Tibet,' has neither been superseded nor greatly supplemented from a botanical standpoint. It

abounds in geological and botanical information, which is repeated in a more digested form in the Introduction to the 'Flora Indica.'

Starting from Simla on the second of August, 1847, the Mission to which Thomson was attached travelled up the valley of the Sutlej river to its junction with the Piti, across the State of Piti, over the Parang Pass and north-eastward to the Indus, the course of which was followed, with a detour in Zanskar, to Leh. Thence northward to Nubra and down the Shayuk river to its junction with the Indus and onward to Iskardo. On the second of December they left Iskardo in the direction of Kashmir, by way of the Indus and Sind to Dras, where they were stopped by the snow. They returned to Iskardo, where they wintered. In February, 1848, an excursion was made down the Indus to Rondu, the most north-westerly point reached—about 75° and 35° 25′. They again returned to Iskardo, and then went southward to Kashmir and Janu, on a tributary of the Chenab river and again north-eastward, across the Upper Chenab valley and Zanskar, to Kalatze, on the Indus, and then on to Leh. Thence by way of Nubra, to Karakorum Pass, in about 77° 40′ and 35° 35′. The return journey was by way of Leh, Kalatze, Kargil, Zoji Pass, and Kashmir to Lahore. Taking Thomson's map, the country traversed in various directions would be between 75° and 78° and 31° and 35° 35′.

Dr. (Sir Joseph) D. Hooker. 88° 45′; 28°. 1849.

Entered Tibet, in October, 1849, from the northern boundary of Independent Sikkim, in about 88° 45′ and 28°. He twice ascended Mount Bhomtso (18,500 ft.) not far from the frontier, where, however, the climate, and consequently the flora, is that of dry Tibet. The botanical results were poor, the number of species gathered in two days' journey amounting to only fifteen or twenty. They are almost identical with those from equal elevations (16,000 to 18,000 ft.) in West Tibet. "A stunted *Lonicera* and *Urtica* being the prevalent species at 16,000 ft., with creeping *Carices* in the sand, and tufted plants of Alsineæ, *Draba*, *Androsace*, *Oxytropis chiliophylla*, *Sedum*, *Saxifraga*, and grasses and sedges, most of which ascend to 18,000 ft. The curious genus *Thylacospermum* forms hard, hemispherical mounds on the stony soil, and is one of the most conspicuous features of the flora. The ground was everywhere there covered with an efflorescence of carbonate of soda, and the pools of water were

full of *Ranunculus aquatilis* and *Zannichellia palustris*, also typical of similar situations in West Tibet."

In the Introduction to Hooker and Thomson's 'Flora Indica,' from which the preceding paragraph was extracted, "Western Tibet," including Little Tibet and Baltistan, is divided into eight Provinces, namely :—

1. Gugé, the Tibetan course of the Sutlej.
2. Piti and Parang, the basins of the rivers of those names, tributaries of the Sutlej.
3. Zanskar, the basin of the Zanskar river.
4. Dras, the basin of the Dras river.
5. Nari, the upper course of the Indus.
6. Ladak, the middle Tibetan course of the Indus.
7. Balti, the lower Tibetan course of the Indus.
8. Nubra, the upper basins of the Nubra and Shayuk rivers, tributaries of the Indus.

These Provinces comprise the country botanized by Thomson, Strachey and Winterbottom, and others ; but only Gugé and Nari come within our limits.

Respecting the boundary between India and Tibet, in relation to botanical regions, the authors express the opinion that it should begin where the dry region begins, and this is practically the boundary adopted in this paper.

The Brothers SCHLAGINTWEIT. 80°—81°; 30°—31° 30′. 1854–58.

Having made use of many of their data, it may be worth while to indicate briefly their route in the North-west Himalaya and Tibet. They traversed the country in many directions between 70° and 80° and between 80° and 37°—that is to say, the valleys of the middle Sutlej and Indus and the upper Ravie, Chenab, and Jelam rivers. They crossed into Tibet by the Milam route, and reached as far north as Gartok ; and they crossed the Karakorum and Kuen Luen chains in two places. Bushia, in the direction of Khotan, was their furthest to the north-east ; but they reached Yarkand and Kashgar in the north-west. From the south they crossed the Pass of Skardo and made the southern ascent of the Karakorum range.

Captain H. BOWER and Surgeon-Captain W. G. THOROLD. 80°—102° ; 29° 30′—34° 30′. 1891–92.

Left Leh on June 14th, 1891, and entered Tibet by the Lanak

La (30° 25′), travelling in an easterly direction to the Mangtza Cho at an elevation of 16,540 ft., over a Pass 18,400 ft. high. Descending to 17,930 ft. they came upon a large lake, the Horpa Cho, the highest they encountered throughout their journey and "probably the highest in the world." This is in about 81°. The next lake they struck was Aru Cho, and then taking a south-easterly direction to camp forty-six, on the banks of Lake Chargat Cho in about 88° and 31°. This is a region of lakes, and in spite of opposition the travellers pressed on in the same direction as far as Gaga Linchin beyond Garing Cho, 88° 25′ and 31° 30′, altitude 15,560 ft., and their nearest point to Lhasa. On October 4th they began to retrace their steps by way of Chargat Cho, where they turned northward, and on the 18th they had to climb a Pass 18,768 ft. high. The cold was intense, although the thermometer only went down to 15° below zero Fahr. They continued northward nearly to the thirty-third parallel, and then proceeded in a south-easterly direction. On November the 14th they camped for the first time during five months below 15,000 ft. Their route lay through Chiamdo, about 96° 40′ and 31° 10′; Batang, Litang, to Tachienlu, Szechuen, in China Proper—about 102° and 30°. Thence to Yatu, and by the Min and Yangtze rivers to Shanghai. Thus they traversed Tibet from west to east and finished by crossing China. There is scarcely any reference to the vegetation in Captain Bower's narrative, except the absence of pasture; but the following extract contains some interesting facts:—

"The whole of central and northern Tibet and almost the whole of Western Tibet is known as the Chang. It consists of a high tableland with hills, mostly of a rounded character; but here and there sharply defined snowy ranges are met with. The mountains have a general east and west tendency, but no defined watershed exists; rivers may be met flowing in almost any direction and all terminate in large salt lakes. These lakes appear to have been at one time much bigger than they now are, as unmistakable signs that they are drying up are to be seen. An idea of the physical configuration of the country may be gathered from the fact that for five months we never once camped at a lower altitude than the summit of Mont Blanc; and all the enormous stretch of country we covered in that time contained not a single tree. The greater part of this Chang is, of course, uninhabitable for the greater part of the year, and most

of the places that would afford grazing in summer are too far distant from suitable winter quarters to be availed of by the nomads.

"In South-eastern Tibet the country is of quite a different character; deeply-cut valleys, steep, well-wooded hills and rivers that eventually find their way to the sea being the characteristics. The population is a settled one, living in houses and growing crops."

Captain Bower's Official Report, which was of a confidential character and not on sale, contains a preliminary list of the plants with comments, both by Dr. Thorold and W. B. Hemsley, and also a brief account of the Zoology by the former. Through the courtesy of the Secretary of State for India we have been permitted the use of a copy for the purpose of extracting the scientific results. As this report is not a public one it seems desirable to extract in full the paragraphs relating to the collections. In the first place we reproduce Dr. Thorold's note on the botanical collection :—

"I am indebted to Mr. W. Botting Hemsley, F.R.S., of the Royal Botanical Gardens, Kew, for the determination of the species. The collection includes, as far as I am aware, every flowering plant seen by me in Tibet, with the exception of the wild rhubarb and the burtza [*Tanacetum tibeticum*], the roots of which latter plant are used in high altitudes of Eastern Ladak for fuel by shepherds and sportsmen. Both these plants are very bulky, and are found in Ladak, and were therefore not collected. I could get no information as to the use of any of the plants as medicines. The leaf of the wild rhubarb is dried and mixed with tobacco for smoking; the smoke is mild and fragrant, and though not resembling tobacco in taste, is pleasant. Owing to the extremely rigorous climate the season of flowers in the high central plateau of Tibet is short.

"When we crossed the frontier of Tibet on July 3rd, 1891, the flowers were in bud; the eggs of the birds were in their nests on the ground, and summer was commencing. No flowers were seen after September 8th, and by that date the grass was in seed, and the autumn well begun.

"The plants were, therefore, collected within a comparatively short period. South-eastern Tibet, which was traversed between the beginning of December and the beginning of February, is a well-wooded country, rich in flora; but the high central plateau of Tibet has not a plant bigger than the burtza, growing four to six inches above the ground; and in this region the only plants that

can be used for fuel are the burtza and the *Myricaria germanica* var. *prostrata*, the roots and stems of which are both woody. For long intervals, however, neither of these plants was found.

"It is interesting to note the frequent comparatively large underground fleshy stems and roots, showing the provision made by nature to store up nutriment for the plant below the surface of the soil, in a climate where the temperature even in midsummer falls at night to a few degrees above or below freezing. The nutritive value of the grass must be very great, from the beginning of July to the end of October, as the herds and flocks of the nomads testify. The plants requiring special names in the catalogue will be named hereafter."

W. B. Hemsley's preliminary summary of the botanical collection is perhaps worth inserting here :—

"The botanical collection submitted by Dr. Thorold to Kew for determination consists entirely of flowering plants, and comprises about 115 species, of which twenty probably are undescribed, or at least unrepresented, in the Kew Herbarium. But until they are critically worked out the number of novelties must remain uncertain, and there was no time to do this previous to Dr. Thorold's return to India. Apart from the number of novelties, however, this is a highly interesting collection, representing as nearly as possible, as Dr. Thorold assures us, the complete Phanerogamic Flora of the region explored, at altitudes of 15,000 to 19,000 ft. and chiefly above 17,000 ft. As may be seen from the accompanying rough list, many of the species are the same as those first discovered some forty years ago by Dr. Thomson in a somewhat higher latitude and ten to fifteen degrees farther west. Most of these are only now collected for the second time.

"The plants are nearly all characteristic of a very dry climate, consisting largely of exceedingly dwarf herbaceous perennials with large root-stocks, evidently often of considerable age. *Ephedra vulgaris* [correctly *E. Gerardiana*], from an elevation of 16,500 ft., is the only truly shrubby plant, and this, judging from the specimens, does not exceed six inches in height, even if it attain so much. Quite a large proportion of the species do not rise more than one to three inches above the surface of the soil, and some of them not more than half an inch. No fewer than twenty-eight Natural Orders are represented in this small collection, yet the great bulk of the species belong to about half-a-dozen Orders. Thus, the Compositæ contribute twenty-two species,

the Gramineæ thirteen, the Leguminosæ twelve, the Cruciferæ eleven, and the Ranunculaceæ eight. Among the plants collected at altitudes of 18,000 ft. and upwards are:—*Capsella Thomsoni*, *Thermopsis inflata*, *Saussurea tridactyla*, *Tretocarya pratensis*, *Microula Benthami*, and *Poa alpina*. The *Saussurea* is recorded from 19,000 ft., perhaps the greatest elevation at which any flowering plant was ever collected.

"Many other points of interest suggest themselves, but it would be premature to attempt to indicate them before the collection has been more thoroughly worked out."

It may be added that no important modification of the foregoing summary results from the more critical determination of all the species, except that *Tretocarya pratensis* and *Microula Benthami* are synonymous, and the same as *M. tibetica*. Dr. Thorold's valuable notes accompanying the specimens collected by him are incorporated in the general account of the Vegetation, which follows the Enumeration.

Dr. Thorold, so far as we are aware, was the only one of our travellers who collected specimens and data of the Zoology of Tibet. The following is a list of the Butterflies, collected or observed, extracted from the Official Report, in Bower's 'Diary of a Journey across Tibet' (Calcutta, 1893), p. 115:—

"*Name.*	*Date.*	*Alt.*	*Lat.*	*Long.*
Oeneis pumilus, Feld.	Aug. 9, 1891.	16,000	33° 25′	84° 25′
Vanessa ladakensis, Moore...	Sept. 10, „	15,500	31° 29′	89° 10′
Synchloë Butleri, Moore.....	June 28, „	17,000	Ladak	
Pieris chloridice, Hübn.....	June 30, „	16,500	„	
Parnassius acco, Gray.....	July 10, „	17,600	34° 25′	80° 35′
„ *Jacquemontii*, Boisd.	July 9, „	„	34° 32′	80° 25′
Colias Fieldii, Mén.	Feb. 15, 1892.	8,500		

"The above collection includes every butterfly seen by me in Tibet, as far as I am aware. The originals have been sent to the Curator, Indian Museum, Calcutta.

"All these species are also found at high altitudes on the north-west frontiers of Tibet and China, with the exception of *Pieris chloridice*, which ranges from Europe to the North-west Himalayas, and *Parnassius acco*, which so far has only been met with on the Karakorum range and the frontier of Ladak and Tibet. As, with the exceptions just noted, they are found at both the east and west frontiers of Tibet, it is justifiable to infer that these species inhabit the whole of the Tibetan central plateau."

The following interesting observations on the Fauna of Tibet are from the same source, pp. 115–116:—"The high central plateau of Tibet is densely stocked with animal life. Yak, *Poëphagus grunniens*; Tibetan antelope, *Kemas Hodgsonii*; Tibetan ravine deer, *Procapra picticaudata*; Kiang or the wild horse, *Equus hemionus*; Burhel, *Ovis Nahura*; *Ovis Hodgsonii*; wild dog, *Canis Chanco*; and grey wolf, *Canis laniger*, were the larger well-known animals met with in suitable ground; often in immense numbers. Herds of 40 to 80 yak—bulls, cows, and calves together—were seen grazing in sheltered valleys or on the hill-sides. As many as 300 kiang, 700 or 800 antelope, and 80 or 100 ravine deer were sometimes viewed on the same day.

"The animal food-supply on the high central plateau is practically inexhaustible, considering the few months in the year this plateau is inhabitable. Hares, Tibetan sand-grouse, *Syrrhaptes tibetanus*, and 'ram chickore,' *Tetraogallus himalayensis*, are resident and occur in great numbers.

"Wild goslings of bar-headed geese, *Anser indicus*, were found in pools at altitudes of about 17,000 ft.; but this appears to be the only game-bird that breeds on the high central plateau. In the autumn immense flocks of 'coolen,' duck, geese, and teal were seen winging their flight India-wards from the north. A single full snipe was very rarely flushed from a marsh. The other animals on the high central plateau were foxes of many kinds, marmots, *Arctomys Bolac*, and a large-eared field-mouse. The only fox identified was *Vulpes ferilatus*, Hodgson. The footmarks of bears were seen, but none of other carnivora except those mentioned above. The small running streams on the southern border of the high central plateau, if rising from springs not liable to freezing, were well stocked with fish; small, but excellent eating. Locusts and butterflies were found on the high central plateau. In South-eastern Tibet, immediately before entering the wooded country, we met with an extremely rare bear (undetermined). The Tibetan wapati, *Cervus eustephanus*, the musk-deer, *Moschus moschiferus*, and the napi *Elaphodus cephalophus*, were the animals met with in the forests and identified. Musk-pods and stag-horns for medicine are largely exported to China from districts not in close proximity to monasteries. It is not yet finally decided whether the stag above mentioned is the *Cervus eustephanus* or not, the question being still under the consideration of experts. The game-birds found in the region

and identified were *Crossoptilon tibetanum*, *Iphaginis Geoffroyii*, *Phasianus decollatus*, *Tetraophasis Schzenii*, *Bonasia Sevatzovi*, and *Perdrix sifanica*. *Crossoptilon tibetanum* is 'Hodgson's eared pheasant,' a magnificent white bird, the habitat of which for many years, and until quite recently, was unknown, the only skin in existence until recently having been procured by a Nepalese, who brought it from Pekin with the story that it had been brought thither as part of a tribute. Near the monasteries the killing of animals is forbidden, and the neighbouring country is a magnificent game-preserve stocked with pheasants and deer. In South-east Tibet, in the large rivers, fish were numerous and large. Honey-bees were seen in this district, and honey was procurable."

We have much pleasure in mentioning here that Captain Bower was awarded the Founders' Medal of the Royal Geographical Society in 1894.

The Hon. W. Woodville Rockhill. 90°—102°; 29°—37°. 1892.

Left Peking on the first of December 1891 and travelled westward through Kalgan, Tumed, and Hangkin to Orat (107° 41′), and then southward and westward to Nifoushan (105° 40′. 37° 40′), Yingspanhui, Lanshoufu and Hsining (101° 15′. 36° 45′), arriving there on the tenth of February, 1892. Kumbum and Lusar were visited and a short excursion was made into the Salar country; then a westerly course was taken, south of lake Koko Nor, to Shangchia (97° 40′. 36°), arriving there on the fourth of April. Thence through Tsaidam, as far as Naichi Gol (94° 35′. 36° 25′), continuing southward across the Kokotom Pass, the Kokoshili range, the Ulanula and Dangle mountains, the sources of the Toktomai river, and the valley and basin of the Murus, reaching Namru Tso (90°. 32°) the eighth of July. This was the nearest approach to lake Tengri Nor, about twenty miles to the south, permitted by the local authorities. The rest of the journey in Tibet was eastward and southward to Shamdun (99°. 29°), Sept. 1st; then northward to Batang, and eastward to Litang and Tachienlu and across China to Shanghai.

Mr. Rockhill presented to Kew through Professor C. S. Sargent, Director of the Arnold Arboretum, Harvard University, the botanical collection he made on this journey; and we may repeat here his note on it, which appeared in the Society's Journal

(Bot. xxx. 1894, p. 131), accompanying our detailed enumeration of the species :—

"The object I had in view when making the little collection of plants, which, through Professor C. S. Sargent's kindness, has been examined and classified by Mr. Hemsley, of the Royal Gardens, at Kew, was to give some idea of the flora of the country between the Kuen Luen range to the north and the inhabited regions of Tibet adjacent to the Tengri Nor on the south. This region has an average altitude of 15,000 ft. above sea-level along the route followed by me in 1892, and had not, prior to my visit, been explored.

"The route followed in 1879 by Przewalski when travelling towards Lhasa, which was nearly parallel to the last that I took, differed considerably as regards the configuration of the country from mine; and consequently I anticipated that notable differences in the flora along the two roads would be discovered.

"I traversed this country in the months of May, June, July, and part of August, and heavy snowstorms and nearly daily frosts occurred during this period, though the thermometer rose more than once to 70° F., and even to 83° on one occasion in the shade at 2 P.M. The mean temperature from the 17th of May, when we entered the mountainous region to the south of the Tsaidam, to the 11th of August, when we descended to below the Timber line (13,500 ft. above sea-level) on the Ramachú, where I ceased collecting plants, except such as the natives pointed out to me as being used by them either as food or medicinally, is shown in the following table :—

1892.	7 A.M.	2 P.M.	7 P.M.
May 17 to 31	37°5 F.	54°6 F.	37°3 F.
June	35·7	55·9	38·3
July	43·0	54·6	44·2
Aug. 1 to 11	40·6	61·5	47·3

"Nearly the whole of the region traversed in this interval was of sandstone formation, the predominating colour of which was bright red. The water was invariably brackish, and in many cases undrinkable; the soil everywhere sandy, or covered with a rather fine gravel, and occasionally a little clay. The grasses grew in bunches, nowhere forming a sod, except around the rare pools of pure water fed by the melting snows we occasionally passed.

"I was careful to collect all the flowering plants I saw along my route, and the barrenness of this region may be judged by the very small number I have brought home with me.

"The only edible plant we found in this country was a species of onion (*Allium senescens*) *, which grew in the sand in great quantities at altitudes higher than 15,000 ft. above the sea-level, though we looked for it in vain below this level.

"I may here remark that the rhubarb-plant, which I found growing in enormous quantities on the north and north-eastern slopes of mountains on the Ich'u, Lench'u, and other feeders of the Jyama-nu ch'u, thrived at an altitude above sea-level, ranging from 12,000 to 13,500 ft. I note this fact, as Col. Przewalski (Mongolia, ii. p. 84) says that this plant rarely flourishes at an elevation of more than 10,000 ft. above the level of the sea."

Including the rhubarb and onion referred to in the above note, of which no specimens reached Kew, the flowering plants observed by Mr. Rockhill numbered fifty species. Each specimen was carefully labelled, giving locality, altitude, latitude and longitude, date, relative frequency, and other particulars. Only two species were not recognized as belonging to previously described species, namely *Gentiana Rockhillii*, Hemsl., and *Kobresia Sargentiana*, Hemsl.

The references to vegetation in Mr. Rockhill's narrative are few, yet on that account of great interest, because so much of the country traversed had no vegetation worthy of the name. But a few special allusions to plants are worth extracting. At p. 192 (May 28th, 93° 35′. 35° 30′, 13,788 ft.) it runs: "The Sharakingi Gol (*i. e.* river of the yellow thigh-bone) is a clear mountain rivulet tumbling down over granite boulders from the snow-covered pass. The road up the latter looks very easy. The grass around our camp is just beginning to turn green, and the ground is covered with yellow and violet tulips and a little edelweiss."

The "tulips" were *Gagea pauciflora*, which appeared in our original list as *Tulipa* (§ *Orithya*) sp. aff. *T. eduli*, Baker; but it was again examined, and our colleague, Mr. C. H. Wright, succeeded in identifying it. Rockhill mentions the iris and tulip again on June 17, in about 92° and 35°. By June 25th (90°. 33° 40′) grass was showing green, and *Lagotis*, *Carex*, *Kobresia*, and *Festuca* were picked in flower. Under date of Aug. 2nd (93° 15′. 31° 50′)

* There was no specimen of this plant in Mr. Rockhill's collection.—W. B. H.

we find the note: "The ground on which we have camped is one big bed of fragrant, light blue flowers (*Microula sikkimensis*), and the grass is so long that it makes a soft bed for us." The change in climate and flora is already perceptible in this longitude.

Mr. Rockhill's mean temperatures are reproduced in our chapter on climate. It may be worth while pointing out that in his Table of Latitudes and Altitudes ('Journey through Mongolia and Tibet,' pp. 386–395), he makes some interesting comparisons with the altitudes and geographical names obtained by other travellers.

From August 11th, approximately in 94° and 32°, Rockhill followed Bower and Thorold's eastward route, and the differences in altitudes and geographical names, as given by the former, are considerable.

Mr. and Mrs. St. George R. Littledale. 80°—90° 25′ : 30°—37°. 1895.

Travelled overland by Constantinople, Tiflis, and Samarkand, across the Tian Shan through the Terek Pass (12,700 ft.) in midwinter, onward to Kashgar. Thence to Yarkand, which they left on Feb. 4th, 1895, for Khotan, Keria, and Cherchen (85° 35′ and 38° 10′), where they arrived on March 19th; and it was not till May 15th that they actually crossed the Arka Tag into Tibet. Their route thence was south-east by east toward Lhasa, which was really the goal of their journey. The pass, though not steep, was high and long and cost them the lives of five or six donkeys and a couple of horses. They were now on the Tibetan Plateau, with lakes and low mountains to the south, as far as could be seen, and to the north the high range of the Arka Tag, with fine glaciers and snowfields. Two peaks, towering above their neighbours, were measured, and estimated to be 25,340 ft. high. Volcanic country was next traversed, where vegetation and fresh water were both scarce. One night all their sheep were killed by wolves; and, owing to the great altitude and scarcity of food, their baggage animals died at an appalling rate and they had to walk. On June 26th (88° 12′ and 33° 12′) they had the first rain since leaving the Black Sea in November, and saw the first men since leaving Cherchen in April. Continued mortality of their animals compelled them to abandon the greater portion of their stores. They passed along the east side of the lake, called by Captain Bower Garing Cho

(about 89° 30′ and 31° 40′), into which a river drains which they were unable to ford, and therefore had to construct rafts as best they could. The grazing in this district is described as being of the most luxuriant description; but apparently no botanizing was attempted here. Soon the Tengri Nor or Nam Tso—Great Sky Lake—appeared in view, stretching far away to the east; while the horizon to the south was fringed by the magnificent Ninchen Tangla range, with the towering peak of Charemaru, upwards of 24,000 ft. high. They crossed the Ninchen Tangla over the Goring La at 19,587 ft. and in 30° 12′, and then descended into the Goring Tangu valley, at about 16,600 ft. Here they were less than fifty miles from Lhasa; and it was here that a small botanical collection was made during the delay consequent on their attempts to continue their journey to that city. At length they had to yield, and on August 29th they started on their long march of 1200 miles to Kashmir, passing northward to the Garing Tso or Zilling Tso, and then westward near the thirty-second parallel. Nearly all the lakes of this country have greatly decreased in size, and the process was still going on; a difference in level of as much as 200 ft. being observed in some places. On September 22nd they sighted some volcanic mountains 4000 ft. above their camp at 15,484 ft., and on the eighty-sixth meridian. On October 10th they sighted the Aling Kangri (81°), and on the 27th they entered Ladak by the Kongda La to the village Shushal to the south-east of Leh. Out of 160 or 170 animals that left Cherchen, or were purchased on the way, only two ponies and six mules reached Srinagar.

The collection contains sixty-four species of vascular plants, including one fern, *Polypodium hastatum*, Thunb., previously only known from China Proper, Japan, Formosa, and Corea. Ten of the species were described as new, and a very pretty grass is the type of a new genus, *Littledalea*, Hemsl. A detailed account of this collection is given in the 'Kew Bulletin,' 1896, pp. 207–216; and some of the novelties are figured in Hooker's 'Icones Plantarum,' tt. 2467–2472.

Captain M. S. Wellby and Lieutenant (Captain) Neill Malcolm, D.S.O. 80°—102°; 34° 25′—37° 25′. 1896.

Entered Tibet from Leh, as their basis, a little south of the Lanak La (79° 35′ and 34° 25′); the same route, practically, as Captain Deasy and Mr. Arnold Pike took. The greater part

of their track across Tibet to China was between the thirty-fifth and thirty-sixth parallels; whereas Captain Bower and Dr. Thorold's route was mainly south of the thirty-fourth parallel. From the ninety-fifth meridian their general course was north-eastward, skirting the north shore of Koko Nor (100°), and thence to Sining and Lanchau, and down the Hoangho to Peking and Tientsin.

Captain Wellby's opening words of his Narrative of this marvellous journey are appropriately repeated here :—"Throughout the journey across this land we generally followed valleys, nullahs, and dry beds of rivers. After marching some 120 miles from Lanak La, we saw immense snow-ranges, running east and west, both north and south of us. The north range was particularly conspicuous with an abrupt massive peak . . . . . For four months we saw no vegetation higher than an onion, and for nearly four months we were at an average height of 16,000 ft. For more than fourteen weeks we were without seeing any sign of mankind, and should have been much longer had we not providentially met a Tibetan caravan travelling at right angles to our route on its way from Lhasa to China. The distance we covered from Leh (78°) to the Chinese frontier town of Tankar (101°) was very nearly 2000 miles. It took us nearly five months and a half."

By June 22nd, or little more than three weeks after starting, they had lost from exhaustion twenty-three mules and ponies, leaving only sixteen, and all their sheep were dead; yet since leaving Lanak La they had not travelled 200 miles. Vegetation was exceedingly scarce; grass just beginning to sprout. In other places they found "boortsa" (*Tanacetum*). Previous to this they had found a small white butterfly at a camp over 16,000 ft., and a brown one was seen a month later. At these high altitudes—16,000 ft. and upwards—"it was astonishing to find the thermometer registering 100° Fahr. in the sun, while at night-time there were sometimes 25° of frost." On July 27th, camp 68 (63?), they crossed a river (in about 87° 30′) which took its rise in the hills close by. The bed of it was half a mile across, and it was the largest body of running water they had seen. "Everywhere grew good grass, flowers, wild onions, and other vegetables, and yak and antelope were abundant." A week or so later they again came upon good grass, fresh water, onions, rhubarb, and game. All went well until Aug. 10th, when, in consequence of the exhausted

state of their mules, they were forced to camp at the summit of a pass, 16,614 ft. high. There was no grass, but certain hardy plants occurred here and there. On the following morning they were astonished at finding nine of the mules dead. No suggestion is made as to the probable cause. In consequence, everything that could be spared had to be left, and they proceeded a sadly reduced party, living on kiang (wild ass) and wild onions, when they could be found. On Aug. 22nd they arrived at a magnificent fresh-water lake (camp 93, in about 92° 30′ and 35° 30′), where rich green grass was abundant and flowers plentiful; wild yak and kiang, water-fowl and hares, likewise, and the travellers describe it as an artist's and sportsman's paradise. The lake was about twenty-three miles long, and four miles broad in places. At 7 P.M., although nearly 16,000 ft. above the sea-level, the thermometer registered nearly 50° Fahr., and during the night it only just froze. Near here they fell in with a caravan of merchants, after marching fourteen weeks and traversing nearly 1000 miles without seeing a sign of mankind. On September 14th they encountered the first brushwood since leaving Niagzu, near Leh, and camped on the right bank of the river Shugatza or Shuga Gol, where there was good grazing. At Namoran Gol (about 97° and 36° 20′) they found wild currants and other berries. Thence they travelled along the north side of the Koko Nor and onward through Kumbum, Sining, and Lanchau to the Huangho, and through China.

The collection of dried plants comprises between sixty and seventy species, all carefully labelled with date, approximate altitude, longitude and latitude, colour of flowers, etc.

Only two species, *Astragalus Malcolmii*, Hemsl. & Pears., and *Saussurea Wellbyi*, Hemsl. (Hooker's 'Icones Plantarum,' t. 2588), proved different from anything in the Kew Herbarium. One other, it is true, had not been previously described, so far as we have been able to ascertain. This is *Peucedanum Malcolmii*, Hemsl. & Pears., also collected by Hedin.

Fifty species of this small collection were obtained at altitudes of above 16,000 ft., and four of them at 17,000 ft. and upwards. These are *Cochlearia scapiflora*, *Thylacospermum rupifragrum*, *Allium Semenovii*, and a very dwarf species of *Festuca*, probably *F. valesiaca*. The *Allium* is doubtless the onion referred to in the letter published in the 'Geographical Journal,' ix. p. 216, where it is stated that they ate quantities of wild onions, which

they found in enormous beds. The greatest elevation given is 17,200 ft. for the *Festuca* in question. With the exception of *Statice aurea*, at 13,350 ft., all the others are from localities above 15,000 ft.

A preliminary list of the plants, furnished from Kew, is given in Wellby's 'Through Unknown Tibet,' p. 423; and this is followed by some meteorological observations, a summary of which will be found in our chapter on climate.

In the autumn of 1898, Captain Wellby started on a journey through Abyssinia to Lakes Rudolf and Stefanie, and on his return in 1899 he was ordered to join his regiment in South Africa. He was in Ladysmith during the siege, and was afterwards attached to General Sir Redvers Buller's force in the Transvaal. On July 30, 1900, he was wounded in an engagement at Mertzicht, and died of his wounds on August 5th. He dried a collection of plants on his Abyssinian expedition and presented it to Kew. An interesting account of this expedition appeared after his death in the 'Geographical Journal,' xvi. (1900), pp. 292–306, with a map.

Captain Neill Malcolm also went on service to South Africa, and was severely wounded at Paardeberg on the 18th of February, 1900, but has happily recovered. Since his return from South Africa he has been to Kew, and given us information on various points connected with the collection of dried plants.

Duffadar Shahzad Mir, of the 11th Bengal Lancers, deserves mention here. He took part in the expedition across Tibet, and afterwards accompanied Captain Wellby on his African travels, and is everywhere spoken of by him in the warmest words of praise and gratitude. He had previously travelled with Captain Younghusband.

Dr. Sven Hedin. 87° 30′—102°; 35° 30′—39°. 1895–7.

