Records

of the

Botanical Survey of India

VOLUME IV.—No. 5

CALCUTTA
SUPERINTENDENT GOVERNMENT PRINTING, INDIA
1911

Issued on August 1911

Price Re. 1 as. 8 or 2s. 6d.

RECORDS

OF THE

BOTANICAL SURVEY OF INDIA

VOLUME IV.—No. 5

CALCUTTA

SUPERINTENDENT GOVERNMENT PRINTING, INDIA

1911

Agents for the sale of Books published by the Superintendent of Government Printing, India, Calcutta.

IN ENGLAND.

Constable & Co., 10, Orange Street, Leicester Square, W.C.

Bernard Quaritch, 11, Grafton Street, New Bond Street, W.

Deighton, Bell & Co., Cambridge.

H. S. King & Co., 65, Cornhill, and 9, Pall Mall, London.

P. S. King & Son, 2 & 4, Great Smith Street, Westminster.

Grindlay & Co., 54, Parliament Street, London, S.W.

Kegan Paul, Trench, Trübner & Co., 43, Gerrard Street, Soho, London, W.

B. H. Blackwell, 50 & 51, Broad Street, Oxford.

T. Fisher Unwin, 1, Adelphi Terrace, London, W.C.

W. Thacker & Co., 2, Creed Lane, London, E.C.

Luzac & Co., 46, Great Russell Street, London, W.C.

ON THE CONTINENT.

R. Friedländer & Sohn, Berlin, W. N., Carlstrasse, 11.

Otto Harrassowitz, Leipzig.

Ernest Leroux, 28, Rue Bonaparte, Paris.

Martinus Nijhoff, The Hague, Holland.

Karl W. Hiersemann, Leipzig.

IN INDIA.

Thacker, Spink & Co., Calcutta and Simla.

Newman & Co., Calcutta.

S. K. Lahiri & Co., Calcutta.

R. Cambray & Co., Calcutta.

B. Banerjee & Co., Calcutta.

The Calcutta School Book and Useful Literature Society, 1, Wellington Square, Calcutta.

Thacker & Co., Ld., Bombay.

D. B. Taraporevala, Sons & Co., Bombay.

A. J. Combridge & Co., Bombay.

Radhabai Atmaram Sagoon, Bombay.

Sunder Pandurang, Bombay.

Gopal Narayan & Co., Bombay.

Ram Chandra Govind & Son, Kalbadevi, Bombay.

G. A. Natesan & Co., Madras.

Higginbotham & Co., Madras.

Combridge & Co., Madras.

Thompson & Co., Madras.

S. Murthy & Co., Madras.

Temple & Co., Madras.

V. Kalyanarama Iyer & Co., Madras.

P. R. Rama Iyer & Co., Madras.

A. Chand & Co., Punjab.

Superintendent, American Baptist Mission Press, Rangoon.

Rai Sahib M. Gulab Singh & Sons, Mufid-i-Am Press, Lahore and Calcutta.

N. B. Mathur, Superintendent, Nazair Kanun Hind Press, Allahabad.

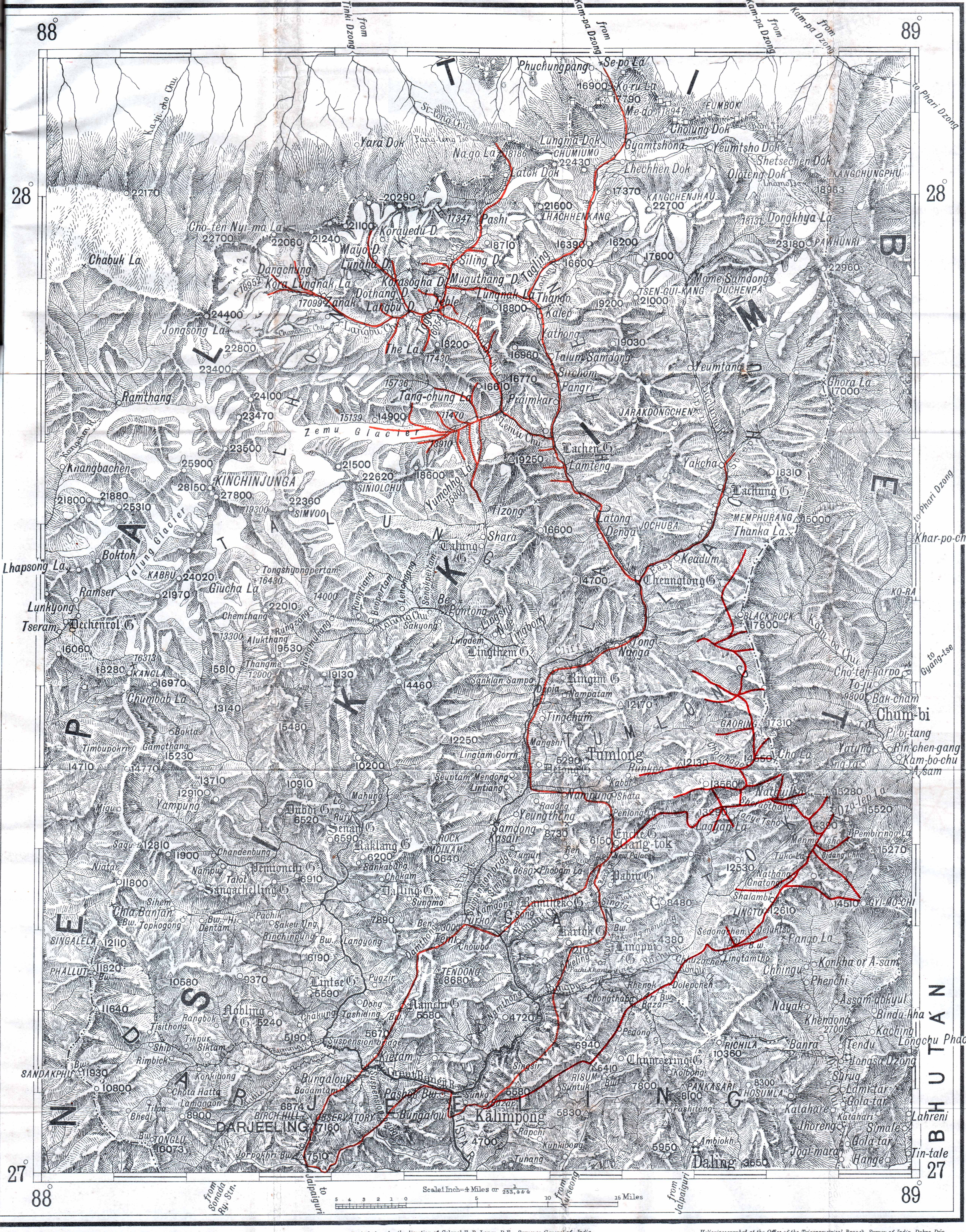
A. M. & J. Ferguson, Ceylon.