Left Kashgar for Khotan on the 14th of December, 1895, whence he continued his travels through the desert to Keria Darja, Schah Jar, Korla, and the Lob Nor country. Then the Takla Makan desert was crossed and various journeys were made in the Kashgar and neighbouring countries: finally, by way of Khotan, Karia, Kopa, Dalai Kurgan, across the Arka Tag, they entered Tibet, crossing Littledale's route of 1893, near the North Karamuran Pass, Aug. 21st, 1896. His first camp (Aug. 1st, 1896) on this section of his travels was in about 85° 25′ and 37°,

and the name Bulak Baschi is the nearest on the map, but he mentions that their camping-place had no special name. They proceeded in a south-easterly direction, crossing the thirty-sixth parallel in about 87° 30′, and their route then lay between the thirty-fifth and thirty-sixth parallels to about 93° 30′. From this point they took a northward course, reaching 36° 40′ in the ninety-fourth meridian, and then eastward, skirting the salt desert of Tsaidam, to about 96° 30′. Again northward to Kurlik Nor (37° 15′) and then eastward to Koko Nor (100°) and onward to Sining, Kalgan, and Peking, where they arrived in March 1897. Dr. Hedin suffered the same hardships and disasters as our other travellers in these inhospitable regions. Indeed, in many respects, their several narratives are much alike. In February 1898, Dr. Hedin, who was awarded the Founders' Medal for that year, read an account of his travels before the Royal Geographical Society of London, and it was published in the 'Geographical Journal' (xi. 1898), from which we extract as follows :—

"The landscape is very desolate, and when the average height reaches 16,000 ft. it is clear that vegetation must be scanty. I collected all the plants we found. They had, as a rule, rather fleshy and downy leaves lying close to the ground in order to protect themselves from the wind and frost. The poor pasturage which was now and then found was so scattered and bitter, that the animals would not have eaten it if they had not been driven to it by hunger. The ground is, however, generally perfectly bare, and the weathering products which have washed down into the central parts of the basins without outlet have, in the course of time, been disintegrated into very fine particles, so that sand and gravel are very scarce. Since the ground is damp as a result of dew and rain, it becomes soft, and the animals frequently sank a foot deep. Only the lake shores, along which we frequently travelled, were suitable for our march. The cold was not at all great, and in the daytime one could ride without a cloak, on account of the strong insolation. At night the temperature seldom sank under 14° Fahr. The worst of all was the wind and hail. With the regularity of clockwork the west wind came every day at one o'clock and swooped down on the plateau with intense fury.

"From the Arka Tag pass we saw, far to the south, a great chain of mountains with perpetual snow-fields and shining tops.

This chain is parallel to Arka Tag, and constitutes, as I afterwards found, a continuation of the Koko Shili. Its highest peak was named after King Oscar. Between these two gigantic chains, which run from east to west, stretches a rolling plateau which is divided into a whole series of basins without outlet . . . . In the middle of each basin is a lake of clear but bitter water from the streams of the surrounding mountains. In travelling east we discovered twenty-three such lakes, of whose existence not even the Chinese had any idea. The largest was three days long. These lakes were dead and desolate as well as the surrounding country. Birds were very scarce, except one species of gull.

"The only animals that were capable of putting any life into these regions were the yaks and khulans, which were there in incredible numbers. Yak-dung afforded us the very best of fuel, and every evening we could warm ourselves by fine, large fires.

"Thus we wandered day after day across the plateaux of Tibet for two months without seeing a single living being. We found trace of man only twice during this time: at the last halting-place north of Arka Tag, where a charred pile of coals after a camp fire showed that we were crossing Littledale's route; and between our seventeenth and eighteenth halting-places, where, in the soft sand, we still found traces of Bonvalot and the Prince of Orleans's camels, these tracks having remained undisturbed for eight years. Meanwhile our caravan dwindled down in an alarming manner; at last the men had to go afoot, and we thought it was time to try to find inhabited country."

Dr. Sven Hedin presented his Tibetan botanical collection to Kew on the condition that we furnished a list of the plants to be embodied in his account of the scientific results of his travels in Petermann's 'Geographische Mittheilungen.' This has already appeared, but we shall be excused for including it in the following enumeration in order to make it accessible to a wider circle of botanists. It should be explained that this collection, consisting of less than sixty species, was made on his journey, in 1896, across the Arka Tag mountains into Tibet and through the Tsaidam country, mainly between the meridians of eighty-five and ninety-four and the thirty-fifth and thirty-seventh parallels. Some of the plants were collected on the north side of the Kuen Luen range, in Chinese Turkestan. But we have not been able to localize all the plants with exactitude, because some of them are merely dated, whilst others only bear the number of the

camp. The party left Dalai Kurgan on the sixth of August, and marched through the pass of Sarik Kol, and it seems that about a third of the plants were collected between these two places; so that a number of them were not actually found in Tibet Proper. Among those sent to Kew there is absolutely nothing new; but Dr. Hedin had previously given two species of *Gentiana* from Sarik Kol to Dr. S. Murbeck, which he described as new, and indeed they seem to be very distinct. *Gentiana Hedini* is remarkable in having fringed scales, similar to those on the corolla, on the inside of some of the sepals; and the other, *G. cordisepala*, is distinguished by the shape of the sepals. But these and several others are excluded from our final enumeration.

Dr. Hedin was the only one of our travellers who collected Algæ, and my colleague Mr. C. H. Wright furnishes the following particulars of the collection, which was determined by Dr. N. Wille:—

"The algæ collected in Northern Tibet by Dr. S. Hedin number twenty-four species, belonging to sixteen genera. Eight species were collected in salt water, viz.:—*Spirogyra* sp., *Enteromorpha percursa*, *Rhizoclonium riparium*, *R. Kerneri*, *R. macromeres*, *Cladophora vaga*, *Vaucheria dichotoma* and *V. littorea* (?).

"One species proved to be new and has been described as *Harpochytrium Hedinii*, Wille. It was found epiphytic on a species of *Zygnema*, growing in fresh water at Sorgotsu Namaga. All the other species occur in Europe, those extending outside that area being:—

"*Cosmarium subspeciosum*. Greenland, Brazil; a variety in New Zealand.

Closterium acerosum. Nova Zembla, Siberia, Japan, Burma, N. America and the Argentine.

Ulothrix tenerrima. New Zealand.

Rhizoclonium riparium. Montevideo.

Cladophora crispata. N. America, Chiloë, Peru, New Zealand.

Vaucheria dichotoma. N. America (*fide* Kuetzing).

Binuclearia tatrana has been found in Lake Csober in the Carpathians at an altitude of about 4500 ft."

Captain H. H. P. Deasy and Mr. Arnold Pike. 80°—84°; 32° 30′—37°. 1896.

Entered Tibet by Lanak La (79° 35′ and 34° 25′), where they arrived on the 18th of June, 1896, when it was quite free

of snow, though 18,000 ft. high. The intention was to cross Tibet from west to east with the special object of determining the identity of the rivers; but various misfortunes befel the party, and they returned, after making a circuit, from Chorul Cho, the most south-easterly point attained, without accomplishing their main object.

The minimum thermometer fell to +8° Fahr., or 24° of frost, during the night of June 16th at an altitude of 17,500 ft. They travelled in a north-easterly direction by Mangtza Cho and Lake Yeshil Kul (81° 45′ and 34° 50′), thence eastward to about 82° 25′, where the country was simply alive with antelope * females and their young. Here was plenty of grass and a moderate amount of fresh water. From this point they went southward to Chorul, about 82° 45′ and 32° 30′, and in several places there was a profusion of grass, but fresh water was often scarce. The return journey began here, and terminated, so far as Tibet was concerned, at the Kone La in November. During this journey twenty-four thousand square miles of territory were surveyed and the heights of seventy-nine peaks were determined. Great altitudes were reached in many parts, and Napo La, next to the last pass crossed, is 18,800 ft. high. Captain Deasy makes few allusions in his Narrative to the vegetation, except in relation to pasturage; but Mr. Pike made a botanical collection, and the specimens were carefully labelled with localities and approximate altitudes, some of which were higher than any on record. This collection, combined with two or three others, formed the subject of an exhibition and preliminary paper at a meeting of the Linnean Society on April 19th, 1900, and the approximate altitudes were referred to as absolute altitudes. Since then Captain Deasy has furnished corrected altitudes, and we shall return to this point when discussing the altitudinal limits of the flowering plants constituting the flora of Tibet.

* Captain Deasy estimated that there were at least 15,000 of these animals in view at one time. Przewalski, it may be added (Peterm. Geogr. Mitth. xx. p. 43) states that enormous herds of animals existed in the Koko Nor region, including yaks, antelopes, gazelles, and sheep. Tchihatchef, referring to Przewalski's account (La Végétation du Globe, i. p. 612, in a footnote), credits the latter with saying that yaks roved there by millions! "En parlant des derniers [yaks] il dit qu'ils y errent par *millions*." Such a statement, however, does not occur in the place cited; but we are not prepared to assert that it occurs nowhere in Przewalski's writings.

In 1897–8 Captain Deasy made another journey, or journeys, in Turkestan and Tibet. The plants collected on these expeditions were presented to the British Museum; but two or three new Tibetan species published in the 'Journal of Botany' have been added to our list.

In his Narrative he says very little about the vegetation, or absence of vegetation, generally; but the following extract relating to the country near his most north-easterly point in Tibet, Kara Sai, is interesting as a sample of the local conditions :—

"In the lower part of the Tolan Khoja valley there is plenty of excellent grass and water, but in the upper part, known as Sarok Tuz (Yellow Salt), there is no grass, but only a limited supply of burtza and not much water. At the head of this valley lies a pass of about 16,500 ft., a very easy and comparatively low one, which may be considered the natural boundary between Turkestan and the great Tibetan plateau. Looking forward from a hill near this pass, not a trace of vegetation is to be seen; and it was not till the western side of the small and irregularly shaped lake, called Shor Kul, was reached that any grass was obtained.....Between the lake and the Kuen Luen range the country is absolutely barren. At the first camp beyond Shor Kul there was little or no vegetation, so the remaining sacks of chopped straw were issued. Here it was again necessary to dig for water, which was by no means sufficient for all the animals. However they quenched their thirst the next day, when the most easterly tributary of the Kiria river was reached. This tributary and the next are undoubtedly the smallest of the principal affluents of the Kiria river, and flow through a country devoid of all vegetation."

The botanical collection of the first expedition was almost entirely made by Mr. Arnold Pike. Indeed Captain Deasy gives him credit for the whole. It was presented to Kew in February, 1897; and a list of the determinations was sent to Captain Deasy in April of the same year, but various circumstances have hitherto prevented the publication of a full account of the plants, though, as already mentioned, they were included in an exhibition and a preliminary paper on the Tibetan Flora read before the Linnean Society on April 19th, 1900. The collection comprises nearly a hundred species, but contains very little that was previously unknown. *Senecio* (§ *Cremanthodium*) *Deasyi*, Hemsl.

(Hooker's 'Icones Plantarum,' t. 2587) is apparently new, and *Astragalus Arnoldii*, Hemsl. & Pears., we also believe to be new.

Summary.

Names.	Longitude.	Latitude.	Date.
Strachey & Winterbottom ..	80°—81° 40′	30° 30′—31° 5′	1848
Hooker	88° 45′	28°	1849
Bower & Thorold.....	80°—102°	29° 30′—34° 30′	1891–2
Rockhill	90°—102°	29°—37°	1892
Littledales	80°—90° 25′	30°—37°	1895
Wellby & Malcolm	80°—102°	34° 25′—37° 25′	1896
Hedin	87° 30′—102°	35° 30′—39°	1895–7
Deasy & Pike	80°—84°	32° 30′—37°	1896

The Map.

The accompanying sketch-map, prepared by Miss M. Smith, was compiled from various sources, but mainly from the maps illustrating the narratives of the various travellers whose botanical collections are dealt with in this paper. It must not be regarded as a critical compilation, for some of the names and altitudes may be contradictory, but it should be of some assistance to persons interested in the subject.

ENUMERATION OF THE JOINT COLLECTIONS.

Ranunculaceæ.

Clematis alpina, *Mill. Gard. Dict.* ed. 8, n. 9; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 107; *Peterm. Mitteil.* Erg.-Heft 131, p. 373.

Atragene alpina, *Linn. Sp. Pl.* p. 542.

Sheltered nooks on hills, 16,200 ft., *Thorold.* Harato, 11,000 ft., *Hedin.* Flowers yellow or blue.

Clematis orientalis, *Linn. Sp. Pl.* p. 543, var. **tangutica**, *Maxim. Fl. Tangut.* p. 3.

C. graveolens, *Lindl. in Journ. Hort. Soc.* i. (1846) p. 307; *Hook. f. Fl. Brit. Ind.* i. p. 4; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 133: *Bot. Mag.* t. 4495.

Sutlej river in Gugé, 14,000 ft., *Strachey & Winterbottom.* Pochu valley, 94° 45′, 31° 45′, very abundant at 14,000 ft., *Rockhill.* 82° 41′, 32° 36′, 14,400 ft., September 4, *Deasy & Pike*, 889. Flowers yellow.

Anemone imbricata, *Maxim. Fl. Tangut.* p. 8, t. 22; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 133; *Kew Bull.* 1896, p. 208.

Foot-hills of Dangla mountains, north-western extremity of range, 90° 35′, 33° 40′, 16,500 ft., June 27, *Rockhill.* Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers changing from a red-brown to violet or white.

Thalictrum alpinum, *Linn. Sp. Pl.* p. 545; *Hook. f. Fl. Brit. Ind.* i. p. 12.

T. acaule, *Cambess. in Jacquem. Voy. Bot.* p. 3.

Gugé, 15,000 ft., *Strachey & Winterbottom.* Flowers yellow.

Callianthemum cachemirianum, *Cambess. in Jacquem. Voy. Bot.* p. 5, t. 3; *Hook. f. Fl. Brit. Ind.* i. p. 14.

Ranunculus pimpinelloides, *D. Don, in Royle, Ill. Bot. Himal.* p. 53.

In 88° 30′, 35° 20′, 16,294 ft., July 28, *Wellby & Malcolm.* Flowers yellow.

Adonis cærulea, *Maxim. in Bull. Acad. Pétersb.* xxiii. (1877) p. 306; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 107.

Wide valleys, 17,200 ft., *Thorold.* Flowers blue.

Ranunculus aquatilis, *Linn. Sp. Pl.* p. 556, partim.

Gyanima, 15,500 ft., *Strachey & Winterbottom.* Bhomtso, *Hooker.* Flowers white.

Ranunculus Cymbalariæ, *Pursh, Fl. Amer. Sept.* ii. p. 392; *Fl. Dan.* xiii. t. 2293; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 107; *Hook. f. Fl. Brit. Ind.* i. p. 17.

Gugé valleys, 14,000–15,000 ft., *Strachey & Winterbottom.* Edge of streams, 17,800 ft., *Thorold.* Near the Horpa Tso, 16,400 ft., June 28, *Deasy & Pike.* Flowers yellow.

Ranunculus hyperboreus, *Rottb. in Skrift. Kjoeb. Selsk.* x. (1770) p. 458, *var.* **natans**, *Regel*; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 108; *Hook. f. Fl. Brit. Ind.* i. p. 18.

Streams, 16,200 ft., *Thorold.* Flowers yellow.

Ranunculus involucratus, *Maxim. Fl. Tangut.* p. 15, t. 22. ff. 7–13; *Hook. Ic. Pl.* t. 2586 A.

Near the Horpa Tso, 16,400 ft., June 28, *Deasy & Pike*, 817. Flowers yellow.

Ranunculus lobatus, *Jacquem. Voy. Bot.* p. 4; *Hook. f. Fl. Brit. Ind.* i. p. 17.

Gugé, 15,000 ft., *Strachey & Winterbottom.* 82° 40′, 33° 30′, 16,800 ft., August 18, *Deasy & Pike.* Flowers yellow.

Ranunculus pulchellus, *C. A. Mey. in Ledeb. Fl. Alt.* ii. p. 333; *Ledeb. Ic. Fl. Ross.* t. 111; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 108; *Hook. f. Fl. Brit. Ind.* i. p. 17.

Niti pass, 17,000 ft., *Strachey & Winterbottom.* Near water, 17,300 ft., *Thorold.* Damp soil on the shore of Aru Tso, 16,200 ft., August 4, *Deasy & Pike*, 865. Flowers yellow.

Ranunculus similis, *Hemsl. in Hook. Ic. Pl.* t. 2586 B.

R. involucratus, *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 107, *non Maxim.*

Sandy earth and gravel in valleys, 17,500 ft., *Thorold.* 82° 30′, 35°, 16,649 ft., June 19, *Wellby & Malcolm.* 81° 40′, 34° 50′, 16,600 ft., July 6, *Deasy & Pike*, 844. Flowers yellow.

Ranunculus tricuspis, *Maxim. Fl. Tangut.* p. 12, *et Enum. Pl. Mong.* p. 16, t. 4. ff. 17–27; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 133.

Valley of Murus, 91° 18′, 33° 44′, 15,640 ft., June 23, *Rockhill.* In moist soil near stream, 82° 8′, 34° 38′, 17,000 ft., July 27, *Deasy & Pike*, 850. Flowers yellow.

Delphinium Brunonianum, *Royle, Illustr. Bot. Himal.* p. 56; *Kew Bull.* 1896, p. 208; *Hook. f. Fl. Brit. Ind.* i. p. 27; *Bot. Mag.* t. 5461.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers blue.

Delphinium cæruleum, *Jacquem. Voy. Bot.* p. 7, t. 6; *Huth, in Engl. Bot. Jahrb.* xx. p. 463; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 108; *Peterm. Mitteil.* Erg.-Heft 131, p. 373; *Hook. f. Fl. Brit. Ind.* i. p. 25.

Near Rakas Tal, 15,000–17,000 ft., *Strachey & Winterbottom.* Top of pass, 17,800 ft., *Thorold.* September 18, *Hedin.* 90° 10′, 35° 17′, 15,970 ft., August 4, *Wellby & Malcolm.* Flowers blue.

Delphinium grandiflorum, *Linn. Sp. Pl.* p. 531; *Journ. Linn. Soc., Bot.* xxx. (1894) pp. 108 et 133.

Side of slope, 14,800 ft., *Thorold.* Kechu valley, 96° 28′, 31° 25′, 12,700 ft., *Rockhill.* Flowers blue.

Delphinium Pylzowii, *Maxim. in Bull. Acad. Pétersb.* xxiii. (1877) p. 307, *et Fl. Tangut.* i. p. 21, t. 3; *Regel's Gartenfl.* 1876, p. 289, t. 879; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 134; *Kew Bull.* 1896, p. 208.

Dangchu valley, 92° 12′, 32° 12′, 14,500 ft., *Rockhill.* Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers violet-blue and black.

Delphinium sp. aff. *D. Brunoniano.*

91° 39′, 35° 21′, 16,386 ft., August 11, *Wellby & Malcolm.*

Aconitum dissectum, *D. Don, Prodr. Fl. Nep.* p. 197, fide *O. Stapf.*

A. Napellus, *Linn.* var., *Hemsl. in Kew Bull.* 1896, p. 208.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers blue.

Papaveraceæ.

Meconopsis horridula, *Hook. f. et Thoms. Fl. Ind.* p. 252; *Journ. Linn. Soc., Bot.* xxx. (1894) pp. 108 et 134; *Kew Bull.* 1896, p. 208; *Peterm. Mitteil.* Erg.-Heft 131, p. 373; *Hook. f. Fl. Brit. Ind.* i. p. 118.

Water-logged soil in valley close to marsh, 15,500 ft., *Thorold.* Plateau west of Dangla mountains, 89° 44′, 32° 51′, 16,350 ft., July 3, *Rockhill.* Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* 85°, 35° 37′, *Hedin.* 92°, 35° 20′, 16,000 ft., August 17, *Wellby & Malcolm.* Flowers blue.

Meconopsis integrifolia, *Franch. in Bull. Soc. Bot. France*, xxxviii. (1886) p. 389; *Kew Bull.* 1896, p. 208.

Cathcartia integrifolia, *Maxim. in Bull. Acad. Pétersb.* xxiii. (1877) p. 310.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers blue.

Hypecoum leptocarpum, *Hook. f. et Thoms. Fl. Ind.* i. p. 276; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 108; *Hook. f. Fl. Brit. Ind.* i. p. 120.

Sheltered nullahs, 15,500 ft., *Thorold.* Flowers pale violet.

Fumariaceæ.

Corydalis Boweri, *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 108; *Kew Bull.* 1896, p. 208.

Water-logged soil in valley, 15,500 ft., *Thorold.* Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers yellow.

Corydalis Hendersoni, *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) pp. 109 et 134; *Peterm. Mitteil.* Erg.-Heft 131, p. 373.

Sandy, gravelly soil in valleys, 17,600 ft., *Thorold.* Extreme head of valley on foot-hills of Dangla mountains, 90° 50′, 33° 43′, 16,340 ft., *Rockhill.* Camp 32, September 22, *Hedin.* 90° 10′, 35° 17′, 15,970 ft., August 4, *Wellby & Malcolm.* 25 miles east of the Lanak-la, 17,100 ft., June 20, *Deasy & Pike.* Flowers yellow.

Corydalis Moorcroftiana, *Wall. Cat.* n. 1432; *Kew Bull.* 1896, p. 209; *Hook. f. Fl. Brit. Ind.* i. p. 125.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers yellow with purple tips.

Corydalis tibetica, *Hook. f. et Thoms. Fl. Ind.* i. p. 265; *Hook. f. Fl. Brit. Ind.* i. p. 124.

Lanjar, 17,000 ft., *Strachey & Winterbottom.* Flowers pale yellow with brown or green tips.

CRUCIFERÆ.

Parrya exscapa, *C. A. Mey. in Ledeb. Fl. Alt.* iii. p. 28; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 134; *Hook. f. Fl. Brit. Ind.* i. p. 131.

Basin of Murus, extreme head of valley, on foot-hills of Dangla mountains, 90° 50′, 33° 43′, 16,340 ft., *Rockhill.* Flowers purple.

Parrya lanuginosa, *Hook. f. et Thoms. in Journ. Linn. Soc., Bot.* v. (1861) p. 136, et xxx. (1894) p. 110; *Hook. f. Fl. Brit. Ind.* i. p. 132.

Lanjar, 17,500 ft., *Strachey & Winterbottom.* In water-logged, stony soil, 17,600 ft., *Thorold.* East of Horpa Tso, 17,000 ft., July 5, *Deasy & Pike*, 832. Flowers purple.

Parrya macrocarpa, *R. Br. in Parry Voy. App.* p. 270; *Hook. f. Fl. Brit. Ind.* i. p. 131; *Hook. Fl. Bor.-Am.* i. t. 15.

Gugé, 14,000–15,000 ft., *Strachey & Winterbottom.* Flowers rose-purple.

Parrya prolifera, *Maxim. Fl. Tangut.* p. 56, t. 15.

In 83° 20′, 35° 8′. 16,480 ft., June 27, *Wellby & Malcolm.* North Tibet, *Przewalski.* Flowers violet.

Cheiranthus himalayensis, *Cambess. in Jacquem. Voy. Bot.* p. 14, t. 13; *Hook. f. Fl. Brit. Ind.* i. p. 132.

C. himalaicus, *Hook. f. et Thoms. in Journ. Linn. Soc., Bot.* v. (1861) p. 137.

In 82° 24′, 4° 55′, 17,300 ft., July 23, *Deasy & Pike*, 842. Flowers violet or purple.

Alyssum canescens, *DC. Syst. Veg.* ii. p. 322; *Hook. f. Fl. Brit. Ind.* i. p. 141.

Tisum, 15,000 ft., *Strachey & Winterbottom.* 87° 10′, 35° 18′, 16,159 ft., July 21, *Wellby & Malcolm.* 82° 12′, 34° 20′, 16,100 ft., July 31, *Deasy & Pike*, 857, 859. Flowers white.

Draba alpina, *Linn. Sp. Pl.* p. 642; *Journ. Linn. Soc., Bot.* v. (1861) p. 150, et xxx. (1894) p. 110; *Hook. f. Fl. Brit. Ind.* i. p. 142.

Valley, 17,600 ft., *Thorold.* Without locality, *Wellby & Malcolm*; *Deasy & Pike.* Flowers yellow.

Draba alpina, *Linn.*, var. γ. **algida**, *Regel, in Radde, Reisen im Süden von Ost-Sibirien*, i. p. 189.

D. algida, *Adams, ex Fisch. in DC. Syst. Veg.* ii. p. 337; *Hook. Fl. Bor.-Am.* i. p. 50.

Without locality, *Deasy & Pike*, 833. Flowers yellow.

Draba fladnitzensis, *Wulf. in Jacq. Misc.* i. p. 147, t. 17. f. 1; *Kew Bull.* 1896, p. 209; *Hook. f. Fl. Brit. Ind.* i. p. 143.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers white.

Draba incompta, *Stev. in Mém. Soc. Nat. Mosc.* iii. (1812) p. 268; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 110; *Hook. f. Fl. Brit. Ind.* i. p. 142.

Gravelly soil in valleys, 16,500 ft., *Thorold.* Flowers white (Thorold); yellow (Flora British India).

Draba lasiophylla, *Royle, Illustr. Bot. Himal.* p. 71; *Hook. f. Fl. Brit. Ind.* i. p. 143.

Gugé, 15,000–16,500 ft., *Strachey & Winterbottom.* Flowers white.

Cochlearia scapiflora, *Hook. f. et Thoms. in Journ. Linn. Soc., Bot.* v. (1861) p. 154, et xxx. (1894) p. 110; *Hook. f. Fl. Brit. Ind.* i. p. 145.

Gugé, 15,500 ft., *Strachey & Winterbottom.* 17,800 ft., *Thorold.* 82° 45′, 35°, 17,108 ft., June 22, *Wellby & Malcolm.* Flowers pale lilac.

Sisymbrium humile, *C. A. Mey. ex Ledeb. Fl. Alt.* iii. p. 137; *Ledeb. Ic. Fl. Ross.* t. 147; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 110; *Hook. f. Fl. Brit. Ind.* i. p. 148.

Sandy, gravelly soil near water, 17,500 ft., *Thorold.* 82° 8′, 34° 20′, 16,100 ft., July 29, *Deasy & Pike*, 855. Flowers white.

Eutrema Przewalskii, *Maxim. Fl. Tangut.* p. 68, t. 28. ff. 11–23; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 134.

Basin of Murus, in lateral valley, 91° 05′, 33° 45′, 15,700 ft., June 24, *Rockhill*. Near the Horpa Tso, 16,400 ft., June 28, *Deasy & Pike*, 821. Flowers white.

Erysimum Chamæphyton, *Maxim. Fl. Tangut.* i. p. 63, t. 28. ff. 1–10; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 134.

Hill-slope two miles north of Murus river (head-waters of Yangtsekiang), 91° 31′, 33° 53′, 14,750 ft.; and the basin of Murus, in lateral valley, 91° 05′, 33° 45′, 15,700 ft., *Rockhill*. Flowers pink and white.

Erysimum funiculosum, *Hook. f. et Thoms. in Journ. Linn. Soc., Bot.* v. (1861) p. 165, et xxx. (1894) p. 110; *Hook. f. Fl. Brit. Ind.* i. p. 153.

Near water in valley, 17,600 ft., *Thorold*. 87°, 35° 18′, 16,401 ft., July 20, *Wellby & Malcolm*. Flowers yellow.

Erysimum ——?

90° 10′, 35° 17′, 15,970 ft., August 4, *Wellby & Malcolm*.

A dwarf perennial with woody rootstock, fleshy, pubescent leaves, and white flowers.

Christolea crassifolia, *Cambess. in Jacquem. Voy. Bot.* p. 17, t. 17; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 110; *Hook. f. Fl. Brit. Ind.* i. p. 154.

Sutlej river in Gugé, 13,500 ft., *Strachey & Winterbottom*. Sandy, gravelly soil in valleys, 16,800 ft., *Thorold*. 15,200 ft., August 28, *Deasy & Pike*, 880. Flowers white.

Seen to-day (Aug. 28) in great quantities. Soil, decomposed granite (?) and gravel.—*Deasy & Pike*.

Braya rosea, *Bunge, Del. Sem. Hort. Dorp.* (1841) p. 8; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 110; *Hook. f. Fl. Brit. Ind.* i. p. 155.

Sagta Deo and Gugé, 10,000–16,500 ft., *Strachey & Winterbottom*. Muddy, stony soil close to streams, 17,800 ft., *Thorold*. Flowers purplish white.

Braya sinensis, *Hemsl. in Journ. Linn. Soc., Bot.* xxix. (1894) p. 303, t. 29.

Near the Horpa Tso, 16,400 ft., June 28, *Deasy & Pike*, 819. Flowers white.

Braya uniflora, *Hook. f. et Thoms. Journ. Linn. Soc., Bot.* v. (1861) p. 168, et xxx. (1894) p. 110; *Hook. f. Fl. Brit. Ind.* i. p. 155; *Hook. Ic. Pl.* t. 2251.

Sandy, gravelly soil, 17,600 ft., *Thorold.* 83° 45′, 35° 15′, 16,528 ft., July 1, *Wellby & Malcolm.* Near the Mangtsa Tso, 17,000 ft., June 24, *Deasy & Pike,* 809. Flowers changing white to pink.

Root when split smells something like horse-radish.—*Deasy & Pike.*

Capsella Thomsoni, *Hook. f. in Journ. Linn. Soc., Bot.* v. (1861) p. 172, *et Fl. Brit. Ind.* i. p. 159; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 110; *Kew Bull.* 1896, p. 209; *Peterm. Mitteil.* Erg.-Heft 131, p. 373.

Hutchinsia tibetica, *Thoms. in Hook. Ic. Pl.* t. 900.

Sandy, gravelly soil near water, 17,500 ft., *Thorold.* Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Camp 17, September 2, *Hedin.* 86° 10′, 35° 19′, 16,214 ft., July 16, *Wellby & Malcolm.* 82° 8′, 34° 38′, 17,000 ft., July 27, *Deasy & Pike.* Flowers white.

Lepidium capitatum, *Hook. f. et Thoms. in Journ. Linn. Soc., Bot.* v. (1861) p. 175, et xxx. (1894) p. 110; *Hook. f. Fl. Brit. Ind.* i. p. 160.

Stony ground close to water, 16,200 ft., *Thorold.* Flowers purple with yellow centre.

Lepidium cordatum, *Willd. ex DC. Syst. Veg.* ii. p. 554; *Peterm. Mitteil.* Erg.-Heft 131, p. 373.

Harato, 11,000 ft., October 5, *Hedin.* Flowers white.

Lepidium latifolium, *Linn. Sp. Pl.* p. 644; *Hook. f. in Journ. Linn. Soc., Bot.* v. (1861) p. 173, *et Fl. Brit. Ind.* i. p. 160; *Peterm. Mitteil.* Erg.-Heft 131, p. 373.

Harato, 11,000 ft., October 5, *Hedin.* Flowers white.

Dilophia salsa, *Thoms. in Hook. Kew Journ. Bot.* v. (1853) p. 20, et iv. (1852) t. 12; *Kew Bull.* 1896, p. 209; *Peterm. Mitteil.* Erg.-Heft 131, p. 373; *Hook. f. Fl. Brit. Ind.* i. p. 161.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Camp 10, *Hedin.* 87° 50′, 35° 12′, 16,000 ft., July 24, *Wellby & Malcolm.* 82° 40′, 33° 30′, 16,800 ft., August 18, *Deasy & Pike,* 877. Flowers white or rose.

Iberidella Andersoni, *Hook. f. et Thoms. in Journ. Linn. Soc., Bot.* v. (1861) p. 177; *Hook. f. Fl. Brit. Ind.* i. p. 163.

Sagta Deo and Gugé, 10,000–16,500 ft., *Strachey & Winterbottom.* Flowers white or pale rose.

Crambe cordifolia, *Stev. in Mém. Soc. Nat. Mosc.* iii. (1812) p. 267; *Hook. f. Fl. Brit. Ind.* i. p. 165.

Without special locality, *Strachey & Winterbottom*. Flowers white.

CARYOPHYLLACEÆ.

Lychnis apetala, *Linn. Sp. Pl.* p. 437; *Fl. Lapp.* t. 12. f. 1; *Wahlenb. Fl. Lapp.* t. 7; *Hook. Fl. Bor.-Am.* i. p. 91; *Kew Bull.* 1896, p. 209; *Hook. f. Fl. Brit. Ind.* i. p. 222.

Gugé, 15,000 ft., *Strachey & Winterbottom*. Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Without locality, *Deasy & Pike*, 894. Flowers purple-brown.

Lychnis macrorhiza, *Royle, Illustr. Bot. Himal.* p. 80; *Hook. f. Fl. Brit. Ind.* i. p. 223.

Lanjar, 17,000 ft., *Strachey & Winterbottom*. Flowers purple.

Silene Moorcroftiana, *Wall. Cat.* n. 626; *Hook. f. Fl. Brit. Ind.* i. p. 219.

Near Rakas Tal, 15,000–17,000 ft., *Strachey & Winterbottom*. Flowers dull red or white.

Stellaria decumbens, *Edgew. in Trans. Linn. Soc.* xx. (1846) p. 35; *Kew Bull.* 1896, p. 209; *Hook. f. Fl. Brit. Ind.* i. p. 234.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Flowers white.

Stellaria decumbens, *Edgew.*, var. **pulvinata**, *Edgew. et Hook. f. in Fl. Brit. Ind.* i. p. 235; *Kew Bull.* 1896, p. 209; *Peterm. Mitteil.* Erg.-Heft 131, p. 373.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Between camps 26 and 27, September 14, *Hedin*. Flowers white.

Stellaria graminea, *Linn. Sp. Pl.* p. 422; *Hook. f. Fl. Brit. Ind.* i. p. 233.

Lungyung and Tisum, 15,000 ft., *Strachey & Winterbottom*. Flowers white.

Stellaria subumbellata, *Edgew. in Hook. f. Fl. Brit. Ind.* i. p. 233; *Kew Bull.* 1896, p. 209.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Flowers white.

Arenaria festucoides, *Benth. in Royle, Illustr. Bot. Himal.* p. 81, t. 21. f. 3; *Hook. f. Fl. Brit. Ind.* i. p. 236.

Karnali river, 15,500 ft., *Strachey & Winterbottom.* Flowers white.

Arenaria Littledalei, *Hemsl. in Kew Bull.* 1896, p. 209.

Gooringia Littledalei, *Williams, in Bull. Herb. Boiss.* v. (1897) p. 530.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers white.

Arenaria musciformis, *Wall. Cat.* n. 641; *Kew Bull.* 1896, p. 209; *Peterm. Mitteil.* Erg.-Heft 131, p. 373; *Hook. f. Fl. Brit. Ind.* i. p. 237.

Balch pass, 15,000–16,500 ft., *Strachey & Winterbottom.* Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Highlands of North Tibet, *Hedin.* 86°, 35° 19′, 15,296 ft., July 15, *Wellby & Malcolm.* South shore of Mangtsa Tso, 17,000 ft., June 24, *Deasy & Pike*, 813. Flowers white.

Arenaria Stracheyi, *Edgew. in Hook f. Fl. Brit. Ind.* i. p. 240.

Rakas Tal, 15,500 ft., *Strachey & Winterbottom.* Dampish soil on broken granite, 16,800 ft., August 12, *Deasy & Pike*, 876. Flowers white.

Thylacospermum rupifragum, *Schrenk, Enum. Pl. Nov.* ii. p. 53; *Hook. f. Fl. Brit. Ind.* i. p. 243.

Arenaria (Dicranilla) rupifraga, *Fenzl, in Ledeb. Fl. Ross.* i. p. 780.

Bryomorpha rupifraga, *Kar. et Kir. in Bull. Soc. Imp. Nat. Mosc.* xv. (1842) p. 172.

Gugé, 15,000–16,500 ft., *Strachey & Winterbottom.* 82° 45′, 35°, 17,108 ft., June 27, *Wellby & Malcolm.* Without locality, *Deasy & Pike.* Flowers very minute, white.

Tamariscaceæ.

Myricaria elegans, *Royle, Illustr. Bot. Himal.* p. 214; *Hook. f. Fl. Brit. Ind.* i. p. 250.

Sutlej river in Gugé, 13,500 ft., *Strachey & Winterbottom.* Flowers pink.

Myricaria prostrata, *Hook. f. et Thoms. in Benth. et Hook. f. Gen. Pl.* i. p. 161; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 134.

M. germanica, *Desv.*, var. prostrata, *Thiselton-Dyer in Hook. f. Fl. Brit. Ind.* i. p. 250; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 111.

17,300 ft., *Thorold.* Upper Naichi Gol valley near river,

93° 49′, 35° 52′, 12,130 ft., May 21, *Rockhill*. 83°, 35° 8′, 16,487 ft., June 25, *Wellby & Malcolm*. Aru Tso, 16,500 ft., August 5, 871; 15 miles south-west of the Mangtsa Tso, 16,000 ft., June 22, *Deasy & Pike*, 805. Flowers pink.

Petals pale pink, stamens white, pistil green. Many very small insects and red spiders in these flowers.—*Deasy & Pike*.

Zygophyllaceæ.

Nitraria Schoberi, *Linn. Syst.* ed. 10, p. 1044; *Gmel. Fl. Sibir.* ii. t. 98; *Maxim. Fl. Tangut.* p. 102; *Peterm. Mitteil.* Erg.-Heft 131, p. 373.

Harmut Vogana, October 17, *Hedin*. Flowers white. Fruit red or black.

Geraniaceæ.

Geranium collinum, *Steph., Willd. Sp. Pl.* iii. p. 705; *Kew Bull.* 1896, p. 209; *Hook. f. Fl. Brit. Ind.* i. p. 429.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Flowers blue.

Biebersteinia Emodi, *Jaub. et Spach, Illustr.* ii. p. 109; *Hook. f. Fl. Brit. Ind.* i. p. 427.

Chirchun and other localities, 16,500 ft., *Strachey & Winterbottom*. Flowers yellow.

Leguminosæ.

Thermopsis inflata, *Cambess. in Jacquem. Voy. Bot.* p. 34, t. 39; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 111; *Hook. f. Fl. Brit. Ind.* ii. p. 63.

Top of pass in sand, 18,500 ft., *Thorold*. 81° 41′, 34° 53′, 16,200 ft., July 8, *Deasy & Pike*, 843. Flowers bright yellow.

Thermopsis lanceolata, *R. Br. in Ait. Hort. Kew.* ed. 2, iii. p. 3; *Ledeb. Fl. Ross.* i. p. 510; *Journ. Linn. Soc., Bot.* xxiii. (1886) p. 150; *Kew Bull.* 1896, p. 210; *Peterm. Mitteil.* Erg.-Heft 131, p. 373.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Camp 31, September 21, *Hedin*. Flowers yellow.

Caragana pygmæa, *DC. Prodr.* ii. p. 268; *Hook. f. Fl. Brit. Ind.* ii. p. 116.

Gugé plains, 14,000–17,000 ft., *Strachey & Winterbottom*. Flowers bright yellow.

Astragalus (§ **Cercidothrix**) **Arnoldi**, *Hemsl. & H. H. W. Pearson*, sp. nov.

Suffrutex nanus, cæspitoso-multiceps, sericeo-canescens pilis peltatim affixis. *Radix* alta, crassa, lignosa, fibrosa. *Rami* breves, patentes, lignosi, petiolis foliorum persistentibus instructi. *Folia* conferta, 3–7-foliolata, 2–4 lin. longa; foliola opposita, breviter elliptica, strigoso-villosa, $\frac{3}{4}$–$1\frac{1}{2}$ lin. longa, $\frac{1}{2}$ lin. lata; stipulæ membranaceæ, extus pubescentes, petiolis breviter adnatæ, breviter connato-vaginantes, circiter $1\frac{1}{2}$ lin. longæ. *Racemi* umbelliformes, pedunculati, axillares, circiter 6-flori, pilis atris albidisque adpressis vestiti. *Flores* purpurei, bracteati, breviter pedicellati. *Calyx* obliquus, dentibus 5 subæqualibus brevibus erectis mox declinatis, pilis atris albidisque adpressis hirsutus, circiter $1\frac{1}{2}$ lin. longus. *Vexillum* glabrum, apice late rotundatum, emarginatum, calycem duplo superans; alæ spathulatæ. *Ovarium* antice hirsutum, breviter stipitatum, 4-ovulatum; stylus glaber. *Legumen* non visum.

Without locality: 17,500 ft., *Deasy & Pike*, 808, 810; 17,500 ft., *Thorold*, 12 & 37. Flowers purple.

This species resembles *A. brahuicus*, Bunge, in habit.

Astragalus confertus, *Benth.*; *Hook. f. Fl. Brit. Ind.* ii. p. 123.

Top of pass, 18,000 ft., and sandy, gravelly soil in valleys, 17,500 ft., *Thorold*, 8 & 58. Without locality, *Deasy & Pike*, 893. Flowers blue or purple-blue.

Astragalus Heydei, *Baker*, *in Hook. f. Fl. Brit. Ind.* ii. p. 118; *Journ. Linn. Soc.*, *Bot.* xxx. (1894) p. 111.

A. Hendersoni, *Baker*, *loc. cit.* ii. p. 120.

Sandy, gravelly soil in valleys, *Thorold*, 50. 87°, 35° 18′, 16,400 ft., July, *Wellby & Malcolm*. 25 miles east of Lanak La, 17,100 ft., *Deasy & Pike*, 802. Flowers purple.

With very complete material before us, we have no hesitation in uniting Mr. Baker's *A. Hendersonii* with his *A. Heydei*.

Astragalus (**Phaca**) **Malcolmii**, *Hemsl. & H. H. W. Pearson*, sp. nov.

Herba pumila, acaulis, perennis, pubescens pilis basi affixis. *Rhizoma* ascendens, tenuis, internodiis 2–3 lin. longis. *Folia* imparipinnata, 9–13-foliolata, $\frac{1}{2}$–$\frac{3}{4}$ poll. longa: foliola opposita, brevissime petiolulata, oblonga vel elliptica, obtusa, subcarnosa, dense pubescentia, $1\frac{1}{4}$–2 lin. longa, circiter $\frac{3}{4}$ lin. lata;

stipulæ herbaceæ, petiolis brevissime adnatæ, basi inter se connatæ, ellipticæ, minute apiculatæ, circiter 1½ lin. longæ. *Racemi* scapiformes, densi, capituliformes, multiflori, pilis atris pubescentes. *Flores* bracteati, purpurei, brevissime pedicellati. *Calyx* subcampanulatus, alte 5-lobatus, pilis atris pubescens, circiter 2 lin. longus; lobi angusti, erecti, mox declinati, circiter ¾ lin. longi. *Vexillum* glabrum, apice late rotundatum, circiter 3 lin. longum. *Stamina* a petalis libera. *Ovarium* stipitatum, glabrum, 2-ovulatum. *Stylus* glaber. *Legumen* non visum.

In 87° and 35° 18′, 16,401 ft., July, *Wellby & Malcolm*. Flowers purple.

Allied to *A. tibetanus*, which, however, is distinctly caulescent.

Astragalus melanostachys, *Benth.*; *Hook. f. Fl. Brit. Ind.* ii. p. 125.

A. bracteosus, *Klotzsch, Reise Pr. Wald., Bot.* p. 160, t. 5, *non Boiss.*

A. strictus, *Hemsl. in Kew Bull.* 1896, p. 210, *non R. Grah.*

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Flowers purple.

Astragalus nivalis, *Kar. et Kir.*; *Hook. f. Fl. Brit. Ind.* ii. p. 136.

In 89°–95°, 35°–37°, August 7, *Hedin*. 88° 30′, 35° 20′, 16,294 ft., July, *Wellby & Malcolm*. Flowers purple.

Astragalus tribulifolius, *Benth.*; *Hook. f. Fl. Brit. Ind.* ii. p. 120; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 111; *Peterm. Mitteil.* Erg.-Heft 131, p. 373.

Sandy valley, 15,800 ft., *Thorold*. September 1 & 21, *Hedin*. Flowers purple.

Astragalus Webbianus, *Grah.*; *Hook. f. Fl. Brit. Ind.* ii. p. 132.

Gugé plains, 15,000 ft., *Strachey & Winterbottom*. Flowers purple.

Oxytropis cachemirica, *Cambess. in Jacquem. Voy. Bot.* p. 38 t. 44; *Kew Bull.* 1896, p. 210; *Hook. f. Fl. Brit. Ind.* ii. p. 139.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., July and August, *Littledale*. Flowers violet or yellow.

Oxytropis densa, *Benth.*; *Hook. f. Fl. Brit. Ind.* ii. p. 138.

Sandy, gravelly soil in valleys, 17,500 ft., *Thorold*, 11. Flowers purple-red.

Oxytropis lapponica, *Gaud.*; *Hook. f. Fl. Brit. Ind.* ii. p. 137.
O. glacialis, *Benth. loc. cit.*
Niti pass, *Strachey & Winterbottom.* Muddy, stony soil in valleys, 17,600–17,800 ft., *Thorold*, 40 & 59. Flowers purple and white.

Oxytropis microphylla, *DC.*; *Hook. f. Fl. Brit. Ind.* ii. p. 139.
O. chiliophylla, *Royle, Illustr. Bot. Himal.* p. 198; *Jacquem. Voy. Bot.* p. 38, t. 45.
Oxytropis physocarpa, *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 111, *vix Ledeb.*
Sandy, gravelly soil in valleys, 17,500 ft., *Thorold.* 91° 20′, 36° 46′, June 22, *Rockhill.* August 7, *Hedin.* 87°, 35° 18′, 16,400 ft., July 21, *Wellby & Malcolm.* Near the Mangtsa Tso, 17,500 ft., June 24, and 82° 42′, 32° 34′, 15,000 ft., September 4, *Deasy & Pike*, 808 & 887. Flowers purple or violet.
Thorold's specimens were originally referred to *O. physocarpa*, Ledeb., which is hardly distinguishable in the flowering state.

Oxytropis Stracheyana, *Benth.*; *Hook. f. Fl. Brit. Ind.* ii. p. 138.
Side of slope, 16,200 ft., *Thorold*, 96. 88° 20′, 35° 20′, 16,600 ft., July 27, *Wellby & Malcolm.* Flowers purple-blue.

Oxytropis tatarica, *Cambess. ex Bunge, in Mém. Acad. Pétersb.* sér. 7, xxii. (1874) i. p. 16; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 112; *Hook. f. Fl. Brit. Ind.* ii. p. 138.
Various localities, 17,500–17,800 ft., *Thorold*, 13, 39 & 73. Toktomai Muren, 14,000–15,000 ft., *Rockhill.* Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* 88° 20′, 35° 14′, 16,140 ft., July 26, *Wellby & Malcolm.* 25 miles east of the Lanak La, 17,100 ft., *Deasy & Pike*, 804. Flowers purple.

Stracneya tibetica, *Benth. in Hook. Kew Journ. Bot.* v. (1853) p. 307; *Hook. f. Fl. Brit. Ind.* ii. p. 147.
Tisum, 15,000 ft., *Strachey & Winterbottom.* Flowers purple.

Rosaceæ.

Potentilla Anserina, *Linn. Sp. Pl.* p. 495; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 135; *Hook. f. Fl. Brit. Ind.* ii. p. 350.
Tisum, 15,000 ft., *Strachey & Winterbottom.* Plateau west of Dangla mountains, 89° 38′, 33° 09′, 16,220 ft., *Rockhill.* Flowers yellow.

Potentilla bifurca, *Linn. Sp. Pl.* ed. 2, p. 711; *Gmelin, Reise Beschreib.* i. t. 27. f. 1; *Falk, Beyträge z. topogr. Kennt. Russ. Reichs*, ii. t. 10; *Kew Bull.* 1896, p. 210; *Hook. f. Fl. Brit. Ind.* ii. p. 353.

Gugé, 16,000 ft., *Strachey & Winterbottom.* Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* 16,300 ft., *Wellby & Malcolm.* Flowers yellow.

Potentilla fruticosa, *Linn. Sp. Pl.* p. 495; *Kew Bull.* 1896, p. 210; *Peterm. Mitteil.* Erg.-Heft 131, p. 373; *Fl. Brit. Ind.* ii. p. 347.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Camp 31, September 21, *Hedin.* Without locality, *Deasy & Pike*, 891. Flowers yellow.

Potentilla fruticosa, *Linn.*, var. **Inglisii**, *Hook. f. Fl. Brit. Ind.* ii. p. 348.

P. Inglisii, *Royle, Illustr. Bot. Himal.* p. 207, t. 41.

Tazang, 16,500 ft., *Strachey & Winterbottom.* Flowers yellow.

Potentilla fruticosa, *Linn.*, var. **pumila**, *Hook. f. Fl. Brit. Ind.* ii. p. 348.

Without locality, *Thorold.* Plateau west of Dangla mountains, 89° 44′, 32° 51′, 16,350 ft., *Rockhill.* Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers yellow.

Potentilla multifida, *Linn. Sp. Pl.* p. 496; *Hook. f. Fl. Brit. Ind.* ii. p. 353.

Niti pass, etc., 15,000–17,000 ft., *Strachey & Winterbottom.* Flowers yellow.

Potentilla nivea, *Linn. Sp. Pl.* p. 499: *Journ. Linn. Soc., Bot.* xxx. (1894) p. 135; *Hook. f. Fl. Brit. Ind.* ii. p. 358.

Kechu valley, 96° 28′, 31° 25′, 12,700 ft., *Rockhill.* Flowers yellow.

Potentilla sericea, *Linn. Sp. Pl.* p. 495, var. **polyschista**, *Lehm. Rev. Gen. Pot.* p. 34; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 112: *Hook. f. Fl. Brit. Ind.* ii. p. 354.

P. polyschista, *Boiss. Fl. Orient.* ii. p. 710.

Near Rakas Tal, 15,000–17,000 ft., *Strachey & Winterbottom.* Sandy earth and gravel in valleys, 17,500 ft., *Thorold.* Near the Mangtsa Tso, 17,000 ft., June 24, *Deasy & Pike*, 811, 890. Flowers yellow.

Chamærhodos sabulosa, *Bunge, in Ledeb. Fl. Alt.* i. p. 431; *Ledeb. Ic. Fl. Ross.* iii. t. 257; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 112; *Hook. f. Fl. Brit. Ind.* ii. p. 360.

Gugé, 15,000 ft., *Strachey & Winterbottom.* Sandy soil in valleys, 17,000 ft., *Thorold.* 82° 6′, 34° 20′, 16,700 ft., July 29, *Deasy & Pike*, 856. Flowers yellow.

SAXIFRAGACEÆ.

Saxifraga flagellaris, *Willd. ex Sternb. Rev. Saxifr.* p. 25, t. 6; *Hook. f. Fl. Brit. Ind.* ii. p. 397.

Lanjar, 17,000 ft., *Strachey & Winterbottom.* Flowers yellow, often with red lines.

Saxifraga Hirculus, *Linn. Sp. Pl.* p. 402, var. **hirculoides**, *C. B. Clarke, in Hook. f. Fl. Brit. Ind.* ii. p. 392.

S. hirculoides, *Decne. in Jacquem. Voy. Bot.* p. 67, t. 78. f. 1.

Balch pass, 17,000 ft., *Strachey & Winterbottom.* Lanak pass, *Thomson.* Flowers yellow.

Saxifraga Jacquemontiana, *Decne. in Jacquem. Voy. Bot.* p. 68, t. 78. f. 2, var. **stella-aurea**, *C. B. Clarke, in Hook. f. Fl. Brit. Ind.* ii. p. 395.

S. stella-aurea, *Hook. f. et Thoms. in Journ. Linn. Soc., Bot.* ii. (1857) p. 72.

91° 40′, 35° 21′, August 12, *Wellby & Malcolm.* Flowers yellow. A very imperfect specimen, doubtfully placed in this species.

Saxifraga parva, *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 112.

Sides of rivulets, 17,000 ft., *Thorold.* Growing near a stream on a patch of grass in broken granite, 16,800 ft., August 12, *Deasy & Pike*, 875. Flowers yellow.

Saxifraga saginoides, *Hook. f. et Thoms. in Journ. Linn. Soc., Bot.* ii. (1857) p. 68; *Peterm. Mitteil.* Erg.-Heft 131, p. 374; *Hook. f. Fl. Brit. Ind.* ii. p. 392.

Without locality, September 1, *Hedin.* Flowers yellow.

Saxifraga tangutica, *Engl. in Bull. Acad. Pétersb.* xxix. (1883) p. 114; *Kew Bull.* 1896, p. 210.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers yellow.

Parnassia ovata, *Ledeb. in Mém. Acad. Pétersb.* v. (1815) p. 528; *Hook. f. Fl. Brit. Ind.* ii. p. 403.

P. trinervis, *Drude, in Linnæa*, xxxix. (1875) p. 322; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 112.

Tisum, 15,000 ft., *Strachey & Winterbottom.* Marsh, 15,000 ft., *Thorold.* Flowers white.

Crassulaceæ.

Sedum algidum, *Ledeb. Fl. Alt.* ii. p. 194, var. **tanguticum**, *Maxim. in Bull. Acad. Pétersb.* xxix. (1884), col. 126; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 135.

Camp north of Tsacha-tsang-bo-chu, 90° 03′, 32° 28′, 15,650 ft., July 5, *Rockhill.* Flowers yellow.

Sedum crenulatum, *Hook. f. et Thoms. in Journ. Linn. Soc., Bot.* ii. (1858) p. 96; *Hook. f. Fl. Brit. Ind.* ii. p. 417.

Niti pass, etc., 14,000–17,000 ft., *Strachey & Winterbottom.* Flowers rose-pink.

Sedum Ewersii, *Ledeb. Fl. Alt.* ii. p. 191; *Hook. f. Fl. Brit. Ind.* ii. p. 421.

Gugé, 15,500 ft., *Strachey & Winterbottom.* Flowers purple-red.

Sedum fastigiatum, *Hook. f. et Thoms. in Journ. Linn. Soc., Bot.* ii. (1858) p. 98; *Hook. f. Fl. Brit. Ind.* ii. p. 419.

Valleys in Gugé, and near Rakas Tal, 15,000–17,000 ft., *Strachey & Winterbottom.* Flowers red.

Sedum Przewalskii, *Maxim. in Bull. Acad. Pétersb.* xxix. (1884) col. 156; *Kew Bull.* 1896, p. 211.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers yellow.

Sedum quadrifidum, *Pall. Reise,* iii. p. 730; *Ledeb. Fl. Ross.* ii. p. 177; *Journ. Linn. Soc., Bot.* ii. (1858) p. 97, et xxx. (1894) p. 112; *Kew Bull.* 1896, p. 211; *Peterm. Mitteil.* Erg.-Heft 131, p. 374; *Hook. f. Fl. Brit. Ind.* ii. p. 418.

S. coccineum, *Royle, Illustr. Bot. Himal.* p. 222, t. 48. f. 3.

Close to streams in valleys, 17,000 ft., *Thorold.* Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* 89° 35′, 35° 18′, 15,990 ft., August 1, *Wellby & Malcolm.* September 2, *Hedin.* Flowers yellow.

The identification of the Tibet specimens is not quite satisfactory.

Sedum Rhodiola, *DC. Fl. Fr.* ed. 3, iv. p. 386; *Ledeb. Fl. Ross.* ii. p. 179; *Hook. f. Fl. Brit. Ind.* ii. p. 417.

In 82° 8′, 34° 38′, 17,000 ft., July 27, *Deasy & Pike*, 852. Flowers yellow. Leaves often red-tipped.

The specimens are much below the average of the species in size.

Sedum rotundatum, *Hemsl. in Kew Bull.* 1896, p. 210; *Hook. Ic. Pl.* t. 2469.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Flowers red.

Sedum tibeticum, *Hook. f. et Thoms. in Journ. Linn. Soc., Bot.* ii. (1858) p. 96; *Kew Bull.* 1896, p. 210; *Hook. f. Fl. Brit. Ind.* ii. p. 418.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Flowers red.

Sedum tibeticum, *Hook. f. et Thoms.*, var. **Stracheyi**, *C. B. Clarke, in Hook. f. Fl. Brit. Ind.* ii. p. 418; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 112.

S. Stracheyi, *Hook. f. et Thoms. in Journ. Linn. Soc., Bot.* ii. (1858) p. 96.

Close to water, 17,500 ft., *Thorold*. Twenty-five miles east of the Lanak La, 17,100 ft., June 20, *Deasy & Pike*, 803.

Sempervivum acuminatum, *Jacquem. Voy. Bot.* p. 63, t. 74. f. 1; *Hook. f. Fl. Brit. Ind.* ii. p. 422.

Gugé plains, 15,500 ft., *Strachey & Winterbottom*. Flowers purple-red.

HALORRHAGIDACEÆ.

Myriophyllum verticillatum, *Linn. Sp. Pl.* p. 992; *Kew Bull.* 1896, p. 211; *Hook. f. Fl. Brit. Ind.* ii. p. 433.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Flowers very small; anthers yellow.

Hippuris vulgaris, *Linn. Sp. Pl.* p. 4; *Hook. f. Fl. Brit. Ind.* ii. p. 432.

Gyanima, 15,000 ft., *Strachey & Winterbottom*. Flowers very small; anthers yellow.

UMBELLIFERÆ.

Selinum striatum, *Benth. et Hook. f. Gen. Pl.* i. p. 914; *Hook. f. Fl. Brit. Ind.* ii. p. 699.

Around Aru Tso, 16,200 ft., August 4, *Deasy & Pike*, 868. Flowers white.

Smells like meadow-sweet. Common, but not plentiful, in dampish places.—*Deasy & Pike.*

Pleurospermum Hookeri, *C. B. Clarke, in Hook. f. Fl. Brit. Ind.* ii. p. 705.

Shelshel and Rakas Tal, 15,500 ft., *Strachey & Winterbottom.* Bracts and flowers white.

Pleurospermum Hookeri, *C. B. Clarke*, var. **Thomsoni**, *C. B. Clarke, loc. cit.*; *Kew Bull.* 1896, p. 211.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.*

Pleurospermum stellatum, *Benth. ex C. B. Clarke, in Hook. f. Fl. Brit. Ind.* ii. p. 704, var. **Lindleyanum**, *C. B. Clarke, loc. cit.* p. 705; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 113.

Sandy soil in broad valley, 16,400 ft., *Thorold.* Bracts and flowers white.

Very young specimens of another species of *Pleurospermum* were gathered by the Littledales.

Peucedanum (§ **Cervaria**) **Malcolmii**, *Hemsl. et H. H. W. Pearson.*

Species habitu *P. Hystrici*, Bunge, altaicæ simillima, a quâ fructus forma, vittarum numero, foliorum basibus petiolisque persistentibus tenuioribus præcipue differt.

Herba pumila, perennis, pubescens, foliorum basibus petiolisque persistentibus, circiter 6 poll. alta. *Folia* petiolata, bipinnatisecta, glanduloso-pubescentia, circiter 3 poll. longa, jugis primariis distantibus, pinnulis trifidis vel nonnunquam pinnatifidis; segmenta ultima lineari-ovata, acuta, crassiuscula, puberula, $\frac{3}{4}$ lin. longa, $\frac{1}{4}$ lin. lata; vaginæ valde nervatæ, intus glabræ, extus minute pubescentes vel glabrescentes, $\frac{3}{4}$–1 poll. longæ. *Umbellæ* compositæ radiis primariis 6–12; involucri involucellique bracteæ paucæ, lineari-lanceolatæ, integræ vel basi rarissime irregulariter lobatæ, 3- vel 1-nervatæ, pubescentes, $1\frac{1}{2}$–$3\frac{1}{2}$ lin. longæ. *Flores* pedicellis brevibus pilosis suffulti. *Calycis* dentes dense pubescentes, deltoidei, $\frac{1}{3}$–$\frac{1}{4}$ lin. longi. *Petala* pallide lutea, glabra; anterius obreniforme, 2 lin. latum; lateralia posterioraque subrotunda, $\frac{3}{4}$ lin. diametro. *Fructus* ellipticus vel fere obovatus, apice leviter emarginatus, complanatus, puberulus, jugis dorsalibus vix elevatis, lateralibus contiguis dilatatis marginem alatem formantibus, $2\frac{1}{2}$ lin. longus, $1\frac{1}{2}$–2 lin. latus; vittæ ad valleculas solitariæ vel rarissime irregulariter 2-næ,

fructus basin attingentes vel rarius abbreviatæ, dorsales obscuræ, commissurales claræ. Semen complanatum, facie planum, dorso convexum.

In 85° and 35° 37′, September 7, *Hedin*. 88° 20°, 35° 14′, 16,142 ft., July 26, *Wellby & Malcolm*. Flowers yellow.

Ladaki name "Kumbak"; found everywhere near fresh water; eaten as a vegetable.—*Wellby & Malcolm*.

Caprifoliaceæ.

Lonicera hispida, *Pall. ex Roem. et Schult. Syst.* v. p. 258; *Kew Bull.* 1896, p. 211; *Hook. f. Fl. Brit. Ind.* iii. p. 11.

L. bracteata, *Royle, Illustr. Bot. Himal.* pp. 236 & 237, t. 53.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Flowers pale yellow.

Dipsaceæ.

Morina Coulteriana, *Royle, Illustr. Bot. Himal.* p. 245; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 113; *Hook. f. Fl. Brit. Ind.* iii. p. 216.

Valleys, 15,500 ft., *Thorold*. Flowers yellow.

Compositæ.

Aster altaicus, *Willd. Enum. Hort. Berol.* p. 881; *Hook. f. Fl. Brit. Ind.* iii. p. 251.

Without locality, *Wellby & Malcolm*; *Deasy & Pike*. Flowers blue.

Aster Bowerii, *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 113; *Kew Bull.* 1896, p. 211; *Hook. Ic. Pl.* t. 2495; *Peterm. Mitteil.* Erg.-Heft 131, p. 374.

Sandy, gravelly soil on hill-sides, 18,000 ft., *Thorold*. Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Camp 10, *Hedin*. 88° 20′, 35° 14′, 16,142 ft., July 26, *Wellby & Malcolm*. Horpa Tso, 17,000 ft., July 3, *Deasy & Pike*. Flowers described as lavender, lilac, and light purplish mauve.

Growing in old gravel; very scarce.—*Deasy & Pike*.

Aster Heterochæta, *C. B. Clarke, Comp. Ind.* p. 44; *Hook. f. Fl. Brit. Ind.* iii. p. 250.

Heterochæta asteroides, *DC. Prod.* v. p. 282.

In 86° 48′, 35° 18′, 16,300 ft., July 19, *Wellby & Malcolm*. Without locality, *Deasy & Pike*. Flowers blue with a yellow centre.

Aster molliusculus, *Wall. Cat.* n. 2972; *Clarke, Comp. Ind.* p. 45; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 114; *Hook. f. Fl. Brit. Ind.* iii. p. 251.

Gugé, 15,000 ft., *Strachey & Winterbottom.* Sandy soil in sheltered nooks, 16,000 ft., *Thorold.* Flowers purple.

Aster tibeticus, *Hook. f. Fl. Brit. Ind.* iii. p. 251; *Journ. Linn. Soc., Bot.* xxx. (1894) pp. 113 et 135; *Kew Bull.* 1896, p. 211.

Calcareous soil, 17,800 ft., *Thorold.* Valley of Murus, 91° 18', 33° 44', 15,640 ft., June 23, *Rockhill.* Goring valley, 90° 25', 30° 12', about 16,500 ft., *Littledale.* Flowers purple with yellow centre.

Aster tricephalus, *C. B. Clarke, Comp. Ind.* p. 43; *Kew Bull.* 1896, p. 211; *Hook. f. Fl. Brit. Ind.* iii. p. 250.

Goring valley, 90° 25', 30° 12', about 16,500 ft., *Littledale.* Flowers blue.

Leontopodium alpinum, *Cass. in Dict. Sc. Nat.* xxv. p. 474; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 136; *Kew Bull.* 1896, p. 211; *Peterm. Mitteil.* Erg.-Heft 131, p. 374; *Hook. f. Fl. Brit. Ind.* iii. p. 279.

Valleys in Gugé, 15,000 ft., *Strachey & Winterbottom.* Bank Chilchang Tso (Lake Glenelg), 90° 10', 33° 27', 16,000 ft., June 30, *Rockhill.* Goring valley, 90° 25', 30° 12', about 16,500 ft., *Littledale.* September 1, *Hedin.* 88° 30', 35° 14', 16,616 ft., July 27, *Wellby & Malcolm.* Near the Aru Tso, 17,000 ft., July 4, *Deasy & Pike*, 867. Flowers white, tipped with purple.

Leontopodium Stracheyi, *C. B. Clarke, in Herb. Kew.*; *Journ. Linn. Soc.* xxx. p. 136.

L. alpinum, *Cass.*, var. Stracheyi, *Hook. f. Fl. Brit. Ind.* iii. p. 279.

Ruchu valley, in river bottom, 95° 12', 31° 10', 12,100 ft., August 16, *Rockkill.* Flowers white.

Anaphalis mucronata, *C. B. Clarke, in Herb. Kew.*; *Journ. Linn. Soc.* xxx. p. 136.

Basin of Dangchu, right bank affluent, 92° 08', 32° 20', 15,180 ft., July 21, *Rockhill.* Flowers white.

Anaphalis xylorhiza, *Sch.-Bip. ex Hook. f. Fl. Brit. Ind.* iii. p. 281; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 114; *Kew Bull.* 1896, p. 212.

Rocky outcrops, 15,500 ft., *Thorold.* Goring valley, 90° 25', 30° 12', about 16,500 ft., *Littledale.* Flowers white.

Antennaria nana, *Hook. f. et Thoms. ex C. B. Clarke, Comp. Ind.* p. 100; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 136; *Hook. f. Fl. Brit. Ind.* iii. p. 278.

Valley of Murus, head-waters of Yangtsekiang, 91° 20′, 33° 45′, 14,900 ft., June 22, *Rockhill*. Flowers white.

Allardia tomentosa, *Decne. in Jacquem. Voy. Bot.* p. 87, t. 95; *Hook. f. Fl. Brit. Ind.* iii. p. 313.

Balch pass, 16,000–17,000 ft., *Strachey & Winterbottom*. Flowers yellow.

Tanacetum fruticulosum, *Ledeb. Fl. Alt.* iv. p. 58, *et Ic. Fl. Ross.* i. t. 38; *Hook. f. Fl. Brit. Ind.* iii. p. 318.

15,000 ft., August 30, *Deasy & Pike*, 885. Flowers yellow.

Known to the Ladaks as "Tchŭktchŭk," *Deasy & Pike*.

Tanacetum gracile, *Hook. f. et Thoms. ex Hook. f. in Fl. Brit. Ind.* iii. p. 318.

Sutlej river in Gugé, 13,350 ft., *Strachey & Winterbottom*. Flowers yellow.

Tanacetum tibeticum, *Hook. f. et Thoms. ex C. B. Clarke, Comp. Ind.* p. 154; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 114; *Kew Bull.* 1896, p. 212; *Peterm. Mitteil.* Erg.-Heft 131, p. 374; *Hook. f. Fl. Brit. Ind.* iii. p. 319.

Close to water among stones, 17,000 ft., *Thorold*. Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Camp 10, *Hedin*. Without locality, *Wellby & Malcolm*. 81° 41′, 34° 52′, 16,200 ft., July 12, *Deasy & Pike*, 836. Flowers yellow.

Ladaki name "Boortzse." The only vegetable fuel of this country.—*Deasy & Pike*.

Artemisia Campbellii, *Hook. f. et Thoms. ex C. B. Clarke, Comp. Ind.* p. 164; *Hook. f. Fl. Brit. Ind.* iii. p. 327.

Bhomtso, 16,000–18,000 ft., *Hooker*. Flowers brown.

Artemisia desertorum, *Spreng. Syst.* iii. p. 490; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 114; *Hook. f. Fl. Brit. Ind.* iii. p. 322.

Broad valleys, 16,000 ft., *Thorold*. Flowers yellow.

Artemisia macrocephala, *Jacquem. ex Besser in Bull. Soc. Nat. Mosc.* ix. (1836) p. 28; *Hook. f. Fl. Brit. Ind.* iii. p. 329.

A. Griffithiana, *Boiss. Fl. Orient.* iii. p. 376.

Without locality at 15,000 ft., August 30, *Deasy & Pike*, 884. Flowers yellow.

Known to the Ladaks as "Cumtchen," *Deasy & Pike*.

Artemisia minor, *Jacquem. ex Besser, in Bull. Soc. Nat. Mosc.* ix. (1836) p. 22; *DC. Prod.* vi. p. 124; *Hook. f. Fl. Brit. Ind.* iii. p. 329.

A. tibetica, *Hook. f. loc. cit.*

A. Sieversiana, *Willd.*, var. tibetica, *C. B. Clarke, Comp. Ind.* p. 165.

88° 30′, 35° 20′, 16,294 ft., July 28, *Wellby & Malcolm.* Flowers mauve.

Artemisia Roxburghiana, *Besser, in Bull. Soc. Nat. Mosc.* ix. (1836) p. 57; *Hook. f. Fl. Brit. Ind.* iii. p. 326.

Sutlej river, 11,500 ft., *Strachey & Winterbottom.* Flowers purple.

Artemisia sacrorum, *Ledeb. in Mém. Acad. Pétersb.* v. (1805) p. 571; *Hook. f. Fl. Brit. Ind.* iii. p. 326.

Sutlej river in Gugé, 12,000–13,500 ft., *Strachey & Winterbottom.* Flowers yellow or yellow-green.

Artemisia salsoloides, *Willd. Sp. Pl.* iii. p. 1832; *Besser, Monogr. Artem.* t. 2; *Kew Bull.* 1896, p. 212; *Hook. f. Fl. Brit. Ind.* iii. p. 321.

Sutlej river in Gugé, 12,000–13,500 ft., *Strachey & Winterbottom.* Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Without locality, *Deasy & Pike*, 897. Flowers yellow-green.

Artemisia Stracheyi, *Hook. f. et Thoms. ex C. B. Clarke, Comp. Ind.* p. 164; *Kew Bull.* 1896, p. 211; *Hook. f. Fl. Brit. Ind.* iii. p. 328.

Manasarowar, 14,000–15,500 ft., *Strachey & Winterbottom.* Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers yellow-green.

Artemisia (§ **Dracunculus**) **Wellbyi**, *Hemsl. et H. H. W. Pearson* sp. nov.; ab *A. salsoloide*, Willd., habitu pumiliore, racemis brevioribus laxioribusque, involucri phyllis marginibus membranaceis atro-fuscis, foliis integris trifidis vel raro pinnatisectis diversa.

Suffrutex circiter ½ ped. altus. *Radix* elongata, lignosa, ramosa. *Caules* numerosi, ramosi, infra lignosi, supra herbacei, repentes vel ascendentes, subangulati, sericeo-pubescentes vel glabrescentes. *Folia* alterna, sessilia, carnosa, dense appresso-pubescentia, demum glabra, integra, lineari-oblonga vel ambitu cuneatim

spatulata, apice alte trifida vel raro pinnatisecta, basibus persistentibus, 4–7 lin. longa; lobi lineares, lineari-oblongi vel -ovati, acuti, marginibus revolutis, 1–4 lin. longi. *Capitula* globosa, pauciflora, 2–3 lin. diametro, pedunculis brevibus bracteolatis suffulta, axillaria, solitaria, plus minus nutantia, in racemos simplices foliatos $\frac{3}{4}$–2 in. longos laxe disposita; phylla circiter 12, oblonga, obtusa, concava, herbacea, crassiuscula, glabra, marginibus membranaceis atro-fuscis, costis prominentibus, 1–$1\frac{1}{4}$ lin. longa, $\frac{1}{2}$–$\frac{3}{4}$ lin. lata. *Receptaculum* nudum. *Flores marginales* feminei, 1–$1\frac{1}{2}$ lin. longi, lobis stigmaticis circiter $\frac{1}{2}$ lin. longis. *Flores disci* omnes masculi ovariis abortivis, tubulosi, $1\frac{1}{8}$–$1\frac{1}{4}$ lin. longi. *Antheræ* $\frac{1}{2}$–$\frac{3}{4}$ lin. longæ, connectivis in aristas tenues breviores productis.

Artemisia sp., *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 114.

17,100 ft., *Thorold.* 86° 10′, 35° 19′, 16,214 ft., July 16, *Wellby & Malcolm.* 82° 8′, 34° 48′, 17,000 ft., July 27, *Deasy & Pike.* Flowers yellow-green.

Plant strongly scented, something like crushed nettle-leaves.—*Deasy & Pike.*

Cremanthodium Deasyi, *Hemsl.*

Senecio (§ Cremanthodium) Deasyi, *Hemsl. in Hook. Ic. Pl.* t. 2587.

Werneria nana, [*Benth. in*] *Benth. & Hook. f. Gen. Pl.* ii. p. 451.

Ligularia nana, *Decne. in Jacquem. Voy. Bot.* p. 91, t. 99.

In water-logged, stony soil, 17,600 ft., *Thorold*, 33. Growing in gravel east of Horpa Tso, 17,000 ft., very scarce and very little vegetation of any kind, *Deasy & Pike*, 827, 841. Flowers yellow.

It was only after the publication of this plant under the name of *Senecio* (§ *Cremanthodium*) *Deasyi* that we found out that it had been collected before in Kashmir and described under the names cited above. *Werneria* is a large Andine genus with which four or five Abyssinian and Himalayan allied plants have been associated. So far as *Werneria nana*, Benth., is concerned we have no hesitation about placing it in *Cremanthodium*; and it is very closely allied to *C. humile*, Maxim. We will not presume to settle here the limits of the genus *Senecio*; but taking such other genera, numerous in species, as *Erica*, *Solanum*, and *Carex*, in relation to range of variation, it might well include *Cacalia*, *Cremanthodium* and several other proposed genera, perhaps *Werneria* itself. Jacquemont's figure was from a better specimen than ours.

Cremanthodium Fletcheri, *Hemsl.*

Senecio (§ Cremanthodium) Fletcheri, *Hemsl. in Kew Bull.* 1896, p 212.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers yellow.

Cremanthodium goringensis, *Hemsl.*

Senecio (§ Cremanthodium) goringensis, *Hemsl. in Kew Bull.* 1896, p. 212; *Peterm. Mitteil.* Erg.-Heft 131, p. 374.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Near lake 18, September 12, *Hedin.* 91° 20′, 35° 23′, 16,404 ft., August 10, *Wellby & Malcolm.* Aru Tso, 16,200 ft., August 4, *Deasy & Pike*, 864. Flowers yellow.

Senecio arnicoides, *Wall. Cat.* n. 8138, var. **frigidus**, *Hook. f. Fl. Brit. Ind.* iii. p. 351; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 114.

Niti pass, 16,700 ft., *Strachey & Winterbottom.* Water-logged soil in wide valleys, 17,000 ft., *Thorold.* Flowers yellow.

Senecio coronopifolius, *Desf. Fl. Atlant.* ii. p. 273; *Hook. f. Fl. Brit. Ind.* iii. p. 341.

Rakas Tal and Shelshel, 14,000–16,000 ft., *Strachey & Winterbottom.* Flowers yellow.

Saussurea alpina, *DC. in Ann. Mus. Par.* xvi. (1810) p. 198; *Peterm. Mitteil.* Erg.-Heft 131, p. 374.

August 7, *Hedin.* Flowers purple-blue.

Saussurea Aster, *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 115, t. 5.

Sandy, gravelly soil, 17,500 ft., *Thorold.* 86° 48′, 35° 18′, 16,300 ft., July 19, *Wellby & Malcolm.* Near Horpa Tso, 16,400 ft., June 28, *Deasy & Pike*, 818. Flowers purple (Thorold); blue (Wellby & Malcolm).

Saussurea bracteata, *Decne. in Jacquem. Voy. Bot.* p. 94, t. 102; *Peterm. Mitteil.* Erg.-Heft 131, p. 374; *Hook. f. Fl. Brit. Ind.* iii. p. 366.

S. Koslowi, *C. Winkl. in Act. Horti Petrop.* xiii. p. 241.

Balch pass and Lanjar, 16,000–17,000 ft., *Strachey & Winterbottom.* Camp 31, *Hedin.* 82° 40′, 33° 30′, 16,800 ft., August 12, *Deasy & Pike*, 873. Flowers red.

Saussurea glanduligera, *Sch.-Bip. ex Hook. f. Fl. Brit. Ind.* iii. p. 371; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 114.

Tisum, 15,000 ft., *Strachey & Winterbottom.* Sandy, stony soil in valley at 17,800 ft., *Thorold.* On gravel near an ice-covered lake, 82° 24′, 34° 41′, 16,600 ft., July 6, *Deasy & Pike*, 834, 899. Flowers purple.

Saussurea Hookeri, *C. B. Clarke, Comp. Ind.* p. 230; *Hook. f. Fl. Brit. Ind.* iii. p. 371.

Balch pass, 16,000 ft., *Strachey & Winterbottom.* Flowers purple.

Saussurea Kunthiana, *C. B. Clarke, Comp. Ind.* p. 225; *Hook. f. Fl. Brit. Ind.* iii. p. 369.

Leontodon ? Kunthiana, *Wall. Cat.* n. 3292.

Aplotaxis leontodontoides, *DC. Prodr.* vi. p. 539.

In 88° 20′, 35° 20′, 16,526 ft., July 29, *Wellby & Malcolm.* Without locality, *Deasy & Pike*, 900. Flowers purple.

Saussurea pumila, *C. Winkl. in Act. Horti Petrop.* xiii. p. 244.

September 21, *Hedin.* Flowers rose-lilac.

Saussurea pygmæa, *Spreng. Syst.* iii. p. 381; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 114.

Top of pass, 17,800 ft., *Thorold.* Flowers purple.

Saussurea sorocephala, *Hook. f. et Thoms. in C. B. Clarke, Comp. Ind.* p. 226; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 115; *Peterm. Mitteil.* Erg.-Heft 131, p. 374; *Hook. f. Fl. Brit. Ind.* iii. p. 377.

Aplotaxis gnaphalodes, *Royle, Illustr. Bot. Himal.* p. 251, t. 59. f. 1.

Stony soil close to water, 17,000 ft., *Thorold.* Camp 10, *Hedin.* 86° 48′, 35° 18′, 16,301 ft., July 19, *Wellby & Malcolm.* Horpa Tso, 17,000 ft., July 5, *Deasy & Pike*, 828, 829. Flowers purple.

Saussurea subulata, *C. B. Clarke, Comp. Ind.* p. 226 partim; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 114; *Kew Bull.* 1896, p. 212; *Peterm. Mitteil.* Erg.-Heft 131, p. 374; *Hook. f. Fl. Brit. Ind.* iii. p. 367.

S. setifolia, *Klatt in Sitz. Akad. Muench.* (1878) p. 95.

Close to water, 17,000 ft., *Thorold.* Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* August 6, *Hedin.* 88° 20′, 35° 20′, 16,526 ft., July 29, *Wellby & Malcolm.* Near the Mangtsa Tso, 16,900 ft., June 25, *Deasy & Pike*, 815, 849. Flowers purple or mauve.

Saussurea tangutica, *Maxim. in Bull. Acad. Pétersb.* xxvii. (1881) p. 489; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 136.

Near the summit of Gam (or Angti) La, 98° 13′, 30° 40′, 15,600 ft., *Rockhill.* Tsaidam, *Przewalski.* Floral leaves large, rose or purple.

Saussurea Thomsoni, *C. B. Clarke, Comp. Ind.* p. 227; *Hook. f. Fl. Brit. Ind.* iii. p. 366.

S. acaulis, *Klatt, in Sitz. Akad. Muench.* (1878) p. 91.

S. amblyophylla, *C. Winkl. in Act. Horti Petrop.* xiii. p. 245.

In 86°, 35° 19′, 16,528 ft., July 15, *Wellby & Malcolm.* Tsaidam, *Przewalski.* Flowers purple.

Saussurea Thoroldi, *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 115, t. 4. ff. 5–9; *Kew Bull.* 1896, p. 212.

Sandy soil close to water, 16,400 ft., *Thorold.* Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* 88° 20′, 35° 14′, 16,142 ft., July 16, *Wellby & Malcolm.* Without locality, *Deasy & Pike*, 898. Flowers purple.

Eaten as a vegetable; found in damp places; flowers purple.—*Wellby & Malcolm.*

Saussurea tridactyla, *Sch.-Bip. ex Hook. f. Fl. Brit. Ind.* iii. p. 377; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 115.

Hill-side, 19,000 ft., *Thorold.* Flowers white.

Saussurea Wellbyi, *Hemsl. in Hook. Ic. Pl.* t. 2588.

Widely distributed: 90°-96°, 35° 15′–36°, 14,600–16,800 ft., *Wellby & Malcolm.*

In flower during August and September. Flowers purple.

Crepis flexuosa, *C. B. Clarke, Comp. Ind.* p. 254.

Crepis glauca, *Benth. et Hook. f. Gen. Pl.* ii. p. 515; *Hook. f. Fl. Brit. Ind.* iii. p. 394.

Youngia flexuosa, *Ledeb. Fl. Ross.* ii. p. 838.

Prenanthes polymorpha et P. flexuosa, *Ledeb. Fl. Alt.* iv. p. 145, *et Ic. Pl. Ross.* t. 498.

Sutlej river in Gugé, 13,350 ft., *Strachey & Winterbottom.* 17,200 ft., *Thorold*, 70. 88° 20′, 35° 20′ 16,526 ft., July 29, *Wellby & Malcolm.* 82° 6′, 32° 32′–34° 21′, 14,400 and 16,100 ft., September 4, *Deasy & Pike*, 857, 862, 878, 888. Flowers yellow.

Grows in rather damp places; scarce.—*Deasy & Pike.*

Crepis glomerata, *Benth. et Hook. f. Gen. Pl.* ii. p. 515; *Hook. f. Fl. Brit. Ind.* iii. p. 398.

Tisum, 15,000 ft., *Strachey & Winterbottom*. Flowers yellow.

Crepis sorocephala, *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 116, t. 4. ff. 1–4.

Sandy, gravelly soil, 17,500 ft., *Thorold*. 83° 15′, 35° 11′, 16,316 ft., June 29, *Wellby & Malcolm*. Without locality, *Deasy & Pike*, 825.

Flowers white with blue tints; centre black and yellow.—*Wellby & Malcolm*.

Crepis, sp. aff. *C. sorocephalæ*, Hemsl., et *C. glomeratæ*, Decne.

Near the Mangtsa Tso, 17,000 ft., June 24, *Deasy & Pike*, 814 (only specimen seen).

This meagre specimen consists of a deep, stout, woody taproot, and a rosette of heads at ground-level. The bracts of the involucre are glabrous, and the dried flowers are pink.

Taraxacum bicolor, *DC. Prod.* vii. p. 148.

T. officinale, *Wigg.*, var., *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 116.

Leontodon leucanthus, *Ledeb. Fl. Alt.* iv. p. 154, *et Ic. Pl. Ross.* t. 132.

Stony, wide valleys, 17,200 ft., *Thorold*, 55 & 71. 82° 12′, 34° 20′, 16,100 ft., in damp ground and swamps, July 31, *Deasy & Pike*, 860, 895, 896. Flowers white tinged with yellow.

Taraxacum lanceolatum, *Poir. in Lam. Encyc.* v. p. 349.

T. officinale, *Wigg.*, var. ?, *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 116.

Hill-sides, 16,000 ft., *Thorold*, 135. Near Aru Tso, 16,900 ft., August 5, *Deasy & Pike*, 840, 869. Flowers yellow.

Taraxacum officinale, [*Weber in*] *Wigg. Prim. Fl. Holsat.* p. 56, var. **parvula**, *Hook. f. Fl. Brit. Ind.* iii. p. 401; *Kew Bull.* 1896, p. 213.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Flowers yellow.

Taraxacum palustre, *DC. Fl. Fr.* iv. p. 45; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 137; *Kew Bull.* 1896, p. 212.

Valley of the Murus, 91° 18′, 33° 44′, 15,640 ft., June 23, *Rockhill*. Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Flowers yellow.

Lactuca Deasyi, *S. Moore, in Journ. Bot.* xxxviii. (1900) p. 428.

Aksu, 81° 7′, 35° 5′, 16,500? ft., *Deasy*. Flowers yellow.

Lactuca Lessertiana, *C. B. Clarke, Comp. Ind.* p. 270; *Hook. f. Fl. Brit. Ind.* iii. p. 408.

Valleys of Gugé, 16,000 ft., *Strachey & Winterbottom.* Flowers blue.

Campanulaceæ.

Cyananthus incanus, *Hook. f. et Thoms. in Journ. Linn. Soc., Bot.* ii. (1858) p. 20; *Hook. f. Fl. Brit. Ind.* iii. p. 434, var. **leiocalyx**, *Franch. in Morot's Journ. de Bot.* i. (1887) p. 279; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 137.

Kechu valley, 96° 28′, 31° 25′, 12,700 ft., August 22, *Rockhill.* Flowers blue.

Plumbaginaceæ.

Statice aurea, *Linn. Sp. Pl.* p. 276; *Amman. Stirp. Rar. Ruth. Ic.* p. 132, t. 18. f. 2.

In 97°, 35° 42′, 13,363 ft., September 15, *Wellby & Malcolm.* Flowers yellow.

Primulaceæ.

Androsace Chamæjasme, *Host, Syn. Pl. Austr.* p. 95; *Willd. Sp. Pl.* i. p. 799; *Reichb. Ic. Fl. Germ.* xvii. t. 1112. f. 6; *Hook. f. Fl. Brit. Ind.* iii. p. 499, var. **coronata**, *Watt in Journ. Linn. Soc., Bot.* xx. (1882) p. 17, t. 17 A, et xxx. (1894) p. 117; *Peterm. Mitteil.* Erg.-Heft 131, p. 374.

Sandy, gravelly soil in sheltered spots near water, 17,500 ft., *Thorold*, 20. September 1, *Hedin.* 81° 41′, 34° 51′, 16,200 ft., July 9, *Deasy & Pike*, 812, 845. Flowers purple, or white with purple centre, or white with yellow centre.

Sweet smell like English May.—*Deasy & Pike.*

Androsace Tapete, *Maxim. in Bull. Acad. Pétersb.* xxxii. (1888) p. 505; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 137.

Valley of Murus, head-waters of Yangtsekiang, 91° 20′, 33° 45′, 14,900 ft., June 22, *Rockhill.* 83°, 35° 8′, 16,487 ft., June 25, *Wellby & Malcolm.* Profuse in valleys west of Horpa Tso, 17,500 ft., June 28, *Deasy & Pike*, 816. Flowers white.

Androsace villosa, *Linn. Sp. Pl.* p. 142; *Hook. f. Fl. Brit. Ind.* iii. p. 499, var. **latifolia**, *Ledeb.*; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 137.

Near Rakas Tal, 15,000–17,000 ft., *Strachey & Winterbottom.* Valley of the Murus, 91° 18′, 33° 44′, 15,640 ft., June 23, *Rockhill.* Flowers white.

Primula purpurea, *Royle, Illustr. Bot. Himal.* p. 311, t. 77. f. 2; *Kew Bull.* 1896, p. 213; *Hook. f. Fl. Brit. Ind.* iii. p. 490, *sub* P. Stuartii.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers pale or deep purple.

Primula rotundifolia, *Wall. ex Roxb. Fl. Ind. ed. Carey*, ii. p. 18; *Kew Bull.* 1896, p. 213; *Hook. f. Fl. Brit. Ind.* iii. p. 483.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers purple.

Primula tibetica, *Watt, in Journ. Linn. Soc., Bot.* xx. (1882) p. 6; xxx. (1894) p. 117; *Hook. f. Fl. Brit. Ind.* iii. p. 488.

Gugé valleys, 14,000–15,000 ft., *Strachey & Winterbottom.* Close to water, 16,200 ft., *Thorold.* Flowers purple.

Glaux maritima, *Linn. Sp. Pl.* p. 207; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 117; *Hook. f. Fl. Brit. Ind.* iii. p. 505.

At 16,200 ft., *Thorold.* Flowers pink.

Gentianaceæ.

Gentiana aquatica, *Linn. Sp. Pl.* p. 229; *Pallas, Fl. Ross.* i. pt. 2, p. 109, t. 98; *Hook. f. Fl. Brit. Ind.* iv. p. 110.

Gyanima, 15,000 ft., *Strachey & Winterbottom.* 16,800 ft., *Deasy & Pike*, 874, partim. Flowers blue.

Gentiana falcata, *Turcz. ex Kar. et Kir. in Bull. Soc. Nat. Mosc.* xv. (1842) p. 404; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 117.

Marsh, 15,000 ft., *Thorold.* Flowers blue.

Gentiana humilis, *Steven, in Mém. Soc. Nat. Mosc.* iii. (1812) p. 258; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 117; *Hook. f. Fl. Brit. Ind.* iv. p. 111.

At 16,200 ft., *Thorold.* 15,000 ft., August 30, *Deasy & Pike*, 883.

Flowers pale blue or lavender; growing in a marsh; very scarce.—*Deasy & Pike.*

Gentiana nubigena, *Edgew. in Trans. Linn. Soc.* xx. (1846) p. 85; *Hook. f. Fl. Brit. Ind.* iv. p. 116.

Balch pass and Rakas Tal, 15,000-17,000 ft., *Strachey & Winterbottom.* Flowers blue.

Gentiana Rockhillii, *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 137.

Kechu valley, 96° 28′, 31° 25′, 12,700 ft., August 22, *Rockhill.* Flowers blue.

Gentiana squarrosa, *Ledeb. in Mém. Acad. Pétersb.* v. (1812) p. 527; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 117; *Hook. f. Fl. Brit. Ind.* iv. p. 111.

Banks of dry rivulet on hill-side, 17,200 ft., *Thorold.* Flowers blue.

Gentiana tenella, *Rottb. in Kiob. Skr. Selsk.* x. (1770) p. 436, t. 2. f. 6; *Hook. f. Fl. Brit. Ind.* iv. p. 109.

In 91° 40′, 35° 21′, 16,812 ft., August 12, *Wellby & Malcolm.* 82° 40′, 33° 30′, 16,800 ft., August 12, *Deasy & Pike,* 874, partim.

Flowers gentian-blue. Growing near stream in a patch of grass on broken granite. Only one or two specimens seen, although I looked closely.—*Pike.*

Gentiana thianschanica, *Rupr. Sert. Thianschan. in Mém. Acad. Sc. Pétersb.* xix. (1869) p. 61.

G. decumbens, *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 117, *non Linn.*

Sandy soil near water, 15,400 ft., *Thorold.* Flowers greenish-white.

Gentiana Thomsoni, *C. B. Clarke, in Hook. f. Fl. Brit. Ind.* iv. p. 109.

G. arenaria, *Maxim. in herb. Kew., ined.?*

Without locality, *Deasy & Pike.* North Tibet, *Przewalski.* Flowers very small, blue.

Pleurogyne brachyanthera, *C. B. Clarke, in Hook. f. Fl. Brit. Ind.* iv. p. 120.

P. diffusa, *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 117, *non Maxim.*

Hill-side close to water, 16,800 ft., *Thorold.* On the south-east shore of Aru Tso, growing with *Taraxacum lanceolatum,* Poir., 16,900 ft., August 5, *Deasy & Pike.* Flowers blue.

BORAGINACEÆ.

Microula sikkimensis, *Hemsl. in Hook. Ic. Pl.* sub t. 2562.

Tretocarya sikkimensis, *Oliver, loc. cit.* t. 2255; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 138.

Basin of Suchu valley, north side, Drayalamo pass, 93° 17′, 31° 52′, August 2, *Rockhill*. Flowers red and blue.

Microula tibetica, *Benth. in Benth. et Hook. f. Gen. Pl.* ii. p. 853; *Hemsl. in Hook. Ic. Pl.* t. 2562; *Maxim. in Bull. Acad. Pétersb.* xxvi. (1880) p. 501.

M. Benthami, *C. B. Clarke, in Hook. f. Fl. Brit. Ind.* iv. p. 167; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 118; *Hook. Ic. Pl.* t. 2257.

Tretocarya pratensis, *Maxim. in Bull. Acad. Pétersb.* xxvii. (1881) p. 505; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 117.

Close to streams, 18,000 ft., *Thorold*. 88° 20′, 35° 20′, 16,616 ft., July 27, *Wellby & Malcolm*. 82° 8′, 34° 38′, 17,000 ft., *Deasy & Pike*, 848. Flowers white or blue.

SOLANACEÆ.

Physochlaina præalta, *Hook. Bot. Mag.* t. 4600, in nota; *Hook. f. Fl. Brit. Ind.* iv. p. 244.

Physochlaina grandiflora, *Hook. Bot. Mag.* t. 4600.

Scopolia præalta, *Dun. in DC. Prod.* xiii. p. 554.

Tisum, 15,000 ft., *Strachey & Winterbottom*. Flowers yellow.

Scopolia sp.

Camps 29 and 30, *Hedin*.

This specimen is leafless and bears only a few old fruits.

SCROPHULARIACEÆ.

Scrophularia dentata, *Royle, ex Benth. Scroph. Ind.* p. 19; *Hook. f. Fl. Brit. Ind.* iv. p. 256.

Without locality, *Deasy & Pike*. Flowers purple-brown.

Pedicularis alaschanica, *Maxim. in Bull. Acad. Pétersb.* xxiv. (1878) p. 59, var. **tibetica**, *Maxim.*; *Prain, in Ann. Bot. Gard. Calc.* iii. p. 164, t. 25. ff. *a–b*; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 118.

Broad valley, 16,000 ft., *Thorold*. Flowers yellow.

Pedicularis cheilanthifolia, *Schrenk*; *Fisch. et Mey. Enum. Pl. Nov.* ii. p. 19; *Prain, in Ann. Bot. Gard. Calc.* iii. p. 171, t. 32. ff. *a–c*; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 118; *Hook. f. Fl. Brit. Ind.* iv. p. 308.

Balch pass, about 17,000 ft., *Strachey & Winterbottom*. In wide valleys, 17,000 ft., *Thorold*. Near Aru Tso, 16,200 ft., August 4, *Deasy & Pike*, 866. Flowers white veined with purple.

Pedicularis longiflora, *Rudolph, in Mém. Acad. Pétersb.* iv. p. 345, t. 3; *Prain, in Ann. Bot. Gard. Calc.* iii. p. 112, t. 1. ff. *e–f*.

P. tubiflora, *Fisch. in Mém. Soc. Mosc.* iii. (1812) p. 58.

Valley of Gugé, 15,000 ft., *Strachey & Winterbottom*. Without locality, 15,000 ft., August 30, 1896, *Deasy & Pike*, 881.

Growing profusely in a swamp; flowers yellow streaked with purple-red; faint smell like cowslips.—*Deasy & Pike*.

Pedicularis Oederi, *Vahl, in Hornem. Dansk. Oek. Plantel.* ed. 2, p. 580; *Prain, in Ann. Bot. Gard. Calc.* iii. p. 181, t. 34. ff. *a–c*; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 138.

P. versicolor, *Wahlenb. Veg. Helvet.* p. 118.

Balch pass, 16,500 ft., *Strachey & Winterbottom*. Valley of the Murus, 91° 18′, 33° 44′, 15,640 ft., June 23, *Rockhill*. Flowers yellow.

Pedicularis Przewalskii, *Maxim. in Bull. Acad. Pétersb.* xxiv. (1878) p. 55; *Prain, in Ann. Bot. Gard. Calc.* iii. p. 120, t. 5; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 138; *Kew Bull.* 1896, p. 213.

Basin of Suchu, valley north side, Drayalamo pass, 93° 17′, 31° 52′, 14,000 ft., August 2, *Rockhill*. Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Flowers purple.

Pedicularis rhinanthoides, *Schrenk, Enum. Pl. Nov.* i. p. 22; *Prain, in Ann. Bot. Gard. Calc.* iii. p. 109, t. 1; *Kew Bull.* 1896, p. 213; *Hook. f. Fl. Brit. Ind.* iv. p. 314.

Balch pass, 13,000–16,500 ft., *Strachey & Winterbottom*. Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Flowers purple.

Oreosolen unguiculatus, *Hemsl. in Kew Bull.* 1896, p. 213.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Flowers yellow.

Selaginaceæ.

Lagotis brachystachya, *Maxim. in Bull. Acad. Pétersb.* xxvii. (1881) p. 525; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 138; *Peterm. Mitteil.* Erg.-Heft 131, p. 374.

Hill-slope 2 miles north of Murus river, 91° 31′, 33° 53′, 14,750 ft., June 21, *Rockhill*. In a stream, September 1, *Hedin*. 90° 20′, 35° 15′, 15,781 ft., August 5, *Wellby & Malcolm*. Flowers white.

Lagotis decumbens, *Rupr. Sert. Tiansch.* p. 64; *Hook. f. Fl. Brit. Ind.* iv. p. 559.

Gymnandra Thomsoni, *C. B. Clarke, in Herb. Kew.*

East of Horpa Tso, 17,000 ft., July 5, *Deasy & Pike*, 831. Flowers purple.

Lagotis glauca, *J. Gaertn. in Nov. Comm. Petrop.* xiv. (1770) p. 533, t. 18. f. 2, var. **kunawurensis**, *Hook. f. Fl. Brit. Ind.* iv. p. 560.

Gymnandra kunawurensis, *Royle, ex Benth. Scroph. Ind.* p. 47.

Rakas Tal, 15,000–16,000 ft., *Strachey & Winterbottom*. Flowers purple.

LABIATÆ.

Nepeta decolorans, *Hemsl. in Hook. Ic. Pl.* t. 2470, *et in Kew Bull.* 1896, p. 213.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*. Flowers blue.

Nepeta discolor, *Royle, ex Benth. in Hook. Bot. Misc.* iii. (1833) p. 378; *Hook. f. Fl. Brit. Ind.* iv. p. 659.

Niti pass, 15,000 ft., *Strachey & Winterbottom*. Flowers white or pale blue.

Nepeta longibracteata, *Benth. Lab.* p. 737; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 118; *Hook. f. Fl. Brit. Ind.* iv. p. 660.

Balch pass, 17,000 ft., *Strachey & Winterbottom*. Stony soil in old watercourse, 17,400 ft., *Thorold*. South end of Aru Tso, 16,200 ft., August 4, *Deasy & Pike*, 870.

Plant smells like "pear drops." Rare.—*Deasy & Pike*. Flowers blue.

Nepeta supina, *Steven, in Mém. Soc. Nat. Mosc.* iii. (1812) p. 265; *Hook. f. Fl. Brit. Ind.* iv. p. 658.

Near Rakas Tal, 15,000–17,000 ft., *Strachey & Winterbottom*. Flowers blue.

Nepeta thibetica, *Benth. Lab.* p. 737; *Hook. f. Fl. Brit. Ind.* iv. p. 664.

Near Rakas Tal, 15,000–17,000 ft., *Strachey & Winterbottom*. Flowers white.

Nepeta Thomsoni, *Benth. ex Hook. f. Fl. Brit. Ind.* iv. p. 658.

Lanjar, 16,400 ft., *Strachey & Winterbottom.* Flowers blue.

Dracocephalum heterophyllum, *Benth. Lab.* p. 738; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 118; *Peterm. Mitteil.* Erg.-Heft 131, p. 375; *Hook. f. Fl. Brit. Ind.* iv. p. 665.

Near Rakas Tal, 15,000–17,000 ft., *Strachey & Winterbottom.* Hill-sides at 17,700 ft., *Thorold*, 54. Camps 14 and 21, *Hedin.* 87° 35′, 35° 18′, 16,237 ft., July 23, *Wellby & Malcolm.* 81° 51′, 31° 41′, 16,200 ft., July 10, *Deasy & Pike*, 838, 847. Flowers white.

Dracocephalum Hookeri, *C. B. Clarke, in Hook. f. Fl. Brit. Ind.* iv. p. 666.

North of Sikkim, 15,000 ft., *Hooker.* Flowers blue.

Phlomis rotata, *Benth., ex Hook. f. Fl. Brit. Ind.* iv. p. 694; *Kew Bull.* 1896, p. 214.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers white.

Lamium rhomboideum, *Benth. Lab.* p. 509; *Hook.f. Fl. Brit. Ind.* iv. p. 678.

Kyungar, at 15,000 ft., *Strachey & Winterbottom.* Flowers purple.

The locality cited is a little south of Balch Dhura, but this species was inadvertently left in the revised table, and has been included in all the comparisons and calculations, so we retain it here, especially as its general distribution justifies the inference that it occurs in Tibet Proper.

Chenopodiaceæ.

Eurotia ceratoides, *C. A. Mey. in Ledeb. Fl. Alt.* iv. p. 239; *Peterm. Mitteil.* Erg.-Heft 131, p. 375; *Hook. f. Fl. Brit. Ind.* v. p. 8.

Plains of Gugé, 15,000–16,000 ft., *Strachey & Winterbottom.* August 7, *Hedin.* Flowers green.

Kalidium gracile, *Fenzl, in Ledeb. Fl. Ross.* iii. p. 769; *Peterm. Mitteil.* Erg.-Heft 131, p. 375.

Harato, 11,000 ft., *Hedin.* Flowers green.

Salsola collina, *Pallas, Ill. Pl.* p. 34, t. 26; *Hook. f. Fl. Brit. Ind.* v. p. 17.

Without locality, *Deasy & Pike*, 886. Fruit pink.

Salsola Kali, *Linn. Sp. Pl.* p. 222; *Hook. f. Fl. Brit. Ind.* v. p. 17.

Tisum, 15,000 ft., *Strachey & Winterbottom*. Fruit pink.

Halogeton glomeratus, *C. A. Mey. in Ledeb. Fl. Alt.* i. p. 378, *Ic. Pl. Ross.* i. t. 40; *Hook. f. Fl. Brit. Ind.* v. p. 20.

88° 30′, 35° 20′, 16,294 ft., July 28, *Wellby & Malcolm*. Flowers white or pink.

Some doubt exists as to the correctness of the identification of Wellby & Malcolm's specimen, the material being in a very young condition.

Polygonaceæ.

Polygonum Bistorta, *Linn. Sp. Pl.* p. 360; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 138.

Pochu valley, 94° 45′, 31° 45′, 14,000 ft., August 14, *Rockhill*. Flowers red.

Polygonum bistortoides, *Boiss. Diagn.* ser. 1, v. p. 46; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 138.

Ramachu valley, hill-side, 94° 28′, 31° 48, 12,800 ft, August 12, *Rockhill*. Flowers red.

Polygonum Deasyi, *Rendle, in Journ. Bot.* xxxviii. (1900) p. 428 (*errore* tibeticum).

North Tibet, *Deasy*. Flowers crimson.

Polygonum sibiricum, *Laxm. in Nov. Act. Petrop.* xviii. (1773) p. 531, t. 7. f. 2; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 118; *Peterm. Mitteil.* Erg.-Heft 131, p. 375; *Hook. f. Fl. Brit. Ind.* v. p. 52.

P. hastatum, *Murray, in Nov. Comm. Gott.* v. (1774) p. 37, t. 6; *Ledeb. Ic. Pl. Ross.* iv. t. 361.

Near salt lake, 16,300 ft., *Thorold*. Between camps 12 and 13, 16,160 ft., August 27, *Hedin*. 83°, 35° 10′, 16,481 ft., June 27, *Wellby & Malcolm*. Flowers pink; green (Thorold).

The Tibetan specimens are small—in many cases minute; while those from Siberia are much taller. Used as a vegetable in Tibet.

Polygonum sphærostachyum, *Meissn. Monogr.* p. 53; *Kew Bull.* 1896, p. 214; *Hook. f. Fl. Brit. Ind.* v. p. 32; *Bot. Mag.* t. 6847.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers crimson.

Polygonum tibeticum, *Hemsl. in Kew Bull.* 1896, p. 214, *et in Hook. Ic. Pl.* t. 2471.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers pink.

Polygonum tortuosum, *D. Don, Prod. Fl. Nep.* p. 71; *Hook. f. Fl. Brit. Ind.* v. p. 52.

Plains of Gugé, 15,500 ft., *Strachey & Winterbottom.* Flowers red.

Polygonum viviparum, *Linn. Sp. Pl.* p. 360; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 138; *Kew Bull.* 1896, p. 214; *Hook. f. Fl. Brit. Ind.* v. p. 31.

Valleys in Gugé, 14,000–16,000 ft., *Strachey & Winterbottom.* Pochu valley, 94° 45′, 31° 45′, 14,000 ft., August 14, *Rockhill.* Goring valley, 90° 25′, 30° 12°, about 16,500 ft., *Littledale.* Flowers pink.

Rheum spiciforme, *Royle, Illustr. Bot. Himal.* p. 318, t. 78: *Kew Bull.* 1896, p. 214; *Peterm. Mitteil.* Erg.-Heft 131, p. 375: *Hook. f. Fl. Brit. Ind.* v. p. 55.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Camp 21, *Hedin.* 81° 41′, 34° 52′, 16,200 ft., July 9, plentiful over an area of about two square miles at the foot of limestone cliffs, *Deasy & Pike*, 846. North Tibet, *Przewalski.* Flowers white or pink. Fruit crimson.

Ladaki name "Latchu."—*Deasy & Pike.*

Rheum Moorcroftianum, referred to by Strachey (Geogr. Journ. 1900, xv. pp. 258–259) as "a species of Rhubarb very common in Tibet," is probably *R. spiciforme*, Royle.

Thymelæaceæ.

Stellera Chamæjasme, *Linn. Sp. Pl.* p. 559; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 118; *Hook. f. Fl. Brit. Ind.* v. p. 196.

Sandy valleys, 15,000 ft., *Thorold.* Flowers green or yellow.

ELÆAGNACEÆ

Hippophaë Rhamnoides, *Linn. Sp. Pl.* p. 1023; *Hook. f. Fl. Brit. Ind.* v. p. 203.

Plains of Gugé, 12,000–15,000 ft., *Strachey & Winterbottom.* Flowers green. Fruit orange or scarlet.

EUPHORBIACEÆ.

Euphorbia tibetica, *Boiss. in DC. Prodr.* xv. 2, p. 114; *Hook. f. Fl. Brit. Ind.* v. p. 260.

Between Gunda-yaukti and Tazang, 15,400–16,100 ft., *Strachey & Winterbottom.* Without locality, *Deasy & Pike.* Flowers green.

URTICACEÆ.

Urtica hyperborea, *Jacquem. ex Wedd. Monogr. Urt.* p. 68; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 118; *Kew Bull.* 1896, p. 214; *Peterm. Mitteil.* Erg.-Heft 131, p. 375; *Hook. f. Fl. Brit. Ind.* v. p. 548.

Amongst stones, 16,200 ft., *Thorold.* Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Between camps 29 and 30, September 20, *Hedin.* 17,000 ft., *Deasy & Pike*, 863. Flowers green.

SALICACEÆ.

Salix Lapponum, *Linn. Sp. Pl.* p. 1019; *Ledeb. Fl. Ross.* iii. p. 617; *Kew Bull.* 1896, p. 214 (?).

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Flowers green.

Salix sclerophylla, *Anderss. in Journ. Linn. Soc., Bot.* iv. (1860) p. 52; *Hook. f. Fl. Brit. Ind.* v. p. 630.

Between Jungbwa Tol and Rakas Tal, 15,000 ft., *Strachey & Winterbottom.* Flowers green.

GNETACEÆ.

Ephedra Gerardiana, *Wall. Cat.* n. 6048; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 118; *Stapf, Gatt. Ephedra*, p. 75.

E. vulgaris, *Brandis, For. Fl.* p. 501, *partim, non Rich.*; *Hook. f. Fl. Brit. Ind.* v. p. 640.

Salt-impregnated soil close to salt-lake, 16,500 ft., *Thorold*, 67. Near the Aru Tso, 16,700 ft., *Deasy & Pike*, 861. Flowers yellow. Fruit red.

Common on west side of Lanak La. It has a slightly resinous smell and taste, and is called "tseput" by the Ladakis, who mix it, when dried and powdered, with tobacco to make "tso tuck," a pinch of which they place under the tongue.—*Deasy & Pike.*

Iridaceæ.

Iris Thoroldii, *Baker, in Journ. Linn. Soc., Bot.* xxx. (1894) p. 118 et p. 139; *Hook. Ic. Pl.* t. 2302.

Top of pass, 17,800 ft., *Thorold,* 116 bis. Sharakuyi Gol. 93° 27′, 35° 50′, 13,800 ft., May 29, *Rockhill*; 91°, 35° 16′, 16,301 ft., August 8, *Wellby & Malcolm.* Flowers yellow.

Liliaceæ.

Allium Jacquemontii, *Regel, in Act. Horti Petrop.* iii. 2 (1875) p. 162; *Hook. f. Fl. Brit. Ind.* vi. p. 342.

Near Rakas Tal, 15,000–17,000 ft., *Strachey & Winterbottom.* Flowers lilac.

Allium Semenovi, *Regel, in Bull. Soc. Nat. Mosc.* xli. (1868) 1, p. 449, *Fl. Turk.* i. p. 49, t. 8. ff. 4 et 5; *Peterm. Mitteil.* Erg.-Heft 131, p. 375; *Hook. f. Fl. Brit. Ind.* vi. p. 338.

Camp 31, September 7, *Hedin.* Widely distributed: 88°–96°, 35° 10′–35° 20′, 14,600–17,000 ft., *Wellby & Malcolm.*

Flowers dull white or pale yellow.

Allium senescens, *Linn. Sp. Pl.* p. 299, var.; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 119.

Rocky hill among stones, 16,200 ft., *Thorold.* Without locality, *Deasy & Pike.* Flowers pink.

The same variety was collected by Conway in the Karakorum.

Gagea pauciflora, *Turcz. in Bull. Soc. Nat. Mosc.* 1838, p. 102 (name only), et xxvii. (1854) pars ii. p. 113; *Ledeb. Fl. Ross.* iv. p. 143.

Plecostigma pauciflorum, *Turcz. in Bull. Soc. Nat. Mosc.* xxvii. (1854) pars ii. p. 113; *Trautv. Imag.* t. 2; *Maxim. Ind. Fl. Mongol. in Prim. Fl. Amur.* p. 485.

Ornithogalum pauciflorum, *Turcz. in Bull. Soc. Nat. Mosc.* xxvii. (1854) pars ii. p. 113.

Tulipa ornithogaloides, *Fisch. ex Ledeb. Fl. Ross.* iv. p. 143.

Szechenyia lloydioides, *Kanitz, Pl. Exped. Széchenyi Asia Centr.* p. 60. t. 7. ff. 1–3.

Tulipa (§ Orithya) sp.aff. T. eduli, *Baker*; *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 139.

Sharakuyi Gol, hill-slope, 93° 27′, 35° 50′, 13,800 ft., May 29, *Rockhill*. Flowers yellow.

Juncaceæ.

Juncus Thomsoni, *Buchenau, in Bot. Zeitung*, xxv. (1867) p. 148.

J. leucomelas, *Royle, in Hook. f. Fl. Brit. Ind.* vi. p. 397, partim.

J. membranaceus, *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 119, *non Royle*.

Close to water, 16,200 ft., *Thorold*, 102. 82° 12′, 34° 19′, 16,100 ft., July 31, *Deasy & Pike*, 858. Flowers white and yellow.

Naiadaceæ.

Potamogeton pectinatus, *Linn. Sp. Pl.* p. 127; *Hook. f. Fl. Brit. Ind.* vi. p. 567.

Without locality, 17,000 ft., *Hooker*.

This was taken for *Zannichellia palustris* when it was collected, which accounts for the latter name appearing in the list of Tibet plants in Hooker & Thomson's 'Flora Indica,' Introduction, p. 227.

Flowers small, green, with yellow anthers.

Triglochin palustre, *Linn. Sp. Pl.* p. 338; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 119; *Hook. f. Fl. Brit. Ind.* vi. p. 563.

Between Tisum and the Sutlej river, 15,000 ft., *Strachey & Winterbottom*. Close to water, 16,200 ft., *Thorold*. Flowers small, green, tinged with red.

Cyperaceæ *.

Kobresia Sargentiana, *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 139.

Hill-slope two miles north of Murus river, 91° 31′, 33° 53′, 14,750 ft., June 21, *Rockhill*. Without locality, *Deasy & Pike*, 839 A.

Kobresia schœnoides, *Boeck. in Linnæa*, xxxix. (1875) p. 7; *Hook. f. Fl. Brit. Ind.* vi. p. 697.

82° 16′, 34° 51′, a small patch only, on the bare hill-side: on

* As the flowers of the Cyperaceæ and Gramineæ are almost invariably green, with yellow, or occasionally red, anthers, it has not been considered worth while repeating this under each species.

dry gravel near the bed of a dry mountain stream, 16,300 ft., July 19, *Deasy & Pike*, 839.

Scirpus Caricis, *Retz. Pl. Scand. Prod.* p. 11; *Kew Bull.* 1896, p. 215; *Hook. f. Fl. Brit. Ind.* vi. p. 660.

Between Gunda-yaukti and Tazang, 15,400–16,000 ft., *Strachey & Winterbottom*. Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*.

Carex incurva, *Lightf. Fl. Scot.* ii. p. 544, t. 24. f. 1; *Hook. f. Fl. Brit. Ind.* vi. p. 711.

Without locality, *Deasy & Pike*.

Carex Moorcroftii, *Falconer, ex Boott, in Trans. Linn. Soc.* xx. (1851) p. 140; *Boott, Ill. Gen. Carex*, i. p. 9, t. 27; *Journ. Linn. Soc., Bot.* xxx. (1894) pp. 119 et 139; *Hook. f. Fl. Brit. Ind.* vi. p. 733, with synonymy.

Sandy, gravelly soil, 17,600 ft., *Thorold*. Hill-slope two miles north of Murus river, 91° 31′, 35° 53′, June 21, *Rockhill*. Without locality, *Wellby & Malcolm*, *Deasy & Pike*, 812.

Moorcroft ('Travels,' i. p. 293) says of this species:—"A very valuable herbage occurs in the 'Long-ma' or 'Sand-grass' of Ladak, which growing on the loose sandy soil and forming an intricate network both on the surface and beneath it, protects the slender covering of the primitive substratum from being blown away by the strong winds that sweep the valleys, and the whole country from being converted into a succession of bare rocks and mounds of sand. The 'Long-ma' rarely reaches more than a height of ten or twelve inches, and frequently not more than five or six, a considerable portion of the blade being always buried in the sand. The length of the root is much more considerable, and strikes so deep that it cannot be extracted entire. At a depth of five feet it was found little diminished in circumference, throwing off numerous lateral fibres through its whole course . . . . . It is sufficiently hardy to outlive other herbage, and in November, when there is nothing else on the ground, it is eaten by horses and yaks. The plant emits a pleasant smell, and has a sweet and agreeable taste, but the leaf is stiff and harsh with sharp edges." (Boott, 'Carex,' *loc. cit.*) Flowers June and July.

Carex rigida, *Gooden. in Trans. Linn. Soc.* (1794) ii. p. 193, t. 22; *Hook. f. Fl. Brit. Ind.* vi. p. 711.

Without locality, *Deasy & Pike*.

Carex sabulosa, *Turcz. ex Kunth, Enum. Pl.* ii. p. 432; *Peterm. Mitteil.* Erg.-Heft 131, p. 375.

Between camps 12 and 13, 16,160 ft., August 27, *Hedin.*

Closely related to *C. melanantha*, Mey., which is common on the Himalaya, and of which it may be merely a long-beaked orm.—*C. B. Clarke.*

Carex stenophylla, *Wahlenb. in Vet.-Akad. Nya Handl. Stockh.* (1803) p. 142; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 119; *Hook. f. Fl. Brit. Ind.* vi. p. 700.

Close to water, 16,200 ft., *Thorold.*

Carex ustulata, *Wahlenb. in Vet.-Akad. Nya Handl. Stockh.* (1803) p. 156; *Kew Bull.* 1896, p. 215; *Hook. f. Fl. Brit. Ind.* vi. p. 734.

Balch pass, about 17,000 ft., *Strachey & Winterbottom.* Goring valley, 90° 25′, 30° 12′, about 16,000 ft., *Littledale.*

Gramineæ.

Pennisetum flaccidum, *Griseb. Gesamm. Abhandl., Gram. Hochasiens*, p. 302; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 120; *Hook. f. Fl. Brit. Ind.* vii. p. 84.

Without locality, *Thorold, Deasy & Pike.*

Stipa Hookeri, *Stapf, in Journ. Linn. Soc., Bot.* xxx. (1894) p. 120; *Hook. f. Fl. Brit. Ind.* vii. p. 232.

Sheltered nullahs near water, 14,800 ft., *Thorold.*

Stipa mongolica, *Turcz. ex Trin. in Bull. Acad. Pétersb.* i. (1836) p. 67; *Hook. f. Fl. Brit. Ind.* vii. p. 229.

Lasiagrostis mongholica, *Trin. et Rupr. in Mém. Acad. Pétersb.* sér. 6, *Sc. Nat.* v. (1842) p. 87.

Gugé, 15,000 ft., *Strachey & Winterbottom.*

Stipa orientalis, *Trin. ex Ledeb. Fl. Alt.* i. p. 83; *Ledeb. Ic. Pl. Ross.* iii. t. 223; *Hook. f. Fl. Brit. Ind.* vii. p. 229.

Tisum, 15,000 ft., *Strachey & Winterbottom.* Without locality. *Wellby & Malcolm, Deasy & Pike.*

This is the common grass of the Pamir, the whole area being practically covered with it.—*Giles*, in Kew Herbarium.

Stipa purpurea, *Griseb. Gesamm. Abhandl., Gram. Hochasiens.*

p. 300; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 120; *Hook. f. Fl. Brit. Ind.* vii. p. 229.

Lasiagrostris tremula, *Rupr. Sert. Thianschan.* p. 35.

Tisum, 15,000 ft., *Strachey & Winterbottom*; 16,500 ft., *Thorold*, 107. Without locality, *Deasy & Pike.*

Stipa sibirica, *Lam. Illustr.* i. p. 158, var. **pallida**, *Hook. f. Fl. Brit. Ind.* vii. p. 231.

S. pallida, *Munro, ex Duthie, Grass. N.W. Ind.* p. 27.

Tisum, 15,000 ft., *Strachey & Winterbottom.*

Oryzopsis lateralis, *Stapf, in Hook. f. Fl. Brit. Ind.* vii. p. 234.

Shelshel river, 14,000 ft., *Strachey & Winterbottom.*

Sir R. Strachey (Geogr. Journ. xv. p. 247) cites this under the name of *O. æquiglumis.*

Deyeuxia compacta, *Munro, ex Duthie, Grass. N.W. Ind.* p. 30; *Hook. f. Fl. Brit. Ind.* vii. p. 267.

Calamagrostis holciformis, *Jaub. et Spach, Ill. Pl. Or.* iv. p. 61, t. 340; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 121.

Gugé, 15,000 ft., *Strachey & Winterbottom.* At great elevations, *Thorold.* Without locality, *Deasy & Pike.*

Deschampsia cæspitosa, *Beauv. Agrost.* p. 91, t. 18. f. 3; *Hook. f. Fl. Brit. Ind.* vii. p. 273.

Balch pass, 16,500 ft., *Strachey & Winterbottom.*

Avena subspicata, *Clairv. Man. Herb.* p. 17; *Hook. f. Fl. Brit. Ind.* vii. p. 278.

Trisetum subspicatum, *Beauv. Agrost.* p. 88; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 119.

Balch pass, about 17,000 ft., *Strachey & Winterbottom.* Without locality, 16,000 ft., *Thorold.*

Phragmites communis, *Trin. Fund. Agrost.* p. 134; *Peterm. Mitteil.* Erg.-Heft 131, p. 375; *Hook. f. Fl. Brit. Ind.* vii. p. 303.

Jugdi, October 17, *Hedin.*

Diplachne Thoroldi, *Stapf, in Journ. Linn. Soc., Bot.* xxx. (1894) p. 121.

Sandy soil in valleys, 15,800 ft., *Thorold*, 120. Without locality, *Deasy & Pike.*

Poa alpina, *Linn. Sp. Pl.* p. 67; *Hook. f. Fl. Brit. Ind.* vii. p. 338, var., *Peterm. Mitteil.* Erg.-Heft 131, p. 375.

September 1, *Hedin*.

This specimen is too poor for certain identification.

Poa attenuata, *Trin. ex Bunge, Verz. Suppl. Fl. Alt.* p. 9; *Hook. f. Fl. Brit. Ind.* vii. p. 340.

P. alpina, *Linn. forma* nana, *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 120.

Sheltered valley, 17,000 ft., and sandy gravelly soil on hill-sides, 16,400 ft., and 18,000 ft., *Thorold*, 26, 80, 103. Without locality, *Deasy & Pike*.

Very common on the Great and Little Pamir, growing in thick tussocks both on the open Pamir and on the slopes up to the limit of vegetation.—*Alcock*, in Kew Herbarium.

Poa nemoralis, *Linn. Sp. Pl.* p. 69; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 119; *Hook. f. Fl. Brit. Ind.* vii. p. 341.

Sheltered valley, 17,000 ft., *Thorold*.

Poa pratensis, *Linn. Sp. Pl.* p. 67; *Hook. f. Fl. Brit. Ind.* vii. p. 339.

Plains of Tibet, 15,000 ft., *Strachey & Winterbottom*.

Poa tibetica, *Munro, ex Duthie, Grasses N.W. Ind.* p. 41; *Hook. f. Fl. Brit. Ind.* vii. p. 339.

Plains of Tibet, 15,000 ft., *Strachey & Winterbottom*.

Littledalea tibetica, *Hemsl. in Kew Bull.* 1896, p. 215.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*.

Glyceria distans, *Wahlenb. Fl. Upsal.* p. 36; *Hook. f. Fl. Brit. Ind.* vii. p. 347, *forma* nana.

Atropis distans, *Griseb. in Ledeb. Fl. Ross.* iv. p. 388, *forma* nana, *Hemsl. in Journ. Linn. Soc., Bot.* xxx. (1894) p. 122.

At 16,200–17,000 ft., *Thorold*, 78, 88, 111. 86° 48′, 35° 18′, 16,300 ft., *Wellby & Malcolm*. Without locality, *Deasy & Pike*.

Glyceria distans, *Wahlenb.*, var. **convoluta**.

Atropis distans, *Griseb., var.* convoluta, *Trautv. in Act. Horti Petrop.* i. p. 282; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 122.

A. convoluta, *Griseb. in Ledeb. Fl. Ross.* iv. p. 389, *forma* nana.

Close to water, 16,200 ft., *Thorold*, 89 & 91. 87° 35′, 35° 18′; 16,237 ft., July 23, *Wellby & Malcolm*.

Festuca Deasyi, *Rendle, in Journ. Bot.* xxxviii. (1900) p. 429.

Plateau near Polu, 10,000 ft., *Deasy*.

Festuca nitidula, *Stapf, in Hook. f. Fl. Brit. Ind.* vii. p. 350.
Tisum, 15,000 ft., *Strachey & Winterbottom.*

Festuca sibirica, *Hackel, ex Boiss. Fl. Orient.* v. p. 626: *Hook. f. Fl. Brit. Ind.* vii. p. 355.
Tisum, 15,000 ft., *Strachey & Winterbottom.*

Festuca valesiaca, *Schleich. ex Gaud. Agrost. Helvet.* i. p. 242; *Hook. f. Fl. Brit. Ind.* vii. p. 348.
Festuca ovina, *Linn.*, var. valesiaca, *Koch*; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 122; *Peterm. Mitteil.* Erg.-Heft 131, p. 375.
Festuca ovina, *Linn.?*, *Journ. Linn. Soc., Bot.* xxx. (1894) p. 140.
Tisum, 15,000 ft., *Strachey & Winterbottom*; 15,500 ft., *Thorold*, 110. Hill-slope two miles north of Murus river, headwaters of Yangtsekiang, 91° 31′, 33° 53′, 14,750 ft., *Rockhill.* September 1, *Hedin.* Near the Horpa Tso, 16,400 ft., June 28. *Deasy & Pike*, 823.

Festuca sp.
In 82° 45′, 35°, 17,108 ft., *Wellby & Malcolm.*
Specimen too poor for identification.

Agropyron longearistatum, *Boiss. Fl. Orient.* i. p. 660; *Peterm. Mitteil.* Erg.-Heft 131, p. 375; *Hook. f. Fl. Brit. Ind.* vii. p. 368.
Between Gunda-yaukti and Tazang, 15,400–16,100 ft., *Strachey & Winterbottom.* Without locality, *Hedin.*

Agropyron striatum, *Nees, ex Steud. Syn. Pl. Gram.* p. 346; *Kew Bull.* 1896, p. 215; *Hook. f. Fl. Brit. Ind.* vii. p. 369.
Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale.* Without locality, *Deasy & Pike.*

Agropyron Thoroldianum, *Oliver, in Hook. Ic. Pl.* t. 2262; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 123; *Peterm. Mitteil.* Erg.-Heft 131, p. 375.
At 16,500 ft., *Thorold*, 108. Camp 21, September 7, *Hedin.*
This strongly resembles *Elymus lanuginosus*, Trin., and may prove to be a state of that plant.

Elymus dasystachys, *Trin. in Ledeb. Fl. Alt.* i. p. 120; *Ledeb. Ic. Pl. Ross.* iii. t. 249; *Journ. Linn. Soc., Bot.* xxx. (1894) p. 120; *Peterm. Mitteil.* Erg.-Heft 131, p. 375; *Hook. f. Fl. Brit. Ind.* vii. p. 374.

Sandy plain, 16,000 ft., and valleys, 17,000 ft., *Thorold*. Jugdi, October 17, *Hedin*.

Elymus junceus, *Fisch. in Mém. Soc. Nat. Mosc.* i. (1811) p. 25, t. 4.

In 90° 45′ and 35° 16′, 15,909 ft., August 6, *Wellby & Malcolm*. Without locality, *Deasy & Pike*.

Elymus lanuginosus, *Trin. ex Ledeb. Fl. Alt.* i. p. 121; *Ledeb. Ic. Pl. Ross.* iii. t. 250.

In 88° 20′ and 35° 20′, 16,526 ft., July 29, *Wellby & Malcolm*.

Elymus sibiricus, *Linn. Sp. Pl.* p. 3; *Journ. Linn. Soc. Bot.* xxx. (1894) p. 120; *Hook. f. Fl. Brit. Ind.* vii. p. 373.

Tisum 15,000 ft., *Strachey & Winterbottom*. Close to water, 16,200 ft., *Thorold*. Without locality, *Deasy & Pike*.

Filices.

Polypodium hastatum, *Thunb. Fl. Jap.* iii. p. 335, et *Ic. Fl. Jap.* p. 10; *Hook. Sp. Fil.* v. p. 74; *Kew Bull.* 1896, p. 215.

Goring valley, 90° 25′, 30° 12′, about 16,500 ft., *Littledale*.

VEGETATION

As illustrated by various Collections from the Countries immediately bordering Tibet.

The general character of the vegetation of Tibet is more or less fully described in the extracts we have made from the narratives of the various travellers whose collections are dealt with in this paper. We propose giving here a more connected account, based on data collected from all these sources, from the notes accompanying the dried plants, and from the plants themselves. This will involve some repetitions, which, however, are unavoidable. But before proceeding to an examination and discussion of the data afforded by these collections, it may be useful to give some particulars of the vegetation of the immediately adjoining countries.

To Maximowicz we are indebted for the following observations on the vegetation of the countries immediately to the north and east of Tibet:—

"On the ridges of the Nan Shan and Altyn Tag, and beyond.

towards the Keria mountains, on the mud-beds (commonly called loess) along the Hoangho, and the river-valleys of the Amdo and in Tsaidam, the flora calls to mind that of the adjoining regions of Mongolia; but in the alpine zone the flora is more like that of the mountains of North Central Asia, and the resemblance becomes greater in the drier areas.

"Forests are altogether absent from the mountain-ridges of Chinese Turkestan and the confines of Mongolia—one or two small areas on the eastern Nan Shan mountains excepted.

"In the Keria mountains also the few shrubs which occur, namely, *Tamarix Pallasii*, *Myricaria germanica*, *Caragana pygmæa*, *Hedysarum*, *Nitraria*, and *Lycium turcomanicum*, are met with only in the deepest ravines.

"Descending the northern slopes of Altyn Tag, between 9000 and 7000 feet above the sea, we find *Tamarix laxa*, *Populus diversifolia*, *Ephedra*, *Halostachys orgyalis*, *Zygophyllum*, *Reaumuria*, *Kalidium*, *Karelinia*, *Phragmites*, *Lasiagrostis*, as well as some of those mentioned above; and at the foot of the mountains *Alhagi camelorum* appears.

"In the desert-valleys between the Nan Shan ridges, the flora, sparse and grey of aspect, is composed of *Salsola abrotanoides*, *Sympegma Regeli*, *Astragalus monophyllus*, *Stellera Chamæjasme*, *Potentilla fruticosa*, *Festuca*, and, in the wetter places, *Hedysarum multijugum*, *Tamarix elongata*, *Comarum Salessowii*, *Caryopteris mongolica*, *Hippophaë*, *Calimeris alyssoides*, *Salix*, *Mulgedium tataricum*, *Rheum spiciforme*, *Gentiana barbata*, *Adenophora*, and other species of *Potentilla*.

"The alpine meadows on the Keria mountains are small and are inhabited by few species, among them dwarf grasses, *Artemisia parvula*, species of *Astragalus*, *Allium*, *Iris*, *Statice*, *Saxifraga*, *Androsace*, and others, which are more common in Northern Tibet. The appearance of the alpine meadows of Nan Shan, situated in a belt between 11,000 and 13,000 ft., is a little better, but even here they are by no means extensive, and are frequently interrupted by broken rocks and stony declivities. Here grow about a dozen species of *Oxytropis* and *Astragalus*, among them *O. tragacanthoides*, *Sterigma sulfureum*, *Crepis Pallasii*, *Allium Szovitsianum*, *Potentilla multifida*. And at a higher elevation, on the northern side up to 13,700 ft., on the southern up to 15,000 ft., are found scattered specimens of *Saussurea sorocephala*, *Leontopodium alpinum*,

Thylacospermum, *Sedum quadrifidum*, *Draba alpina*, *D. himalaica*, and *Werneria nana*.

"Some parts of Tsaidam, which is protected on all sides by high mountains, supports a more vigorous vegetation, although the species represented are not numerous. In the swamps at the foot of the mountains there are *Scirpus maritimus*, *Typha stenophylla*, *Hippuris vulgaris*, and *Utricularia*, with *Elymus sibiricus* on their margins. In the salt plain, among the pools and marshes, many large areas are covered with *Arundo Phragmites* (*Phragmites communis*); the streams are fringed with shrubs of *Myricaria germanica*, *Nitraria*, *Lycium turcomanicum*. In the salt-marshes occur *Kalidium gracile*, *Salsola Kali*, *Halogeton*, and *Kochia mollis*; in the drier areas grow *Nitraria Schoberi* var. *orgyalis*, *Eurotia ceratoides*, *Atraphaxis lanceolata*, *Reaumuria soongorica* and *R. trigyna*; and on the dunes of shifting sand, *Haloxylon Ammodendron*, *Hedysarum Arbuscula*, *Psamma villosa*, *Apocynum venetum*, *Tamarix Pallasii*, *T. laxa*, and *Artemisia campestris* are the predominating plants. On the slopes of the Koko Nor mountains extending into Tsaidam is a forest of *Juniperus Pseudo-Sabina*; along the rivers Bais and Nomochu, towards the Tibetan frontier, *Tamarix Pallasii* attains a height of nearly twenty feet, and *Sphærophysa salsula*, *Calligonum mongolicum*, and *Cynomorium coccineum* occur.

"The elevated plateaux around the Koko Nor and upper Hoangho are either salt-marshes and very sparsely covered with such herbs as *Nitraria*, *Kalidium*, *Polygonum Laxmanni*, *Orchis salina*, *Iris ensata*, *Pedicularis cheilanthifolia*, *Primula sibirica*, or expanses covered with *Lasiagrostis splendens*, *Stipa orientalis*, and other grasses, or meadows in which grow *Calimeris altaica*, *Thalictrum petaloideum*, *Oxytropis aciphylla*, and a few Tibetan species, such as *Hypecoum leptocarpum* and *Hymenolæna* sp., for example. Trees and the taller shrubs have withdrawn from the fierce winds either into the mountain-passes or to the deep precipices and ravines of the loess, where open woods exist composed of *Populus Przewalskii*, with a trunk sometimes 70 ft. high and two feet thick; *Hippophaë*, 40 ft. high and one foot thick; *Abies*, 100 ft. high and three to four feet thick; trees of *Juniperus Pseudo-Sabina*, and very frequently shrubs belonging to the genera *Berberis*, *Sorbus*, *Cotoneaster*, *Lonicera*, *Rosa*, *Ribes*, etc.

"On the high plateau of Tibet there occur not a few Mongolian or Siberian species, especially in the saline areas.

"Certain Tangut species are found in N.E. Tibet and in some river-valleys where loess is absent, in the Amdo province, and here indeed they grow more vigorously than any other species. Forests at 8000 ft. and upwards on the Tetung mountains, and from 11,500 feet on the southern Koko Nor chain, as well as the thickets of the alpine region, contain upwards of 60 species; *e. g.* in the forests: *Betula Bhojpattra*, *B. alba*, *Pinus leucosperma*, *Abies Schrenkiana*, *Sorbus Aucuparia*, *S. microphylla*, *Prunus stipulacea*, seven species of *Lonicera*, *Ribes stenocarpum*, *R. nigrum*, two new species of *Berberis* 12 ft. high, and of the same height *Philadelphus coronarius*, *Hydrangea pubescens*, *Spiræa longigemmis*, *Eleutherococcus senticosus*, *Daphne tangutica*. In the alpine thickets are four new species of *Rhododendron*, *Caragana jubata*, *Sibiræa lævigata*, *Potentilla fruticosa*, *P. glabra*, etc.

"In the shade of the woods and thickets numerous herbs are congregated, often luxuriant and tall, among which are several new species of *Senecio*, *Saussurea*, and *Salvia*, *Podophyllum Emodi*, etc.

"The alpine meadows along the river Tetung, between 13,000 and 15,000 ft., also abound with peculiar species belonging to the genera *Corydalis*, *Gentiana*, *Pedicularis*, *Primula*, *Lagotis*, etc., intermingled with which are Himalayan species, such as *Trollius pumilus*, *Crepis glomerata*, *Saussurea hieracifolia*, *Lancea tibetica*, *Halenia elliptica*, *Dracocephalum heterophyllum*, etc.

"On the most elevated plateau of Tibet trees and the larger shrubs are entirely wanting. Undershrubs, a few inches high, occur on the banks of the river Yangtze (Mur-assu), *Lonicera hispida*, *L. rupicola*, *L. parvifolia*, *Spiræa*, *Hippophaë*, *Caragana*, *Berberis cratægina*, *Ribes* sp., *Salix* sp., as outliers of Siberian and Himalayan species. At first sight the mud or gravel flats seem to be quite destitute of life; nevertheless they support low herbs one to three inches high, growing in widely scattered masses, tufted, erect, or in low cushions with bare intervening spaces, many of which are found also in Amdo, but here they are excessively dwarfed—*Incarvillea compacta*, *Meconopsis integrifolia*, *M. punicea*, *Przewalskia*, *Anaphalis*, *Werneria*, *Cremanthodium*, *Arenaria*, *Ranunculus tricuspis*, *R. pulchellus*, etc. But there is also a considerable proportion of new species—*Nasturtium tibeticum*, *Parrya villosa*, *Androsace Tapete*, *Astragalus* spp., *Oxytropis* spp., and numerous very dwarf species of *Saussurea*, some of which are very handsome.

"Alongside the rivers, yet rarely, are meadows gay with *Stipa pedalis*, *Elymus*, *Comarum*, *Nitraria*, *Clematis orientalis*, *Allium*, *Iris*, *Astragalus*, *Statice*, *Rheum spiciforme*, etc.

"At the base of the mountains to the north, as well as in the Tang-la Range towards the south, are swamps filled with very dense tufts of *Kobresia tibetica*.

"All this peculiar Tibetan flora—as it were a 'very cold' repetition of the Alpine flora of Amdo—does not seem to cross a diagonal line drawn between Tengri lake and Odontala (96° 30′ and 35°), for no mention is made, at least by our travellers, of any species common to this flora and to that of Amdo, to the west of that line, where the region is drier and more sterile, and a large area seems to be uninhabited. Other species, endemic in Tibet, in part at least, do cross that line. Hence it seems proved that Northern Tibet may be divided into two natural provinces according to the distribution of the plants. The western part is poor in species, and in every respect reminds one of the highest regions of the Himalaya and Tibet Minor. The eastern part, Tangut properly so-called, relatively abounds in species which flourish in the deep valleys of the eastern frontier bordering Amdo, and not a few cross beyond Amdo, entering Eastern Khansu, Northern Szechuen, or even the Alps of the Shansi and Chihli Provinces, for example, *Ajuga lupulina*, *Anaphalis Hancockii*, and *Stellaria infracta*."

Plants of the Gilghit-Chitral Expedition, 1885–1886.

The collection of dried plants, made on this expedition by Dr. G. M. Giles, was presented to Kew, and a rough list of them was published in Col. Sir W. S. A. Lockhart's Confidential Report, together with some interesting notes by Dr. Giles. Much care had been devoted to the collecting and labelling of the 500 species, or thereabouts, and it was a pity, as Dr. Giles remarks, that the geographical and biological questions were not worked out; but pressure of work at Kew prevented anything beyond approximate determinations of the species being made. Reference is made here to the collection more with the intention of making known its existence and partial publication in an almost inaccessible report, than for purposes of comparison. But some of Dr. Giles's observations deserve reproduction:—

"As I have already remarked in my other reports, the district over which the Mission worked is an extremely barren one.

Lying well beyond the abundant rainfall of the outer ranges, the ground in general gets, as a rule, but one thorough wetting in the year, viz., at the time of the melting of the snows. From this it follows that outside the limits of the irrigated cultivation, where the hand of man has made oases, the flora is but a scanty one, and is restricted to hardy drought-resisting plants, such as *Artemisia Absinthium*, etc.

"The irrigated ground yields a flora entirely distinct from this, which can hardly be said to be truly indigenous, as nearly all its members have been introduced by the agency of man, either directly or indirectly. A further exception exists in the narrow belt of hillside which lies just below the summer snow-lines. Here continuous melting of the snows above produces a land of ever-moistened soil, which has a flora peculiarly its own, consisting mainly of northern European forms, and which is quite distinct, alike from that of the dry and from the irrigated areas. Its bathymetric limits are from about 13,000 to 15,000 feet, and its character appears pretty uniform alike in the rainy regions of Kashmir and in the dry inner ranges.

"From a natural history point of view it is an unfortunate circumstance that our visit to the Pamir took place at the period of the year that it did. Coming, as we did, just after the snow had melted, but before the revival of vegetation, the collection was disappointingly small from the most interesting region of all we visited.

"In May but few plants had even sprouted, and had it not been for a peculiar circumstance, my Pamir collection might have been numbered on the fingers. This was that a very large number of the plants are provided with inflorescences of a peculiarly permanent character. This character, which no doubt serves the object of preserving the seed during the long period for which the plants are buried under the snow, is especially marked on the higher parts of the Pamir at about 14,000 feet, and is the common characteristic of a large number of the plants of the region of widely different natural orders. In one or two instances the preservation extended to the whole of the floral whorls, the androecium excepted, but in the majority of cases it extended to the calyx and gynæceum alone. Many of the plants were thus in a fairly recognizable condition, and collecting these naturally-preserved herbarium specimens I was able to avoid the annoyance of coming away quite empty-handed.

Judging from experience of other parts of the range at the same level I should say that August would be the best time of the year for a naturalist to visit the steppe."

Dr. Giles's observations on the provisions for protecting and preserving the seeds of the plants of this country are valuable, because they throw some light on the permanency of vegetation, even in the most arid regions.

Flora of the Kuen Luen Plains.

In 1892 Captain H. P. Picot, of the Indian Staff Corps, visited the Kuen Luen Plains, in the extreme north-east of Kashmir, and brought home a few fragments of plants screwed up in a newspaper. They are enumerated in a previous volume of this *Journal*, xxx. (1894) pp. 107, 123-124. There are twenty-five species, collected at altitudes between 11,500 and 17,000 ft., chiefly at the greater altitude. Among them were three or four which had only previously been collected by Dr. T. Thomson, about fifty years previously. The following are not in our enumeration:—*Berberis salicina*, Hook. f. & Thoms., *Chrysanthemum Richteria*, Benth., *Lindelofia Benthami*, Hook. f., *Pedicularis dolichorrhiza*, Schrenk, *Allium blandum*, Wall., and *Kobresia Royleana*, Boeck.

The Plants of Mr. Bonvalot and Prince Henry of Orleans's Journey across Tibet.

It was intended in the first instance to include this collection in our Enumeration, but we soon discovered that it was almost entirely made in China Proper. The new plants were described by Prof. Ed. Bureau and Mr. A. Franchet. Freely translated, their note on the collection runs:—It was made almost wholly along a narrow strip of country beginning at Lhassa, and, without deviating much from the thirtieth parallel of latitude, continuing through Batang and Litang as far as Tatsienlou. The plants may be classed as the smallest of the genera to which they belong, and are remarkable for the almost total absence of stem, associated with a great development of corolla. In the direction of Tatsienlou the character of the Flora gradually changes; the plants are larger with broader foliage and more numerous flowers. The majority of the new plants described were collected between Batang and Litang. They are:—*Parrya ciliaris*, *Viola florida*, *Silene platypetala*, *S. cæspitosa*, *Astragalus litangensis*, *Spiræa*

thibetica, *Abelia angustifolia*, *Lonicera thibetica*, *L. trichosantha*, *Aster batangensis*, *Gnaphalium thibeticum*, *Rhododendron Principis*, *R. primulæflorum*, *R. nigro-punctatum*, *Primula vittata*, *P. leptopoda*, *P. diantha*, *P. Henrici*, *Androsace bisulca*, *Schistocaryum ciliare*, *Pedicularis batangensis*, *P. microphyton*, *Incarvillea Principis*, *I. Bonvaloti*, *Fritillaria lophophora*, and *Aletris lanuginosa*. This wealth of new species is sufficient to prove that we are outside of the Tibetan region, and on the borders of the rich flora of Western China.

VEGETATION

As illustrated by the various Tibetan Collections.

The combined collections comprise 283 species, belonging to 119 genera and forty-one natural orders. A very large proportion of the species are perennial herbaceous plants having long, often very long, thick tap-roots; almost no stem, which may be either unbranched, bearing a single or compound inflorescence, or very shortly-branched, bearing several inflorescences: a rosette of leaves, when unbranched, commonly lying flat on the ground; and an almost sessile inflorescence nestling in the centre of the rosette of leaves. When the stems are branched the leaves are usually very small and numerous. Plants of this description are usually very thinly scattered, and some indeed are so rare that they were only observed in a single locality, or collected by only one of our travellers.

Saussurea.

The genus *Saussurea** (Compositæ) will serve well to illustrate this type of plant. This genus has been selected because it is highly characteristic and more numerously represented in species than any other genus within our area. Including the very numerous recent discoveries in Western China and Central Asia, *Saussurea* now contains upwards of one hundred described species, exhibiting a very great variety in habit, foliage, and inflorescence. They are by far the most numerous in Central and Northern Asia, but they extend all round the northern hemisphere, chiefly inhabiting mountain regions. One species, *S. alpina*, inhabits Great Britain, and it has nearly the same

* A selection of Tibetan species of *Saussurea* was exhibited at the Society's rooms when this paper was read.

range as the whole genus, including Tibet, Arctic Europe, and North America. Altogether fifteen species have been found in Tibet, being a third more than any other genus is represented by. They are all herbaceous perennials, ranging from an inch to six or eight inches in height. Six of them are of the rosette type, of which *S. Thoroldi*, Hemsl., and *S. Aster*, Hemsl. (Journ. Linn. Soc., Bot. xxx. p. 115, tt. 4 and 5) are characteristic examples. *S. subulata*, C. B. Clarke, is a densely-tufted species, having crowded acerose leaves; *S. tangutica*, Maxim., is of erect habit, having solitary stems, relatively broad distant leaves, those immediately beneath the flower-heads being highly coloured; and *S. tridactyla*, Schulz-Bip., is of a similar habit, but the leaves are deeply divided, and densely clothed with a white woolly tomentum. The last-named species was collected by Dr. Thorold at an elevation of 19,000 ft., and its altitudinal range in the Himalayas is given as 16,000 to 18,000 ft. Indeed the genus *Saussurea* apparently reaches the uppermost limit of flowering plants in Tibet, and twenty-one species have been collected at 15,000 ft. and upwards in the Himalayas. Seven of the Tibetan species were collected at altitudes of 17,000 ft. and upwards; six at altitudes of 16,000 ft. and upwards; whilst of the remaining two the altitudes are not given by the collectors. Further particulars on this point will be found under the heading of "Altitudes."

Saussurea may also be cited as an illustration of the general dispersion of characteristic species within our area. *S. Thoroldi*, for instance, is represented in all the recent collections, though it was previously unknown; and Kew also possesses specimens of it from the mountains of Western China. But further information on this point will be found in our "Enumeration" and "Tabular View of the Distribution of the Plants of Tibet."

Artemisia *and* Tanacetum.

These two genera of the Compositæ are so closely allied that they may be considered as one in our endeavours to picture the vegetation of Tibet. Both genera are widely spread in the northern hemisphere, including North America; and *Artemisia* reappears in the Sandwich Islands and in extratropical South America. Both find their greatest concentration of species in Central Asia and are especially abundant in the drier regions. *Artemisia* numbers upwards of 150 species, and is perhaps nearly as fully developed in North America, where, in the dry regions

of the interior and south-west, various species cover vast areas and are commonly called "sage bushes." *Artemisia* and the much smaller genus *Tanacetum* combined are represented in Tibet by about a dozen species; possibly more, because they are so similar that only a trained eye would detect the differences. In appearance they do not differ greatly from the British species, except in a more stunted habit and less development of leaf. Some of them are woody, but the wood is mostly produced underground, or under stones, or in densely matted ramifications close to the surface of the ground. In the drier parts they constitute one of the predominating elements in the vegetation of Tibet. *Tanacetum tibeticum* furnishes, according to Mr. Arnold Pike, the only vegetable * fuel in some parts of the country. The Ladak name of this plant is "boortze," which is mentioned, though variously spelt, by nearly all travellers; yet Pike and Hedin are the only ones who collected specimens. Pike collected it in flower at an elevation of 16,200 ft. in North-west, and Hedin in North Central Tibet. *Tanacetum fruticulosum* is another woody species, and is known to the Ladakis as "tchŭktchŭk"; and *Artemisia macrocephala* as "cumtchen." Therefore it is evident that they distinguish some of the species. At the same time it seems probable that the name "boortze" is applied to more than one species of these strongly scented plants.

Taraxacum *and* Crepis.

There are three or four species of each of these genera, some of which must be rather common in widely separated damp situations and will be alluded to again under "Useful Plants." Pike collected specimens of *Taraxacum bicolor*, DC., at an elevation of 16,100 ft., having roots at least a foot long, whilst the portion above ground was less than two inches.

Several other genera of Compositæ are probably more conspicuous from their colour, but they will be dealt with under that head.

Astragalus *and* Oxytropis.

As components of the vegetation these two genera of the Leguminosæ, like *Artemisia* and *Tanacetum* of the Compositæ, may be treated as one, because they are indistinguishable, except

* In explanation of this it may be mentioned that the only fuel to be had in many parts of Tibet is yak dung, of which the travellers usually found abundance.

by close examination. Nearly a thousand species of *Astragalus* are described from the Old World, chiefly from Central Asia, and there are perhaps two hundred in America, extending from the Arctic regions southward through the Andes. About two hundred species of *Oxytropis* have been described, and they are confined to the northern hemisphere. Thus we have here another parallel to *Artemisia* and *Tanacetum*, and a third may be found in the prominence of the two groups in the vegetation of Tibet; but the *Astragali* generally have much more conspicuous flowers than their counterparts in the Compositæ. Notwithstanding the fact that the *Astragali* are exceedingly numerous in species in Central Asia, we have only fourteen from Tibet. This may be due to the fact that similar species were passed by as the same as others already collected. On the other hand, the fact that some of the species are represented in every collection, or nearly so, stands against there being much confusion in this direction. To give an example: *Oxytropis microphylla*, DC., is in every collection save Littledale's, and from the most distant localities. The specimens vary in having leaves and peduncles from one to six inches in length; and a specimen collected by Pike must have had a thick, woody root that penetrated the ground to the depth of at least two feet. The majority of these *Astragali* may be described as exceedingly diminutive dense shrubs, having relatively thick branches due to the persistent bases of the greatly crowded leaves. There are others, such as *A. tribulifolius*, which have slender, trailing branches, apparently of only one season's duration. Another type of growth is furnished by *A. Heydei*, Baker, which has also deep, permanent root-stocks, from which annual branches are produced some distance down among the stones, which bear a few leaves and a cluster of flowers just above the medium in which the plant is growing. This last type of growth is exhibited by a number of other Tibetan plants, notably by *Corydalis Hendersoni*, Hemsl., *Capsella Thomsoni*, Hook. f., *Cochlearia scapiflora*, Hook. f. et Thoms., *Braya sinensis*, Hemsl., *Thermopsis inflata*, Camb., *Microula tibetica*, Maxim., *Nepeta longibracteata*, Benth., *Dracocephalum heterophyllum*, Benth., and *Euphorbia tibetana*, Boiss.

Gramineæ *and* Cyperaceæ

The total number of grasses is thirty species, belonging to fourteen genera; of sedges nine, belonging to three genera. To these may be added one rush, making a total of forty species

of this class of plants. This probably does not exhaust the number existing in Tibet; partly due to their similarity, and partly to close grazing which would prevent flowers being produced. We have the evidence of the travellers, repeated in their respective "Itineraries," that relatively luxuriant pasturage was found in certain valleys and sweet-water lake districts, and it is further clear that abundance of pasturage must exist somewhere within the range of the enormous herds of roaming animals that so astonished some of the travellers. On the other hand, long stretches of country were traversed in which grasses occurred only in tufts, like the majority of the other plants.

Cushion-like Plants.

Foremost amongst these is *Thylacospermum rupifragum*, Schrenk, Caryophyllaceæ. This is like a coarse moss with the stems so crowded together as to form a consolidated mass. *Arenaria musciformis*, Wall., and *Stellaria decumbens*, Edgew., belonging to the same natural order, are similar in growth, but the cushions do not attain the great size and density of *Thylacospermum*. *Androsace Tapete*, Maxim., and other species of Primulaceæ display the same peculiarities.

Woody Plants.

The woody element in the vegetation of Tibet within our limits is exceedingly small, including nothing more than a foot above ground, and, with the exception of the *Astragali* and *Artemisiæ*, described in preceding paragraphs, such woody plants as exist are extremely rare and mostly near the confines of the country. *Clematis orientalis*, L., is the tallest, so far as our specimens go, being just about a foot to the top of the inflorescence. Rockhill collected it in longitude 94° 45′, where it was abundant at 14,000 ft., and Deasy and Pike collected it in 82° 41′, and note that it had been observed three days before. There is no evidence of its existence between the longitudes given. *Nitraria Schoberi*, which grows five or six feet high in favourable situations outside of Tibet, is represented by a fragment collected by Hedin in S. Tsaidam. *Myricaria prostrata*, Hook. f. et Thoms., is widely spread, but it is quite prostrate and makes branches at the most six inches long. The variety of *Potentilla fruticosa*, L., attains similar dimensions. Of *Caragana pygmæa*, DC., there is only a single specimen from Gugé. *Lonicera hispida*, Pall., collected only by the Littledales, in the Goring Valley, grows larger in the locality named, where

vegetation is not so sparse as in many parts; but its size could not be determined from a detached branch. *Hippophaë Rhamnoides*, L., like *Caragana*, is only from the Plains of Gugé, where it was collected by Strachey and Winterbottom. One species of *Salix* from the Goring Valley and another from the Plains of Gugé and *Ephedra Gerardiana* complete our list of woody plants. The willows are represented only by very small specimens. The *Ephedra* is perhaps the most woody of all, having very stout root-stocks and trailing branches a quarter of an inch thick; it is common in Western Tibet at elevations between 16,000 and 17,000 ft. The absence of *Juniperus* from all the collections is remarkable.

Fleshy-leaved Plants.

With the exception of the Crassulaceæ—*Sedum* and *Sempervivum*, of which there are ten species—fleshy plants are rare in Tibet. The species of *Sedum* inhabiting the Himalayan and Tibetan regions are in need of revision, consequently we are not quite sure of our names in all instances. Several species are apparently not uncommon in the west, and the species we have named *quadrifidum* with some doubt was collected in very distant localities, and as far eastward, at least, as the ninetieth meridian.

Large-leaved Plants.

Rheum spiciforme, Royle, is the only plant having leaves of considerable surface; but the specimens collected probably do not bear the largest produced by this species. The blade of the largest leaf is only about four by three inches. Still, in certain districts, of considerable area, this plant must be very conspicuous in the vegetation. Kew possesses specimens collected by Przewalski, Hedin, the Littledales, and Deasy and Pike in very distant localities. Pike notes that it was plentiful over an area of about two square miles in 81° 41′ and 34° 52′, and "seen once or twice afterwards, but not common." Further particulars of this plant are given under "Useful Plants."

Aquatic *and* Marsh Plants.

Ranunculus aquatilis, *Hippuris vulgaris*, *Myriophyllum verticillatum*, and *Potamogeton pectinatus* are the only true aquatics in the Kew collections, and each one is in only one collection. It seems highly probable that the freshwater lakes and watercourses have not been exhausted in this direction. Marsh plants

and plants inhabiting the moist ground near the shores of the lakes are also fewer than might have been expected. The genera *Ranunculus*, *Selinum*, *Cremanthodium*, *Pleurogyne*, *Gentiana*, *Pedicularis*, *Polygonum*, and *Triglochin* are represented by moisture-loving species. Some of the sedges and grasses are most likely confined to wet ground, but evidence is wanting. *Phragmites communis* may be classed here. *Zannichellia palustris*, mentioned at p. 142 as having been found by Hooker at Bhomtso, proves to be *Potamogeton pectinatus*.

Bulbous *and* Tuberous Plants.

The small number of species coming under this head is one of the most inexplicable facts connected with the vegetation of Tibet, though it is also true that bulbous plants are rare among the high-level plants in all parts of the world. *Gagea pauciflora*, collected by Rockhill only, and three or four species of *Allium* are the only bulbous plants in the collections. One species of *Allium*—*A. Semenovi*—is widely distributed and very abundant in some localities. This species was collected by Hedin, and Wellby and Malcolm, and it is probably the one referred to by Rockhill as being very plentiful at altitudes above 15,000 ft., though they sought it in vain below this level. Wellby and Malcolm, who had to subsist largely on this onion during part of their journey, note that it was commonly distributed between 88° 20′ and 96° along the thirty-fifth parallel. *A. Jacquemontii*, collected by Strachey and Winterbottom in W. Tibet, has also an edible bulb.

Annual Plants.

The conditions are not favourable to the development of "annual" plants—that is to say plants which have only one growing season, springing from seed and flowering within a few weeks, or at all events before the end of season. The following appear to belong to this category:—*Hypecoum leptocarpum*, *Pleurogyne brachyanthera*, *Gentiana tenella*, *G. humilis*, *G. Thomsoni*, *G. aquatica*, *G. Rockhillii*, *Salsola collina*, *S. Kali*, and *Halogeton glomeratus*. All of these plants are apparently very rare in Tibet, and, with one or two exceptions, represented in only one of the collections. Thus *Gentiana tenella*: "only one or two specimens seen, although I looked closely" (Pike). *G. humilis*: "very scarce" (Pike). *Pleurogyne brachyanthera*: "the only specimen I have seen" (Pike)—a diminutive plant bearing one flower.

In addition to the foregoing, some of the plants taken for perennials may be monocarpic, but of biennial or two seasons' duration, as many plants of this class form large tap-roots in which is stored during the first season the food required for the flowering and fruiting season.

Meconopsis horridula, one of the most conspicuous and widely-spread plants of Tibet, probably flowers only once though of two seasons' duration.

Diminutive Plants.

In more than one place stress has been laid on the fact that Tibetan plants generally are of small dimensions; but some of them are so exceedingly small as to merit attention on that account; and it is among the annuals that some of the smallest are found, notably *Pleurogyne brachyanthera*, *Gentiana Thomsoni*, and *G. aquatica*, which are sometimes not more than an inch high with a solitary terminal flower. Among others of exceptionally reduced proportions are: *Ranunculus tricuspis*, *R. similis*, *R. involucratus*, *Anemone imbricata*, *Corydalis Boweri*, *Eutrema Przewalskii*, *Arenaria Littledalei*, *Saxifraga parva*, and *Sedum Przewalskii*. So many others are small for their respective genera that it is sufficient to put the fact on record. But *Iris Thoroldi*, having narrow, grass-like leaves, rising at the most six inches above the ground, and solitary, yellow flowers, barely emerging from the ground, specially deserves mention as the miniature of its genus. Going back to the first of these diminutive plants, *Ranunculus tricuspis*; there are specimens of this at Kew from Mongolia, collected by Przewalski, and from Tibet, collected by Rockhill and Pike; therefore from very distant habitats; and the specimens all appear to have attained normal dimensions. Pike collected his specimens in moist soil, near a small stream, in about 82° and 34°, at an elevation of 17,000 ft. The largest specimen is less than three inches long, including the tap-root, which is not whole, having been broken off when removing the plant from the ground. It has about half-a-dozen stalked leaves with a three-lobed blade, about a quarter of an inch long, and one flower. Only the blade of the leaf appears above ground and that is spread out horizontally. The solitary flower, about a quarter of an inch in diameter, is scarcely raised above the outspread leaves which encircle it. This interesting little plant is evidently a perennial, which propagates itself vegetatively by very short stolons.

Colours *of the* Flowers *or* Fruit.

For our purpose colour in flowers includes everything excepting green. Excluding the Cyperaceæ, the Gramineæ, and a few other plants which have very inconspicuous flowers mostly exhibiting colour only in the anthers, which are usually yellow, rarely red, there are 241 species to account for. Roughly classed as white or some shade of yellow, of red, or of blue, according to the dominant primary, the following figures are obtained:—

Flowers white	44
„ some shade of yellow....	81
„ „ red	70
„ „ blue	46
	241

We have no precise data for comparisons, but it may be safely asserted that there is as much variety and brilliancy of colour in the Tibetan Flora as there is in the British Flora. Here the comparison ends, because there is nothing in Tibet to match the masses of colour produced by bluebells, buttercups, primroses, heather, and other native plants. On the other hand, the intensity of colour characteristic of the Alpine flora of Europe is not equalled in Tibet, even individually. Compared with the remote Insular Flora of St. Helena, the advantage of colour, if any, is with Tibet. In St. Helena, for example, blue and red are almost wholly wanting in the native flowers, which are usually white, or white and yellow. In a less degree this is the case in the Sandwich Islands.

The connection between colours and insects in relation to pollination we shall not attempt to discuss; but in the "Itineraries" we have repeated all the references to insects, including a list of butterflies observed by Dr. Thorold.

The Tibetan species of familiar genera have mostly flowers of the same colour as the predominating one in British species. Thus *Ranunculus*, yellow; *Sedum*, red or yellow; *Artemisia*, yellow; *Gentiana*, blue; *Saussurea*, red; *Astragalus*, blue or red; *Potentilla*, yellow; *Delphinium*, blue; and *Aster*, blue. The Cruciferæ are mostly white or yellow, and the Caryophyllaceæ mostly white.

A better idea of the appearance of colour in the vegetation may perhaps be conveyed by means of a selection of plants having either conspicuous individual flowers, or conspicuous inflores-

cences—heads or clusters of flowers. It will perhaps be as well to present this information in a tabular form. The colour is that noted by the collectors; the diameter is that of individual flowers or inflorescences (Leguminosæ, Compositæ, etc.) taken from the specimens; and the degree of prevalence is deduced from the number of collectors partly, and partly from collectors' remarks accompanying the specimens, and has reference to them only as components of the Flora of Tibet.

Name.	Colour.	Diameter or length.	Prevalence.
Clematis orientalis	Yellow.	1½ in.	Rare.
Delphinium	Blue.	1 „	Common.
Meconopsis horridula.....	Blue.	1½ „	Common.
Braya sinenis.....	White.	½ „	Rare.
Parrya macrocarpa	Purple.	1 „	Rare.
Geranium collinum	Blue.	¾ „	Rare.
Thermopsis.....	Yellow.	2 „	Frequent
Astragalus	Purple.	1 „	Common.
Saxifraga	Yellow.	1½ „	Frequent.
Aster	Blue.	1½ „	Common.
Cremanthodium.....	Yellow.	1½ „	Frequent.
Saussurea	Purple.	2 „	Common.
Pedicularis.....	Red.	2 „	Frequent.
Rheum spiciforme.....	Red.	2 „	Frequent.
Allium senescens	Pink.	1 „	Frequent.

Where only the generic name is given in the preceding table it should be understood that there are several similar species and that, taken collectively, they constitute a more or less conspicuous feature in the vegetation. To the foregoing might be added several genera of cushion-like growth belonging to the Cruciferæ, Caryophyllaceæ, Primulaceæ, etc., which produce a profusion of flowers, individually small, though collectively conspicuous.

Reproduction, Propagation, *and* Dispersion.

One of the most interesting questions connected with this inquiry is: How does this scanty vegetation maintain its hold under such adverse conditions? And this leads to another: Is the vegetation increasing or decreasing? The first question is much easier to answer than the second, because we have the evidence before us. There are two modes by which reproduction

or propagation may be effected; namely, by seed and by vegetative increase. It has already been explained that few of the Tibetan plants are annual or monocarpic, and that most of those species which are, are exceedingly rare and only met with as solitary individuals. It is possible, however, that individuals are much more numerous in some years than in others. With regard to the production and maturation of seed, there seems no reason why every species or almost every species in the Flora should not do so, as it seems to be quite independent of altitude. About twenty-five per cent. of the species are represented by dried specimens bearing ripe fruits and seeds, and these species comprise members of almost every natural order in the Flora. Many of those not represented by fruiting specimens were collected too early in the season to secure fruit. Some of the plants produce seeds very copiously, and, given the conditions favourable to germination and subsequent growth, there ought to be an increasing vegetation; but the perennial drought, the shifting sands, and the large herds of herbivorous animals, conjointly, are probably sufficient to prevent the spread of most plants. Among the plants which undoubtedly increase vegetatively are the species of *Allium*, from bulbs; the cushion-like plants, by successive branchings or offsets; and the trailing plants, by runners or rooting of the new branches. Doubtless most of the grasses increase in this way, but perhaps only enough to make good the previous season's consumption. But under any circumstances and conditions the spread of plants vegetatively in Tibet must be a very slow process, because none of them, so far as we know, produce runners or rooting branches of great length.

The dispersal of the seeds and fruits of plants by wind and other agencies in Tibet is certainly much greater than the probabilities of successful germination in the localities to which they are transported. It is a significant fact, however, that the achenes of *Saussurea*, one of the commonest and most widely spread genera, have a plumose pappus, and might be carried almost any distance and height by the prevailing winds. Further, there is not a seed produced in Tibet which might not be conveyed in the great sand-storms; but the chances of their meeting with favourable conditions must be very remote. The few berry-bearing plants, such as *Ephedra*, *Hippophaë*, and *Nitraria*, have an equally small chance of being successfully dispersed by

birds. On the whole it seems probable that the increase in vegetation in Tibet, if any, must be exceedingly slow. On the other hand, there is apparently no positive evidence that it ever was more general than at the present day.

VEGETATION

As illustrated by the Altitudinal limits of Flowering Plants in Tibet and the adjoining Countries.

At the meeting of the Society on April 19th, 1900, my colleague, Mr. H. H. W. Pearson, and I gave a preliminary account of the collections made by Deasy and Pike, Wellby and Malcolm, and Sven Hedin, illustrated by a selection of their plants. Special attention was directed to the great altitudes at which some of Deasy and Pike's plants were obtained, based on the figures given on the labels accompanying them. These particulars were published in 'Nature,' lxii. (1900) p. 46, and in the 'Gardeners' Chronicle,' xxvii. (1900) p. 303, and probably elsewhere. It is there stated that the highest point at which flowering plants had been found was 19,200 ft. above sea-level, and a list of nine species, purporting to have been collected at 19,000 ft. and upwards, is given. Subsequently it was ascertained that the altitudes of this expedition had been erroneously calculated, and Captain Deasy has since supplied the corrected determinations, which appear in our "Enumeration." According to these corrections, 17,300 ft. was the hightest point at which they collected, and only one plant, *Cheiranthus himalayensis*, was found at this elevation. *Astragalus Heydei* and *Oxytropis tatarica*, originally recorded from 19,200 ft., were actually taken at 17,100 ft. It is possible that some of the other observations on record in this paper are too high, and some of those previously published are certainly so.

Dr. O. Drude (Petermann's 'Geographische Mitteilungen,' 1894, p. 92), in a review of the report on Bower and Thorold's collection, which is in the Society's *Journal*, vol. xxx., questions the correctness of the assumption, there enunciated, that 19,000 ft. was the greatest altitude at which a flowering plant had been collected or observed; and he goes on to say that Hemsley appears to have overlooked the record of Schlagintweit's discoveries. It is true that the original record had been overlooked, as well as subsequent versions of it and references to it; and it seems desirable to subject Schlagintweit's data to a critical examination

here. Drude himself states, in the place cited, that Schlagintweit ('Reisen in Hochasien,' vol. iv.) places the extreme upper limit of flowering plants at 6038 metres (=19,804 ft.), in a higher latitude even than Tibet. The name of no plant is given by Drude, and we have not been able to refer to the German work from which he professes to quote. But in Schlagintweit's English work ('Results of a Scientific Mission to India and High Asia,' ii. p. 501) is the following paragraph :—"The very extreme limit of phanerogamic plants appeared in Western Tibet, on the north-eastern slopes of the Ibi-gamin pass at a height of 19,809 ft., next in order come those of Gunshankar, in Guari Khorsum, at 19,237 ft., or 572 ft. above the limit of snow. In the Himalaya the highest plants were found at 17,500 ft., on the slopes of the Janti pass." Incidentally it may be mentioned that Schlagintweit gives the height of Ibi-gamin as 25,550 ft., and the height reached as 22,259 ft. Here, again, no names of plants are given; and Tchihatchef ('Végétation du Globe,' ii. p. 615), who refers to Schlagintweit's writings, and gives the limit as 6037 metres, is also silent on this point. Schlagintweit's "Einleitung" to Klatt's 'Die Compositæ des Herbarium Schlagintweit,' repeated in the 'Journal of Botany' (vi. 1868), is almost as indefinite. He takes the genera *Artemisia* and *Saussurea* to illustrate the distribution of the Compositæ, and of the latter genus he says that it begins to predominate at the upper limit of trees, and that some of the species are among the phanerogams reaching the greatest altitudes. Further on, he mentions *S. Schlagintweitii* as a species ascending almost to the snow-line, on the south side of the Kuen Luen range, having just before stated that the snow-line on the south side of the Karakorum range is at about 19,400 ft. Turning to the description of this species, where its localities are given in detail, the altitudinal range is from 13,800 to 15,500 ft.; and of two other species, *S. subulata* and *S. Thomsonii*, specially designated as high-level species, 17,000 ft. is the upper limit recorded.

Taking all things into consideration, and especially the light of later explorations, there seem to be strong reasons for doubting the correctness of the highest altitudes recorded. At the same time it must be admitted that, given nooks and crevices free from snow and seed conveyed thither by wind or birds, a plant might thrive as well at 20,000 ft. as it does at 17,000. Indeed Ball, Christ, Whymper, and others agree that the only upper limit is perpetual snow.

Before entering upon a discussion of the altitudinal distribution of the Tibetan Flora, it may be instructive to glean some data from collections made in adjoining countries.

The collection made by Sir Martin Conway and Mr. McCormick when exploring the Hispar and other glaciers of the Karakorum range, in 1892, was worked out at Kew, and is useful for comparisons. Its composition follows :—

	Orders.	Genera.	Species.
Polypetalæ	17	54	96
Gamopetalæ	15	50	80
Incompletæ	6	8	12
Gymnospermæ	2	2	2
Monocotyledones	6	9	10
Totals	46	123	200

The predominating natural orders are :—

	Species.		Species.
Compositæ	30	Brought forward	99
Cruciferæ	17	Ranunculaceæ	7
Rosaceæ	17	Saxifragaceæ	7
Leguminosæ	14	Crassulaceæ	7
Boraginaceæ	13	Gentianaceæ	7
Caryophyllaceæ	8	Labiatæ	7
		Primulaceæ	6
	99		140

With the exception of the Boraginaceæ, the orders and the proportions of species are very nearly the same as in the Flora of Tibet.

This collection was made between 74° 30′ and 76° 42′, and between 35° 38′ and 36° 15′—that is to say between Nagyr, at 7790 ft., and Skoro La, at 17,320 ft.; and the highest point reached was Pioneer Peak, 22,600 ft. Eleven species of flowering plants were collected at 16,000 ft. and upwards, namely :—

Isopyrum grandiflorum	16,000 ft.	*Saxifraga imbricata*	16,000 ft.
Parrya exscapa	16,500 „	„ *oppositifolia*	17,000 „
Cheiranthus himalayensis	16,500 „	„ *Hirculus*	17,320 „
Lychnis apetala	16,400 „	*Sedum tibeticum*	16,500 „
Astragalus confertus	16,500 „	*Leontopodium alpinum*	16,500 „
Potentilla Inglisii	17,000 „		

No new species were discovered on this expedition and only one orchid, *Orchis latifolia*, was collected.

Another collection presented to Kew, a collection which was confidently supposed to contain a number of novelties, was made near Yatung by H. E. Hobson, Esq., in 1897. Yatung belongs politically to Tibet, and is situated on a strip of territory that wedges into Sikkim. It is in 88° 35′ and 27° 51′, at an elevation of about 11,000 ft., and is really within the humid region of the Himalayas. The following is a rough analysis of the composition of the collection, which, contrary to expectation, contains no striking novelty, though it may prove to include a few undescribed species when the material comes to be more critically examined.

Orders.	Genera.	Species.
Ranunculaceæ	9	23
Berberidaceæ	1	2
Papaveraceæ	2	4
Fumariaceæ	1	6
Cruciferæ	11	16
Violaceæ	1	2
Caryophyllaceæ	5	14
Tamariscaceæ	1	1
Hypericaceæ	2	5
Geraniaceæ	3	9
Aceraceæ	1	1
Coriariaceæ	1	1
Leguminosæ	6	9
Rosaceæ	11	32
Saxifragaceæ	9	22
Crassulaceæ	1	6
Droseraceæ	1	1
Onagraceæ	1	4
Cucurbitaceæ	1	1
Umbelliferæ	5	11
Araliaceæ	2	4
Caprifoliaceæ	4	7
Rubiaceæ	3	5
Valerianaceæ	2	3
Dipsaceæ	4	4
Compositæ	20	54
Campanulaceæ	4	9
Ericaceæ	6	15
Primulaceæ	3	20
	29	121	291

Orders.	Genera.	Species.
29	121	291
Oleaceæ	1	1
Asclepiadaceæ	2	2
Gentianaceæ	4	12
Boraginaceæ	5	7
Convolvulaceæ	1	1
Solanaceæ	1	1
Scrophulariaceæ	4	17
Orobanchaceæ	1	1
Lentibulariaceæ	1	2
Acanthaceæ	1	1
Selaginaceæ	1	1
Labiatæ	12	17
Plantaginaceæ	1	1
Polygonaceæ	4	17
Euphorbiaceæ	1	1
Urticaceæ	2	2
Coniferæ	3	6
Orchidaceæ	12	23
Scitamineæ	1	1
Iridaceæ	1	2
Amaryllidaceæ	1	1
Liliaceæ	9	15
Juncaceæ	2	10
Commelinaceæ	1	1
Araceæ	1	1
Cyperaceæ	3	7
Gramineæ	12	13
Ferns & Allies	17	36
Totals.... 57	226	491

The foregoing list offers many interesting points of comparison with the Flora of Tibet. The proportions of orders, genera, and species are much the same, whilst the totals are much higher, though the area over which they were collected is very small. Leguminosæ and Compositæ are relatively much less numerously represented, whereas sixteen additional orders come in, and the number of petaloid monocotyledons is proportionately much larger. The Orchidaceæ, for example, absent from our Tibetan collections, though *Orchis salina* was collected in the Koko Nor region by Przewalski, are represented by no fewer than twelve genera and twenty-three species. And ferns and other vascular

cryptogams number seventeen genera and thirty-six species. Figuratively speaking, a step further north we enter the dry barren region of Tibet.

Flora of the Himalayas from 15,000 *ft. and above.*

	Genera.	Species.
Ranunculaceæ	8	21
Berberidaceæ	1	1
Papaveraceæ	2	3
Fumariaceæ	1	8
Cruciferæ	17	34
Violaceæ	1	1
Caryophyllaceæ	6	28
Tamariscaceæ	1	1
Geraniaceæ	2	2
Leguminosæ	9	28
Rosaceæ (*Potentilla*)	1	15
Saxifragaceæ (*Saxifraga*, 20)	3	25
Crassulaceæ	2	12
Halorrhagidaceæ	1	1
Umbelliferæ	5	10
Caprifoliaceæ	1	3
Valerianaceæ	1	1
Compositæ (*Saussurea*, 21)	19	73
Campanulaceæ	3	5
Ericaceæ	2	5
Primulaceæ (*Primula*, 17)	3	22
Gentianaceæ (*Gentiana*, 13)	4	16
Boraginaceæ	6	10
Scrophulariaceæ (*Pedicularis*, 13)	4	20
Selaginaceæ (*Lagotis*)	1	4
Labiatæ	10	18
Chenopodiaceæ	3	4
Polygonaceæ (*Polygonum*, 13)	3	15
Euphorbiaceæ (*Euphorbia*, 3)	1	3
Urticaceæ	1	1
Salicaceæ (*Salix*)	1	8
Coniferæ (*Juniperus*)	1	2
Orchidaceæ (*Herminium*)	1	3
Liliaceæ	3	4
Juncaceæ (*Juncus*)	1	4
Naiadaceæ	3	4
Cyperaceæ (*Carex*, 12)	3	20
Gramineæ (*Poa*, 8)	14	35
Totals	38	149	470

The preceding summary of the Himalayan Flora from 15,000 ft. and upwards was compiled by Mr. Pearson from Hooker's 'Flora of British India,' and can only claim to be a very rough approximation, whether as affecting the author or ourselves. It is sufficiently correct to afford a basis for comparisons, a few of which are given :—

	Orders.	Genera.	Species.
Himalaya	38	149	470
Tibet	41	119	283

This brings out the fact that the poorer Flora in species is the richer, relatively, in genera and orders, which is in accord with most poor Floras, and especially with those of remote Oceanic Islands.

Generally speaking the natural orders are the same in both Floras, and the preponderating orders likewise; but the following are not in our collections from Tibet:—Berberidaceæ, Violaceæ, Valerianaceæ, Ericaceæ, Coniferæ, and Orchidaceæ. Of course no importance can be attached to this circumstance. It is interesting to compare this general summary of the Himalayan Flora with that of Hobson's Yatung collection, a few pages back, especially the relative increase of Leguminosæ and Compositæ at the higher level.

Plants ascending to 18,000 *ft. in the Himalayas and Little Tibet.*

Ranunculus pulchellus	10,000 to 18,000 ft.	
Delphinium glaciale	12,000	,,
Parrya exscapa	15,000	,,
,, *macrocarpa*	,,	,,
Braya rosea	,,	,,
,, *tibetica*.....	,,	,,
Capsella Thomsoni.....	,,	,,
Lychnis apetala	,,	,,
Stellaria decumbens	,,	,,
Arenaria pulvinata	,,	,,
,, *oreophila*.....	18,000 ft.	
,, *glanduligera*	14,000 to 18,000 ft.	
,, *melandryoides*	,,	,,
Thylacospermum rupifragum ..	15,000	,,
Potentilla tetrandra	14,000	,,
,, *microphylla*	,,	,,
Saxifraga aristulata	,,	,,
,, *saginoides*	10,000	,,
,, *hemisphærica*.....	17,000	,,

Saxifraga Jacquemontiana	13,000 to 18,000 ft.	
Sedum crenulatum	12,000	„
„ *quadrifidum*.....	11,000	„
Cortia Hookeri	13,000	„
Aster heterochæta	14,000	„
Erigeron andryaloides	9,000	„
Antennaria muscoides	16,000	„
Leontopodium alpinum	10,000	„
Allardia glabra	15,000	„
Tanacetum gossypinum	16,000	„
Artemisia desertorum	17,000	„
„ *Campbelli*	16,000	„
„ *minor*	15,000	„
Saussurea Thomsoni	17,000	„
„ *wernerioides*	16,000	„
„ *subulata*	15,000	„
„ *sacra*	14,000	„
„ *tridactyla*	„	„
„ *sorocephala*	„	„
Taraxacum officinale	1,000	„
Androsace Selago	15,000	„
Gentiana amœna.....	14,000	„
„ *nubigena*	16,000	„
Pleurogyne Thomsoni	15,000	„
Lagotis decumbens	16,000	„
Nepeta tibetica	17,500	
Oxyria digyna.....	17,500	
Juncus minimus	16,000 to 18,000 ft.	
Avena subspicata.....	10,000	18,500 ft.
Poa hirtiglumis	16,000	18,000 ft.
Elymus sibiricus.....	10,000	„

Excepting *Nepeta tibetica* and *Oxyria digyna*, at 17,500 ft., these fifty species are recorded as ascending to 18,000 ft., unless we are to understand that they were collected somewhere between the two altitudes given in each instance. The only safe inference, for the majority of these data, is that the Collector, with imperfect means of determination, believed that he collected the plants in question somewhere between the points named. From subsequent explorations it appears highly improbable that many of them were collected at so great an altitude as 17,000, to say nothing of 18,000 ft. This number, fifty, as compared with the fifty-two species gathered between 17,000 and 18,000 ft. in Tibet, affords further proof that plants ascend higher in the plateaux

than they do in the peaks. A further comparison brings out the fact that it is the same genera, and often the same species, that attain the upper limits of phanerogamic vegetation in both Tibet and the Himalayas.

Plants collected at Altitudes of 16,000 *feet and upwards in Tibet.*

	Altitude.	Collectors.
Clematis alpina	16,200 ft.	Thorold.
Callianthemum cachemiricum	16,294	Wellby & Malcolm.
Adonis cærulea	17,200	Thorold.
Ranunculus hyperboreus	16,200	,,
,, *similis*	17,500	,,
,, *tricuspis*	17,000	Deasy & Pike.
,, *Cymbalariæ*	16,400	,, ,,
,, *pulchellus*	16,200	,, ,,
	17,300	Thorold.
,, *lobatus*	17,300	Deasy & Pike.
,, *involucratus*	16,400	,, ,,
	17,500	Thorold.
Delphinium cæruleum	16,386	Wellby & Malcolm.
	17,800	Thorold.
Meconopsis horridula	16,000	Wellby & Malcolm.
	16,500	Littledale.
Corydalis Hendersoni	17,100	Deasy & Pike.
	17,500	Thorold.
Parrya prolifera	16,480	Wellby & Malcolm.
,, *lanuginosa*	17,000	Deasy & Pike.
	17,600	Thorold.
Cheiranthus himalayensis	17,300	Deasy & Pike.
Alyssum canescens	16,150	Wellby & Malcolm.
Draba incompta	16,500	Thorold.
,, *alpina*	17,600	,,
Christolea crassifolia	16,800	,,
Lepidium capitatum	16,200	,,
Cochlearia scapiflora	17,100	Wellby & Malcolm.
	17,800	Thorold.
Sisymbrium humile	17,500	,,
Eutrema Przewalskii	16,400	Deasy & Pike.
Erysimum funiculosum	17,600	Thorold.
Braya uniflora	17,000	Deasy & Pike.
	17,600	Thorold.
,, *sinensis*	16,400	Deasy & Pike.
,, *rosea*	17,800	Thorold.
Capsella Thomsoni	17,000	Deasy & Pike.
	17,500	Thorold.

	Altitude.	Collectors.
Dilophia salsa	16,800 ft.	Deasy & Pike.
Arenaria musciformis	17,000	„ „
„ *Stracheyi*	16,800	„ „
Thylacospermum rupifragum	17,100	Wellby & Malcolm.
Myricaria prostrata	16,900	Deasy & Pike.
	17,300	Thorold.
Thermopsis inflata	18,540	„
„ *lanceolata*	16,500	Littledale.
Astragalus melanostachys	16,500	„
„ *Heydei*	16,400	Wellby & Malcolm.
	16,800	Thorold.
	17,100	Deasy & Pike.
„ *Arnoldi*	17,500	„ „
	„	Thorold.
„ *nivalis*	16,290	Wellby & Malcolm.
„ *Malcolmii*	16,400	„ „
„ *confertus*	17,100	Deasy & Pike.
	18,000	Thorold.
Oxytropis densa	17,500	„
„ *microphylla*	16,400	Wellby & Malcolm.
	17,500	Deasy & Pike.
	17,800	Thorold.
„ *tatarica*	16,140	Wellby & Malcolm.
	17,100	Deasy & Pike.
	17,800	Thorold.
„ *Stracheyana*	16,200	„
	16,600	Wellby & Malcolm.
„ *lapponica*	17,800	Thorold.
„ *cachemirica*	16,500	Littledale.
Potentilla fruticosa	„	„
„ *bifurca*	16,300	Wellby & Malcolm.
„ *sericea*	17,500	Thorold.
Chamærhodos sabulosa	16,700	Deasy & Pike.
	17,000	Thorold.
Saxifraga parva	16,800	Deasy & Pike.
	17,000	Thorold.
„ *Jacquemontiana*	16,800	Wellby & Malcolm.
Sedum quadrifidum	16,500	Littledale.
	17,000	Thorold.
„ *Rhodiola*	17,000	Deasy & Pike.
„ *tibeticum*	17,100	„ „
	17,500	Thorold.
Myriophyllum verticillatum	16,500	Littledale.
Peucedanum Malcolmii	16,140	Wellby & Malcolm.
Pleurospermum stellatum	16,400	Thorold.
Aster Heterochæta	16,300	Wellby & Malcolm.

	Altitude.	Collectors.
Aster Boweri	16,140 ft.	Wellby & Malcolm.
	16,500	Littledale.
	17,000	Deasy & Pike.
	18,000	Thorold.
„ *tibeticus*	17,800	„
„ *tricephalus*	16,500	Littledale.
Leontopodium alpinum	16,500	„
	17,000	Deasy & Pike.
Anaphalis xylorrhiza	16,500	Littledale.
Tanacetum tibeticum	16,200	Deasy & Pike.
Artemisia Stracheyi	16,500	Littledale.
„ *salsoloides*	„	„
„ *Wellbyi*	16,200	Wellby & Malcolm.
	17,000	Deasy & Pike.
	17,100	Thorold.
„ *minor*	16,290	Wellby & Malcolm.
Cremanthodium goringensis	16,200	Deasy & Pike.
	16,500	Littledale.
	16,400	Wellby & Malcolm.
„ *Fletcheri*	16,500	Littledale.
„ *Deasyi*	17,000	Deasy & Pike.
	17,600	Thorold.
Saussurea Thoroldi	16,140	Wellby & Malcolm.
	16,400	Thorold.
	16,500	Littledale.
„ *subulata*	16,500	„
	16,520	Wellby & Malcolm.
	16,900	Deasy & Pike.
	17,000	Thorold.
„ *sorocephala*	16,300	Wellby & Malcolm.
	17,000	Thorold.
	„	Deasy & Pike.
„ *Aster*	16,300	Wellby & Malcolm.
	16,400	Deasy & Pike.
	17,800	Thorold.
„ *Kunthiana*	16,520	Wellby & Malcolm.
„ *Wellbyi*	16,800	„ „
„ *bracteata*	„	Deasy & Pike.
„ *pygmæa*	17,800	Thorold.
„ *glanduligera*	16,600	Deasy & Pike.
	17,800	Thorold.
„ *tridactyla*	19,000	„
„ *Thomsoni*	16,520	Wellby & Malcolm.
Crepis flexuosa	16,100	Deasy & Pike.
	16,520	Wellby & Malcolm.
	17,200	Thorold.

	Altitude.	Collectors.
Crepis sorocephala	16,300 ft.	Wellby & Malcolm.
	17,500	Thorold.
Taraxacum bicolor	16,100	Deasy & Pike.
	17,300	Thorold.
„ *lanceolatum*	16,000	„
	16,900	Deasy & Pike.
„ *palustre*	16,500	Littledale.
Androsace Tapete	16,400	Deasy & Pike.
	16,480	Wellby & Malcolm.
„ *Chamæjasme*	16,200	Deasy & Pike.
	17,500	Thorold.
Gentiana aquatica	16,800	Deasy & Pike.
„ *tenella*	16,800	„ „
	16,800	Wellby & Malcolm.
Pleurogyne brachyanthera	16,800	Thorold.
	16,900	Deasy & Pike.
Microula tibetica	16,600	Wellby & Malcolm.
	17,000	Deasy & Pike.
	18,000	Thorold.
Pedicularis cheilanthifolia	16,200	Deasy & Pike.
„ *Przewalskii*	16,500	Littledale.
„ *rhinanthoides*	„	„
Oreosolen unguiculatus	„	„
Lagotis decumbens	17,000	Deasy & Pike.
Nepeta longibracteata	16,200	„ „
„ *decolorans*	16,500	Littledale.
Dracocephalum heterophyllum	16,200	Deasy & Pike.
	16,230	Wellby & Malcolm.
	17,700	Thorold.
Phlomis rotata	16,500	Littledale.
Halogeton glomeratus	16,290	Wellby & Malcolm.
Rheum spiciforme	16,200	Deasy & Pike.
	16,500	Littledale.
Polygonum tibeticum	16,500	„
„ *viviparum*	„	„
„ *sibiricum*	16,480	Wellby & Malcolm.
Urtica hyperborea	16,200	Thorold.
	16,500	Littledale.
	17,000	Deasy & Pike.
Salix Lapponum	16,500	Littledale.
Ephedra Gerardiana	16,500	Thorold.
	16,700	Deasy & Pike.
Iris Thoroldii	16,300	Wellby & Malcolm.
	17,800	Thorold.
Allium senescens	16,200	„
„ *Semenovii*	17,000	Wellby & Malcolm.

	Altitude.	Collectors.
Juncus Thomsoni	16,100 ft.	Deasy & Pike.
	16,200	Thorold.
Carex ustulata	16,500	Littledale.
„ *Moorcroftii*	16,480	Wellby & Malcolm.
	17,600	Thorold.
„ *sabulosa*	16,160	Hedin.
„ *stenophylla*	16,200	Thorold.
Kobresia schœnoides	16,300	Deasy & Pike.
Stipa purpurea	16,500	Thorold.
Poa attenuata	18,000	„
Atropis distans	17,000	„
Festuca valesiaca	16,500	„
	16,400	Deasy & Pike.
Littledalea tibetica	16,500	Littledale.
Agropyrum Thoroldianum	16,500	Thorold.
„ *striatum*	„	Littledale.
Elymus lanuginosus	16,520	Wellby & Malcolm.

The above list is doubtless imperfect and incomplete. For instance, it is doubtful whether so many of Littledale's plants were collected above 16,000 ft., because only a general indication of altitude of "about 16,500 ft." was given, and some of the plants may have been collected a thousand feet or more lower. Still, as may be seen, many of the plants of the Littledale collection were found at greater elevations by other travellers. It is also probable that Thorold's altitudes are all susceptible to some reduction. The general result is :—

Species from 16,000 and below 17,000 ft.	72
„ 17,000 „ „ 18,000	52
„ 18,000 „ above	6
	130

According to these figures, nearly half of the Tibetan species in our Enumeration have been collected at 16,000 ft. and upwards. Whether these figures are very exact or not, they go to prove that there is no altitudinal limit to flowering plants except perpetual snow. In the Alps of Europe, as proved by the late John Ball and others, plants exist in snow-free nooks and corners far above the ordinary snow-line. The species recorded from 18,000 ft. and upwards are :—*Thermopsis inflata*, 18,540 ft.; *Astragalus confertus*, 18,000 ft.; *Aster Boweri*, 18,000 ft.; *Saussurea tridactyla*, 19,000 ft.; *Microula tibetica*, 18,000 ft. and *Poa attenuata*, 18,000 ft.

The Useful Plants of Tibet.

In a sense, almost all the plants of Tibet are useful, if only as food for animals; but some are injurious, or at least one is injurious, to animals; and it is of importance to know what this is. Both Rockhill ('Mongolia and Tibet,' p. 139) and Malcolm (Geogr. Journ. ix. 1897, p. 216) mention a "poisonous weed," which in each instance cost them the lives of several mules in one night. It is mentioned as though it were well known, yet we have not succeeded in identifying it with any of the plants collected. Possibly it was *Stipa sibirica*, a grass which is injurious to animals at a certain stage of growth; but it is a mechanical irritant rather than a poison. By useful plants, however, we mean those directly useful to the traveller, either for food or fuel. The only really valuable plant for food, or perhaps we should say the only one much used, because there was no choice, was a kind of onion, *Allium Semenovi*, which was eaten by several of the travellers, and Wellby and Malcolm nearly lived on it for several days. Happily it was abundant in the country where it was most needed. The bulbs of *A. senescens* and *A. Jacquemontii* are also eaten.

The following plants are noted as being used as vegetables; in some cases it is the leaves which are eaten, in others the roots:—*Braya uniflora*, *Crambe cordifolia*, *Peucedanum Malcolmii*, *Saussurea Thoroldii*, *S. tangutica*, and *Polygonum sibiricum*. Most likely other plants are used for food, such, for instance, as the species of *Taraxacum* and *Crepis*. Concerning rhubarb, there is nothing to add to the notes in the "Itineraries" and in the "Enumeration."

A few native names appear on the labels and in the narratives of some of the travellers. Dama = *Caragana pygmæa*, of which we have seen no specimen from within our limits, except one collected by Strachey and Winterbottom in Gugé. Kumbuk = *Peucedanum Malcolmii*. Hann = *Saussurea Thoroldii*. Cumtchen = *Artemisia macrocephala*. Tami is the name applied to various shrubby species of *Artemisia*, according to Schlagintweit, who also states that *Eurotia* is called Burzu. On the authority of Deasy and Pike, *Tanacetum tibeticum* bears the name of Boortze in Tibet. The name is variously spelt by different travellers, and it is probable that this name is applied to more

than one species of *Tanacetum* and perhaps also to species of *Artemisia*. The dried berries of *Ephedra Gerardiana* are mixed with tobacco and carried in the mouth.

Table of the Distribution of the Plants of Tibet.

The following Table is intended to show the distribution of the vascular plants collected in Tibet Proper by the travellers whose names appear in the heading. It is probable that half a dozen species are included that have not been collected within our limits, and as many perhaps omitted that should have been included. It was not considered necessary for our purposes to have strictly defined areas to illustrate the general distribution of the plants, and the results seem to justify this view. The regions adopted, roughly described, are:—

1. *Himalayan Region.*—Himalayan and Karakorum mountains, and most of the country designated Tibet in the 'Flora of British India,' as pointed out more fully at p. 128.
2. *Mongolian Region.*—Chinese Turkestan, Mongolia, and Tangut or North-western Kansuh.
3. *Chinese Region.*—China Proper, Japan, Korea.
4. *Siberian Region.*—Temperate Siberia, Mandshuria, and Kamtschatka.
5. *Persian Region.*—Russian Turkestan, Afghanistan, Baluchistan, Persia, extratropical Arabia.
6. *Mediterranean Region.*—Caucasus, Asia Minor, South Europe, and extratropical North Africa.
7. *Arctic Region.*—Arctic Europe, Asia, and America.
8. *Other Regions.*—Asia south of the mountains of Northern India and south of China Proper; Europe, between the Arctic circle and the country bordering the Mediterranean Sea; America south of the Arctic circle: Africa, tropical and south; tropical Arabia; Australasia and Polynesia.

As may be learnt from the analysis following the table, we are able to give fuller information than the table itself supplies, because we compiled a much more detailed one for working purposes.

TABULAR VIEW of the Distribution of the Plants collected in Tibet by Thorold & Bower, Rockhill, the Littledales, Wellby & Malcolm, Deasy & Pike, and Hedin, with some additional species from the earlier collections of Hooker and Strachey & Winterbottom.

	Regions.							
TIBET.	Himalayan.	Mongolian.	Chinese.	Siberian.	Persian.	Mediterranean.	Arctic.	Of wider Distribution.
1. RANUNCULACEÆ.								
Aconitum dissectum	...	...	*					
Adonis cærulea.....	...	...	*					
Anemone imbricata.								
Callianthemum cachemirianum	*	...	*	...	*			[N. Am.
Clematis alpina.....	...	...	*	*	...	...	...	Temp. Eur., As.,
,, orientalis	*	*	*	...	*			
Delphinium Brunonianum	*	*						
,, cæruleum	*							
,, grandiflorum	...	...	*	*				
,, Pylzowii	...	*	*					
Ranunculus aquatilis	*	*	*	*	*	*	*	N. & S. Temp. Reg.
,, Cymbalariæ.....	*	...	*	*	*	...	*	N. Am., Andes.
,, hyperboreus.....	*	...	...	*	...	...	*	
,, involucratus.								
,, lobatus.....	*							
,, pulchellus	*	*	*	*	*			
,, similis.								
,, tricuspis	...	*						
Thalictrum alpinum.....	*	...	*	*	*	*	*	
2. PAPAVERACEÆ.								
Hypecoum leptocarpum	*							
Meconopsis horridula	*	*	*					
,, integrifolia	...	...	*					
3. FUMARIACEÆ.								
Corydalis Boweri.								
,, Hendersoni	*	*						
,, Moorcroftiana	*	...	...	...	*			
,, tibetica	*							
4. CRUCIFERÆ.								
Alyssum canescens	*	...	...	*				
Braya rosea	*	...	...	*	...	...	*	
28	17	8	13	9	7	2	5	3

	Regions.							
Tibet.	Himalayan.	Mongolian.	Chinese.	Siberian.	Persian.	Mediterranean.	Arctic.	Of wider Distribution.
28	17	8	13	9	7	2	5	3
4. Cruciferæ (*continued*).								
Braya sinensis	...	...	*					
,, uniflora	*							
Capsella Thomsoni	*	*	*					
Cheiranthus himalayensis	*							
Christolea crassifolia	*	*						
Cochlearia scapiflora	*	*						
Crambe cordifolia	*	*	...	...	*	*		
Dilophia salsa	*	*	*					
Draba alpina	*	*	...	...	*	...	*	N. Alpine Regions.
,, fladnitzensis	*	...	...	...	...	...	*	,, ,,
,, incompta	*	...	...	...	*	*		
,, lasiophylla	*	*						
Erysimum Chamæphyton.								
,, funiculosum	*							
Eutrema Przewalskii.								
Iberidella Andersonii	*							
Lepidium capitatum	*							
,, cordatum	...	...	...	*				
,, latifolium	*	*	*	...	*	*	...	Temp. Europe.
Parrya exscapa	*	...	...	*				
,, lanuginosa	*							
,, macrocarpa	*	...	...	*	*	...	*	
,, prolifera.								
Sisymbrium humile	*	*	...	*	...	...	*	
5. Caryophyllaceæ.								
Arenaria festucoides	*							
,, Littledalei.								
,, musciformis	*	*						
,, Stracheyi	*							
Lychnis apetala	*	*	...	*	...	...	*	N. Alpine Regions.
,, macrorhiza	*							
Silene Moorcroftiana	*	...	...	...	*			
Stellaria decumbens	*							
,, graminea	*	*	*	*	*	*	*	Europe.
,, subumbellata	*							
Thylacospermum rupifragum	*	*						
6. Tamariscaceæ.								
Myricaria elegans	*							
,, prostrata	*							
65	48	21	18	15	14	6	11	8

Tibet.	Himalayan.	Mongolian.	Chinese.	Siberian.	Persian.	Mediterranean.	Arctic.	Of wider Distribution.
	Regions.							
65	48	21	18	15	14	6	11	8
7. Zygophyllaceæ.								
Nitraria Schoberi	...	*	*	*	*	*	...	Australia.
8. Geraniaceæ.								
Biebersteinia Emodi.....	*							
Geranium collinum	*	...	...	*	*			
9. Leguminosæ.								
Astragalus Arnoldi.								
,, confertus	*							
,, Heydei	*	*						
,, Malcolmii.								
,, melanostachys	*							
,, nivalis.....	*	...	...	*				
,, tribulifolius	*							
,, Webbianus.....	*							
Caragana pygmæa	*	*	...	*	*			
Oxytropis cachemirica	*	*	...	*				
,, densa	*							
,, lapponica.....	*	...	...	*	...	...	*	Mts. of Europe.
,, microphylla.....	*	...	...	*				
,, Stracheyana.....	*							
,, tatarica	*	*						
Stracheya tibetica	*							
Thermopsis inflata	*							
,, lanceolata	...	*	*	*				
10. Rosaceæ.								
Chamærhodos sabulosa	*	...	*	*				[Austral.
Potentilla Anserina	*	*	*	*	*	*	*	N. Temp. S. Am.
,, bifurca	*	*	*	*	...	*		
,, fruticosa	*	*	*	*	*	*	*	N. Temp. Regions.
,, multifida	*	*	*	*	*	*	*	,, ,,
,, nivea	*	*	*	*	*	*	*	,, ,,
,, sericea	*	*	*	*	*	*	*	,, ,,
11. Saxifragaceæ.								
Parnassia ovata	*	...	...	*				
Saxifraga flagellaris	*	*	...	*	...	*	*	N. Temp. Regions.
,, Hirculus	*	*	*	*	*	*	*	,, ,,
,, Jacquemontiana	*	...	...	*				
97	76	35	28	34	23	15	19	17

	Regions.							
Tibet.	Himalayan.	Mongolian.	Chinese.	Siberian.	Persian.	Mediterranean.	Arctic.	Of wider Distribution.
97	76	35	28	34	23	15	19	17
11. Saxifragaceæ (*continued*).								
Saxifraga parva.								
,, saginoides	*							
,, tangutica	...	*						
12. Crassulaceæ.								
Sedum algidum	...	*	...	*	*			
,, crenulatum	*							
,, Ewersii	*							
,, fastigiatum	*							
,, Przewalskii	...	*						
,, quadrifidum	*	...	...	*	...	...	*	
,, Rhodiola	*	*	...	*	...	...	*	N. Temp. Regions.
,, rotundatum.								
,, tibeticum	*	...	...	...	*			
Sempervivum acuminatum	*							
13. Halorrhagidaceæ.								
Hippuris vulgaris	*	*	*	*	*	*	*	N. Temp. Regions, S. Amer.
Myriophyllum verticillatum	*	*	*	*	*	*	...	
14. Umbelliferæ.								
Peucedanum Malcolmii.								
Pleurospermum Hookeri	*							
,, stellatum	*	*						
Selinum striatum	*							
15. Caprifoliaceæ.								
Lonicera hispida	*	...	...	*	*			
16. Dipsaceæ.								
Morina Coulteriana	*							
17. Compositæ.								
Allardia tomentosa	*							
Anaphalis mucronata	*							
,, xylorrhiza	*							
Antennaria nana	*							
Artemisia Campbellii	*							
123	96	42	30	40	28	17	22	20

Tibet.	Himalayan.	Mongolian.	Chinese.	Siberian.	Persian.	Mediterranean.	Arctic.	Of wider Distribution.
	Regions.							
123	96	42	30	40	28	17	22	20
17. Compositæ (*continued*).								
Artemisia desertorum	*	*	...	*				
„ macrocephala	*	*	...	...	*			
„ minor	*							
„ Roxburghiana	*							
„ sacrorum	*	...	*	*	...	...	...	E. Europe.
„ salsoloides	*	*	...	*	...	*	...	„ „
„ Stracheyi	*							
„ Wellbyi.								
Aster altaicus	*	*	*	*	*			
„ Boweri.								
„ Heterochæta	*	...	*	*				
„ molliusculus	*							
„ tibeticus	*	*						
„ tricephalus	*							
Cremanthodium Deasyi.								
„ Fletcheri.								
„ goringensis.								
Crepis flexuosa	*	*	...	*				
„ glomerata	*							
„ sorocephala.								
Lactuca Deasyi.								
„ Lessertiana	*							
Leontopodium alpinum	*	*	*	*	...	...	...	Alps of Europe.
„ Stracheyi	*							
Saussurea alpina	...	...	...	*	*	...	*	N. Temp. Regions.
„ Aster.								
„ bracteata	*							
„ glanduligera	*							
„ Hookeri	*							
„ Kunthiana	*							
„ pumila.								
„ pygmæa	...	*	...	*				
„ sorocephala	*	*	...	*				
„ subulata	*	*						
„ tangutica	*	*						
„ Thomsoni	*							
„ Thoroldii	...	*	*					
„ tridactyla	*							
„ Wellbyi.								
Senecio arnicoides	*							
„ coronopifolius	*	...	...	...	*	*	...	Temp. Europe.
Tanacetum fruticulosum	*	...	...	*	*			
„ gracile	*							
„ tibeticum	*							
167	127	54	35	51	33	19	23	25

Tibet.	Himalayan.	Mongolian.	Chinese.	Siberian.	Persian.	Mediterranean.	Arctic.	Of wider Distribution.
	Regions.							
167	127	54	35	51	33	19	23	25
17. Compositæ (*continued*).								
Taraxacum bicolor	*	*	...	*				
,, lanceolatum	...	...	...	*	...	...	...	Temp. Europe.
,, officinale	*	*	*	*	*	*	*	N. & S. Temp. Reg.
,, palustre	*	...	...	...	...	*	*	
18. Campanulaceæ.								
Cyananthus incanus	*	...	*					
19. Plumbaginaceæ.								
Statice aurea	...	*	...	*				
20. Primulaceæ.								
Androsace Chamæjasme	*	...	...	*	...	*	*	N. Temp. Regions.
,, Tapete.								
,, villosa	*	*	*	*	*	*		
Glaux maritima	*	*	*	*	*	*	*	N. Temp. Regions.
Primula purpurea	*	...	...	...	*			
,, rotundifolia	*							
,, tibetica	*							
21. Gentianaceæ.								
Gentiana aquatica	*	*	*	*	*			
,, falcata	...	...	...	*				
,, humilis	*	...	...	*	...	*	...	N. Temp. Regions.
,, nubigena	*							
,, Rockhillii.								
,, squarrosa	*	...	*	*				
,, tenella	*	...	...	*	...	...	*	Alps of Europe.
,, tianschanica	*	*						
,, Thomsoni	*	*						
Pleurogyne brachyanthera	*							
22. Boraginaceæ.								
Microula sikkimensis	*	...	*					
,, tibetica	*	...	*					
23. Solanaceæ.								
Physochlaina præalta	*	*						
193	148	63	43	63	38	25	28	31

Tibet.	Regions. Himalayan.	Mongolian.	Chinese.	Siberian.	Persian.	Mediterranean.	Arctic.	Of wider Distribution.
193	148	63	43	63	38	25	28	31
24. Scrophulariaceæ.								
Oreosolen unguiculatus.								
Pedicularis alaschanica	*	*	*					
„ cheilanthifolia	*	...	*	*				
„ longiflora	*	*	*	*				
„ Oederi	*	...	*	*	...	...	*	N. Alpine Regions.
„ Przewalskii	*	...	*					
„ rhinanthoides	*	*	*	...	*			
Scrophularia dentata	*							
25. Selaginaceæ.								
Lagotis brachystachya	...	*	*					
„ decumbens	*	*						
„ glauca	*	*	*	*	...	...	*	N. Temp. Regions.
26. Labiatæ.								
Dracocephalum heterophyllum	*	*	...	...	*			
„ Hookeri	*							
Lamium rhomboideum	*	*	...	...	*			
Nepeta decolorans.								
„ discolor	*	...	...	...	*			
„ longibracteata	*	...	...	...	...	*		
„ supina	*							
„ Thomsoni	*							
„ thibetica	*							
Phlomis rotata	*							
27. Chenopodiaceæ.								
Eurotia ceratoides	*	*	*	*	*	*	...	Eur., N.W.America.
Halogeton glomeratus	*	...	...	*	*			
Kalidium gracile	...	*						
Salsola collina	*	...	*	*	*	...	...	E. Europe.
„ Kali	*	*	*	*	*	*	...	N. & S. Temp. Reg.
28. Polygonaceæ.								
Polygonum Bistorta.....	...	*	*	*	...	*	*	N. Temp. Regions.
„ bistortoides	...	...	...	...	*	*		
„ Deasyi.								
„ sibiricum	*	*	*	*	...	...	*	
„ sphærostachyum ...	*							
224	172	76	56	73	47	30	32	37

	Regions.							
Tibet.	Himalayan.	Mongolian.	Chinese.	Siberian.	Persian.	Mediterranean.	Arctic.	Of wider Distribution.
224	172	76	56	73	47	30	32	37
28. Polygonaceæ (*continued*).								
Polygonum tibeticum.								
,, tortuosum	*							
,, viviparum	*	*	...	*	...	*	*	N. Alpine Regions.
Rheum spiciforme	*	...	*	...	*			
29. Thymelæaceæ.								
Stellera Chamæjasme	*	*	*	*	*	*		
30. Elæagnaceæ.								
Hippophaë Rhamnoides	*	...	*	*	*	*	...	Temp. Europe.
31. Euphorbiaceæ.								
Euphorbia tibetica	*	*						
32. Urticaceæ.								
Urtica hyperborea	*	*						
33. Salicaceæ.								
Salix Lapponum	...	...	...	*	...	*	*	Alps of Europe.
,, sclerophylla	*							
34. Gnetaceæ.								
Ephedra Gerardiana	*							
35. Iridaceæ.								
Iris Thoroldii.								
36. Liliaceæ.								
Allium Jacquemontii	*							
,, Semenovii	*	*						
,, senescens	...	*	...	*	...	...	...	E. Europe.
Gagea pauciflora	...	*	*	*	*			
240	183	83	60	79	51	34	34	41

Tibet.	Himalayan.	Mongolian.	Chinese.	Siberian.	Persian.	Mediterranean.	Arctic.	Of wider Distribution.
			Regions.					
240	183	83	60	79	51	34	34	41
37. Juncaceæ.								
Juncus Thomsoni	*	*						
38. Naiadaceæ.								
Potamogeton pectinatus	*	*	*	*	*	*	*	N. & S. Temp. Reg.
Triglochin palustre	*	*	*	*	*	*	*	,, ,,
39. Cyperaceæ.								
Carex incurva	*	*	*	*	*	*	*	N. Temp. Regions.
,, Moorcroftii	*	*	*					
,, rigida	*	...	...	...	...	...	*	,, ,,
,, sabulosa	...	*	...	...	...	*		
,, stenophylla	*	...	*	*	...	*	*	
,, ustulata	*	...	*	...	...	...	*	,, ,,
Kobresia Sargentiana.								
,, schœnoides	*	...	...	*	...	*		
Scirpus Caricis	*	...	...	*	...	...	...	Mts. of Europe.
40. Gramineæ.								
Agropyron longiaristatum	*	...	...	...	*	...	...	Abyssinia.
,, striatum	*							
,, Thoroldianum.								
Atropis distans	*	*	...	*	...	*	*	Temp. Europe.
Avena subspicata	*	*	*	*	*	*	*	N. & S. Temp. Reg.
Deschampsia cæspitosa	*	*	*	...	...	*	*	,, ,,
Deyeuxia compacta	*	*						
Diplachne Thoroldi.								
Elymus dasystachys	*	*	*	*				
,, junceus	...	*	...	*	*			
,, lanuginosus	...	...	...	*				
,, sibiricus	*	*	...	*	*	...	...	N. Am. Abyssinia.
Festuca Deasyi.								
,, nitidula	*							
,, sibirica	*	...	...	*	...	*		
,, valesiaca	*	*	*	*	*	*	...	Europe. N. Am.
Littledalea tibetica	...	...	*					
Oryzopsis lateralis	*	...	...	...	*			
Pennisetum flaccidum	*	*	*	...	*			
Phragmites communis	*	*	*	*	*	*	*	N. & S. Temp. Reg.
272	207	99	73	94	62	46	44	54

	Regions.							
Tibet.	Himalayan.	Mongolian.	Chinese.	Siberian.	Persian.	Mediterranean.	Arctic.	Of wider Distribution.
272	207	99	73	94	62	46	44	54
40. Gramineæ (*continued*).								
Poa alpina	*	*	*	...	...	*	*	N. Alp. Regions.
,, attenuata	*	*	...	*	*			
,, nemoralis	*	*	*	*	...	*	*	N. Temp. Regions.
,, pratensis	*	*	*	...	...	*	*	,, ,,
,, tibetica	*							
Stipa Hookeri	*							
,, mongolica	*	*	...	*				
,, orientalis	*	*	*	*	*			
,, purpurea	*	*	...	...	*			
,, sibirica	*	*	*	*	*			
41. Filices.								
Polypodium hastatum	...	...	*					
Total number of the 283 Tibetan species extending to each region	217	107	79	99	66	49	47	57
Approximate percentage of the 283 Tibetan species extending to each region	76·6	38·1	27·9	35	23·3	17·3	16·2	20·1

Analysis and Discussion of the Table.

The foregoing table comprises 283 species of vascular plants belonging to 119 genera and 41 natural orders. As pointed out elsewhere, these totals can only be regarded as approximations; yet it seems probable that these 283 species of plants constitute, or nearly so, the entire flora of Dry Tibet. The uniform composition and smallness of the collections, coupled with the fact that the various explorers traversed the country in the most distant longitudes and latitudes, favour this view, which is also supported by the independent observations of the collectors themselves. Considering that the country stretches across about twenty degrees of longitude, by ten degrees of latitude, the

numbers are indeed very low. Members of several other natural orders, such as the Violaceæ (*Viola*), the Onagraceæ (*Epilobium*), and the Ericaceæ (*Rhododendron niveum*), have been found on the borders of the adjoining countries, and it is therefore probable that they may be represented within our limits. At the same time it is improbable that further researches will considerably increase the number of species, genera, or natural orders,—that is to say in Dry Tibet. On the other hand, if we keep strictly to longitudinal and latitudinal limits, say from 80° to 102°, and 28° to 39°, the numbers would be considerably augmented, especially from the country south of Lhassa between 28° and 30°; and the contiguous parts of Chinese Turkestan and Mongolia, though also poor, have a more varied flora than Tibet. Strachey and Winterbottom's collections illustrate this point, and so does Przewalski's so far as it has been published. Of Hedin's small collection, nearly a third was from the Arka Tag mountains, where he entered Tibet; and the only new species, *Gentiana Hedini* and *G. cordisepala*, were from this region. It is probable, therefore, that some of the species included in the list of his plants should have been left out. The two species of *Gentiana* in question were originally left out, because we had seen no specimens, and subsequently because it was ascertained that they were from Sarik Kol. Under the head of "Vegetation" we give some particulars of the botanical collection made by Bonvalot and Prince Henry of Orleans, chiefly between Lhassa and Tachienlu, and our reasons for not including them. In the same place an account is given of several other collections from the countries adjoining Tibet.

Natural Orders.

The forty-one natural orders found in Tibet are either nearly cosmopolitan, or at least widely spread in the northern hemisphere, and all are represented in the British flora by indigenous species except the Tamariscaceæ, Zygophyllaceæ, Selaginaceæ, and Gnetaceæ, and all are represented in the European flora.

The ordinal representation, taken systematically, is as follows:—

	Genera.	Species.
Ranunculaceæ	8	19
Papaveraceæ	2	3
Fumariaceæ	1	4
Cruciferæ	15	26
Caryophyllaceæ	5	11
Tamariscaceæ	1	2
Zygophyllaceæ	1	1
Geraniaceæ	2	2
Leguminosæ	5	18
Rosaceæ	2	7
Saxifragaceæ	2	7
Crassulaceæ	2	10
Halorrhagidaceæ	2	2
Umbelliferæ	3	4
Caprifoliaceæ	1	1
Dipsaceæ	1	1
Compositæ	13	53
Campanulaceæ	1	1
Plumbaginaceæ	1	1
Primulaceæ	3	7
Gentianaceæ	2	10
Boraginaceæ	1	2
Solanaceæ	1	1
Scrophulariaceæ	3	8
Selaginaceæ	1	3
Labiatæ	4	10
Chenopodiaceæ	4	5
Polygonaceæ	2	9
Thymelæaceæ	1	1
Elæagnaceæ	1	1
Euphorbiaceæ	1	1
Urticaceæ	1	1
Salicaceæ	1	2
Gnetaceæ	1	1
Iridaceæ	1	1
Liliaceæ	2	4
Juncaceæ	1	1
Naiadaceæ	2	2
Cyperaceæ	3	9
Gramineæ	14	30
Filices	1	1
Totals.....41	119	283

Out of forty-one natural orders fourteen, or just over a third, are represented by only one genus and one species each. Fifteen other natural orders comprise 83 genera and 234 species, or, approximately, 70 per cent. and 82·7 per cent. respectively of the total number of genera and species. We have little information on the relative individual abundance of the species of the predominating natural orders and genera, but such remarks as "common" and "rare," and "only seen once" are attached to some of the specimens and are reproduced in our Enumeration; and it may perhaps be a legitimate inference that the natural orders most numerous in genera and species constitute the greater part of the vegetation. Admitting this, the following figures should enable us to picture, if only imperfectly, the appearance of the vegetation of the country, always bearing in mind that certain species grow gregariously, whilst others grow sporadically. For instance, many species of *Saussurea* occur as solitary individuals; *Thylacospermum* forms large tufts; some species of *Allium* grow in large masses, and grasses, generally speaking, form a continuous carpet, though some of the Tibetan species grow in tufts. The fifteen natural orders preponderating both in genera and species are :—

Orders.	Genera.		Species.	
Ranunculaceæ	8	= 6·7 per cent.	19	= 6·7 per cent.
Cruciferæ	15	12·6	26	9·2
Caryophyllaceæ	5	4·2	11	3·9
Leguminosæ.....	5	4·2	18	6·3
Rosaceæ	2	1·7	7	2·4
Saxifragaceæ	2	1·7	7	2·4
Crassulaceæ	2	1·7	10	3·5
Compositæ	13	11	53	18·7
Primulaceæ	3	2·5	7	2·4
Gentianaceæ	2	1·7	10	3·5
Scrophulariaceæ	3	2·5	8	2·8
Labiatæ	4	3·3	10	3·5
Polygonaceæ	2	1·7	9	3·1
Cyperaceæ	3	2·5	9	3·1
Gramineæ	14	11·7	30	10·6
Totals : 15	83		234	

These totals are equal to about 70 per cent. of the genera, and 82·7 per cent. of the species of the whole flora. Similar proportions are found in the richest floras, and they therefore call for no special remarks. There is no great development in Tibet of any order of restricted distribution or of any order of peculiar structure or habit. The number and percentages of the Compositæ call for some remark. Some years ago the late C. J. Maximowicz drew up a table showing the predominating natural orders in seven floral regions, ranging from the Caspian through Central Asia, North China, and Mandshuria to Japan, and in each of these regions the Compositæ considerably exceed any other natural order; in most instances by a third, varying from 15·4 per cent. in the Aralo-Caspian region to 7·7 per cent. in Japan. The decline was almost uniform from West to East. In Tibet nearly 11 per cent. of the genera and 18·7 per cent. of the species belong to this natural order; and it may be added that the preponderance of Compositæ among the high-level plants obtains almost throughout the world. Whether this is altogether due to the special means for dispersion possessed by members of this order would require much investigation to prove, but it may be put forward as probable.

The total absence of certain orders and the poverty of others offer, indeed, points of greater interest. One of the most surprising facts is the extreme rarity of bulbous plants in a country where the conditions seem so favourable to the existence and propagation of this class, and this more especially, because bulbous plants abound in the dry regions of the surrounding countries, though at lower levels. Possibly more may depend on elevation, and the concomitant temperatures of the soil, than is obvious. But the fact remains that petaliferous monocotyledons are exceedingly rare; and not a single species of the Orchidaceæ occurs in the Tibetan collections dealt with in this paper, but Przewalski collected *Orchis salina*, a near ally of the widely diffused *O. latifolia*, in the Koko Nor region. Considering the extent of saline country, a more numerous representation of the Chenopodiaceæ might have been expected.

Genera.

Out of the 119 genera less than a dozen are peculiar to the region; that is, to Tibet and the immediately contiguous countries, and it is exceedingly doubtful whether any genus is endemic in, or confined to, Tibet. The few more or less local genera are:—

Dilophia (Cruciferæ), a diminutive monotype ranging from Ladak in the south-west across Tibet to Kansuh in the north-east.

Thylacospermum (Caryophyllaceæ), a monotype widely spread in the Himalayas, Turkestan, Tibet, and Mongolia. A moss-like plant forming excessively dense cushions.

Stracheya (Leguminosæ), an almost stemless monotypic herb having prickly pods, limited to the Himalayas and the extreme west of Tibet.

Allardia (Compositæ), a genus of about half-a-dozen dwarf herbaceous species inhabiting the Himalayas, Tibet, and Chinese Turkestan.

Cremanthodium (Compositæ), better treated as a section of *Senecio*, which consists of eight or ten almost stemless herbaceous species inhabiting the Himalayas and Tibet.

Cyananthus (Campanulaceæ), a genus of about eight tufted herbaceous species inhabiting the Himalayas, Tibet, and Western China.

Microula (Boraginaceæ), a genus of two or three dwarf herbaceous species inhabiting the Himalayas, Tibet, Kansuh, and Western China.

Oreosolen (Scrophulariaceæ), two stemless herbaceous species, one in the Himalayas and the other in Tibet.

Gooringia, Williams, is a genus founded on *Arenaria Littledalei*, Hemsl., which, if accepted, would constitute, so far as our present knowledge goes, an endemic genus; but we prefer retaining it in *Arenaria*, at least until this group has been more thoroughly investigated.

In contrast to this poverty of local genera is the numerically large representation of families and widely dispersed genera, as the following list shows:—

	Species.
Saussurea	15
Sedum	9
Artemisia	9
Gentiana	9
Ranunculus	8
Astragalus	8
Polygonum	8
Oxytropis	6
Potentilla	6
Saxifraga	6
Aster	6
Pedicularis	6
	96

	Species.
Brought up	96
Nepeta	6
Carex	6
Poa	5
Stipa	5
Delphinium	4
Corydalis	4
Draba	4
Parrya	4
Arenaria	4
Taraxacum	4
Elymus	4
Festuca	4
Total	150

These figures show that twenty-four (or 20·1 per cent. of the total) genera furnish 150 (or 50·3 per cent. of the total) species. Against this there are sixty-eight genera each represented by only one species. In other words, 57·1 per cent. of the genera yield only 24 per cent. of the species. It will be seen that the percentages in these two comparisons are almost exactly reversed.

Species.

The ultimate elements or components of the flora, so far as we subdivide, are species of unequal value, it should be remembered, both as to distinctness from other species and individual representation in the vegetation. Two hundred and eighty-three species is indeed a small number in so large an area; and the question naturally arises, why is it so restricted? But before attempting an answer to this question we will give some of the more striking particulars concerning these 283 species *. It has been shown that there is not a genus of flowering plants that is strictly endemic, or peculiar to Tibet; and very few indeed are endemic in a wider area embracing the contiguous countries

* It should be mentioned here that slight discrepancies may possibly exist in the figures given in various parts of this paper in consequence of some of the latest corrections not having been made all through; but there are very few, if any, and they can affect no question of importance.

which might, from their physical conditions, be considered as forming a part of the same botanical region. But, what is more surprising, the number of species restricted to Tibet is also very small. Taking our arbitrary boundaries, only thirty-four species out of 283 have hitherto, so far as we are aware, not been found outside of Tibet. They are :—

Ranunculus involucratus.
,, similis.
Anemone imbricata.
Corydalis Boweri.
Erysimum Chamæphyton.
Eutrema Przewalskii.
Parrya prolifera.
Arenaria Littledalei.
Astragalus Arnoldi.
,, Malcolmii.
Saxifraga parva.
Sedum rotundatum.
Peucedanum Malcolmii.
Artemisia Wellbyi.
Aster Boweri.
Cremanthodium Deasyi.
,, Fletcheri.
Cremanthodium goringensis.
Crepis sorocephala.
Lactuca Deasyi.
Saussurea Aster.
,, pumila.
,, Wellbyi.
Androsace tapete.
Gentiana Rockhillii.
Oreosolen unguiculatus.
Nepeta decolorans.
Polygonum Deasyi.
,, tibeticum.
Iris Thoroldii.
Kobresia Sargentiana.
Agropyron Thoroldianum.
Diplachne Thoroldi.
Festuca Deasyi.

This gives about 12 per cent. of endemic species, which is very low compared with most countries and especially Asiatic, though high as compared with the British Islands, for example. Moreover, we are convinced that further researches will result in a reduction rather than an augmentation of this number or proportion.

Considering, for our present purpose, Tibet as the centre, the extensions of the remaining 249 species are :—

1. Himalayan	Region ..	217	species, or about	76·6	per cent.
2. Mongolian	,, ..	107	,, ,,	38	,,
3. Chinese	,, ..	79	,, ,,	27·8	,,
4. Siberian	,, ..	99	,, ,,	35	,,
5. Persian	,, ..	67	,, ,,	23·3	,,
6. Mediterranean	,, ..	50	,, ,,	17·3	,,
7. Arctic	,, ..	47	,, ,,	16·2	,,
8. Other regions	..	57	,, ,,	20	,,

It is clear from this summary that the bulk of the Tibetan plants have a wide range. This is more strongly emphasized by the fact that fifty-three species, or 18·7 per cent., occur in five or more of the regions tabulated. Forty-seven species extend to the Arctic regions, and of these twenty-nine occur in Arctic Europe, Asia, and America. Against this very few are common to Tibet and the European Alps.

The most noteworthy point in connection with the distribution of the species is the great preponderance of the Himalayan element, or rather of plants common to Tibet and the Himalayas, amounting to 217 species, or 76·6 per cent. of the whole. Out of these 217 species 119 are not recorded from Sikkim-Himalaya. Seventy-three species, or 25·8 per cent., are apparently restricted to Tibet and the Himalayas; but the almost unexplored mountains of Western China may yield some of these species. A glance down the table is sufficient to enable us to realize how very few species are restricted to Tibet and any one other of the surrounding countries, as Mongolia or China, for example. Indeed our table shows only eight.

Among plants of extraordinary distribution *Nitraria Schoberi* is specially interesting. It is only reported from the Koko Nor district; but it is abundant in Mongolia, Siberia, Turkestan, Afghanistan, and Persia, and extends westward to Southern Russia and Egypt. It is also found in Upper Guinea and Australia, being widely dispersed in the latter country, where it occurs in all the colonies, usually inhabiting more or less saline districts. The fruit is a berry varying in colour from yellow through various shades of red and purple to black. It is greedily eaten by birds and various animals, even by the Tibetan bear, according to Maximowicz, who ascribes its presence in Australia to migratory birds.

Saussurea alpina, *Polygonum Bistorta*, and *Salix Lapponum*, three very generally diffused plants in North temperate and arctic regions, are not recorded from the Himalayas. *Myriophyllum verticillatum* is not known to occur within the Arctic zone, though both *M. spicatum* and *M. alterniflorum* reach Arctic Europe and America.

The plants common to the Alps of Europe and Tibet are:—*Clematis alpina*, *Thalictrum alpinum*, *Draba alpina*, *D. fladnitzensis*, *Oxytropis lapponica*, *Potentilla fruticosa*, *P. multifida*,

P. nivea, *Sedum Rhodiola*, *Saxifraga Hirculus*, *Leontopodium alpinum*, *Saussurea alpina*, *Taraxacum officinale*, *T. palustre*, *Androsace Chamæjasme*, *A. villosa*, *Gentiana tenella*, *Pedicularis Œderi*, *Polygonum viviparum*, *Salix Lapponum*, *Carex incurva*, *C. rigida*, *C. ustulata*, *Scirpus Caricis*, *Avena subspicata*, *Festuca valesiaca*, *Poa alpina*, *P. nemoralis*, *P. pratensis*. Altogether twenty-nine species, and rather less than ten per cent. Adding the following eleven subalpine species — *Ranunculus aquatilis*, *Stellaria graminea*, *Potentilla Anserina*, *Hippuris vulgaris*, *Myriophyllum verticillatum*, *Polygonum Bistorta*, *Potamogeton pectinatus*, *Triglochin palustre*, *Atropis distans*, *Deschampsia cæspitosa*, and *Phragmites communis*— brings it up to nearly fourteen per cent. But it will be seen at once that they are all plants of wide distribution, so there can be no question about special affinities or connections between the two floras.

The plants common to the Arctic regions and Tibet are forty-seven in number, and of these forty-one are of very wide distribution, and thirty-four of them are included in the above list as extending to the Alps. The species not common to the Alps and the Arctic regions are :—*Clematis alpina*, *Myriophyllum verticillatum*, *Leontopodium alpinum*, *Androsace villosa*, *Scirpus Caricis*, and *Festuca valesiaca*. Curiously enough, each of these plants is peculiar in its distribution, as may be seen by consulting the table showing the general distribution of the Tibetan plants. *Clematis alpina* extends eastward to China, but misses the Himalayas. *Leontopodium alpinum* has the same eastward distribution and also occurs in the Himalayas; and the genus *Leontopodium* has its greatest concentration in China, where there are several very distinct and elegant species. But we need not pursue this investigation any further, because these are clearly just vicissitudes of distribution.

The material for comparisons offered by our table is by no means exhausted; but all comparisons lead to such very obvious conclusions, that we do not propose extending them beyond a short list of species not found in the Himalayas.

List of Tibetan Plants not known to occur in the Himalayan Region.

	Mongolia.	China.	Siberia.	Persia.
Clematis alpina	..	1	1	
Delphinium grandiflorum	..	1	1	
„ Pylzowii	1	1		
Ranunculus tricuspis	1			
Meconopsis integrifolia	..	1		
Braya sinensis	..	1		
Lepidium cordatum	..	..	1	
Nitraria Schoberi	1	1	1	1
Saxifraga tangutica	1			
Sedum algidum	1	..	1	1
„ Przewalskii	1			
Saussurea alpina	..	..	1	1
„ pygmæa	1	..	1	
„ Thoroldii	1	1		
Taraxacum lanceolatum	..	..	1	
Statice aurea	1	..	1	
Androsace Tapete	..	1		
Gentiana falcata	..	..	1	
Lagotis brachystachya	1	1		
Kalidium gracile	1			
Polygonum Bistorta	1	1	1	
Salix Lapponum	..	..	1	
Carex sabulosa	1			
Elymus junceus	1	..	1	1
„ lanuginosus	..	..	1	
Littledalea tibetica	..	1		
Totals .. 26	14	11	14	4

Against these twenty-six species, there are seventy-three restricted to Tibet and the Himalayas; and, as already mentioned, 217, or about 76·6 per cent. of the total Tibetan species, also occur in the Himalayas.

Conclusions.

No elaborate arguments are required to prove that the Tibetan is a derived Flora; that is to say derived since the Tertiary period; and its composition is so largely Himalayan that there can be little doubt as to its origin. It may be well to repeat that "Himalaya," as here understood, includes the mountains to the west of the Himalaya Proper, and northward to, and including, the Karakorum. In fact it is from what we have termed Western Himalaya that the greater migration seems to have

proceeded. Whether the local conditions generally, both past and present, favour this view, we will not attempt to prove, but the prevalence of westerly winds is one factor which might be expected to operate actively in bringing about the present condition of things. Whether the precarious vegetation of Tibet is on the whole increasing, is a question for the traveller rather than for the closet botanist, but there is no doubt that if there is an increase in one place there is temporary or permanent destruction in other places, due to the shifting sands.

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