S. C. Talukdar, Proprietor, Students & Co., Cooch Behar.

Map

OF

SIKKIM



Prepared specially for the Bengal Government from an original based on sheet No. 7 N.W. N.E.T. Frontier 3rd Edition

Reg. No. 278E October. 1910. Bot. Surv. 600

Published under the direction of Colonel F. B. Longe, R.E., *Surveyor General of India.*

Heliozincographed at the Office of the Trigonometrical Branch, Survey of India, Dehra Dún.

Reg. No. 246-S. 06.

REFERENCE
- G — Gom-pa or Monastery
- La — Pass
- D — Dok, or Cattle Station

Province or State Boundary

1909 Tour Shown thus

1910 Tour Shown thus

THE VEGETATION OF THE ZEMU AND LLONAKH VALLEYS OF SIKKIM.

By

W. W. Smith & G. H. Cave.

THE Sikkim Himalaya including in the term the Darjeeling District as well as independent Sikkim is fairly well known botanically. In addition to the historic explorations of Sir Joseph Hooker in 1848-49, botanists have traversed most of the ranges and valleys during the last 40 years and the Calcutta Herbarium possesses large collections made by the late Sir George King, the late C. B. Clarke, Lieutenant-Colonel D. Prain, J. S. Gamble, Sir George Watt, the late R. Pantling, G. A. Gammie, by Forest Officers and by the staff of the Government Cinchona Plantations and Lloyd Botanic Garden. In addition Lepcha collectors have been employed regularly for many years chiefly to obtain seeds of such species as are welcomed by botanical gardens throughout the world.

The result is that probably no corresponding area in India has been so fully ransacked for its flora and probably none is so well known, despite the wealth and variety of its vegetation due to the great range of altitude and of humidity. There are, however, several of the more remote and difficult valleys which have never been explored either by botanists or native collectors in addition to some which have been only partially so.

The portion of this Sikkim Himalaya least known is the north-west corner comprising the valleys of the Zemu and Llonakh rivers with their tributaries. These valleys are the most distant from the main roads, the most difficult of access on account of rhododendron jungle or high passes and so inclement and inhospitable that for nine months of the year they are devoid of inhabitants. In neither of them is there a house of any kind beyond a shelter of inclined logs in the Zemu valley and the yak-hair tents of the nomad Tibetan herdsmen in Llonakh. There are no roads and no bridges and the traveller has to leave his ponies behind. Difficulties of commissariat for a large party are great in a district where there is nothing to be got from the inhabitants

and a tour is consequently expensive. As the three or four months during which it is possible to visit these uplands are June to September, this means travelling from Darjeeling during the rains and the possibility of routes and communications being much interrupted. Added to the natural difficulties there has been until of late years a political difficulty. The Llonakh has long been claimed by the Tibetans who send many yaks and sheep there during the short summer. It affords comparatively good grazing—where the best is but poor—and is almost inaccessible for those animals from the Sikkim villages. Hooker in his Himalayan Journals records the numerous difficulties put in his way by the headmen of the various villages to prevent his going further north than Lachen. Not so much objection was offered to his proceeding up the Zemu and Llonakh valleys but he was unable to reach the upper portions of these owing to the impenetrable nature of the rhododendron forest through which his party was too limited in numbers to cut their way. More than 40 years later in 1892 a proposal to send an official botanist, Mr. G. A. Gammie, to the Zemu valley was frustrated by the difficulties the Government were at that time experiencing in their relations with the Tibetans and it was not deemed safe to permit of the tour. Since that date Llonakh has been visited by Mr. J. C. White, C.I.E., late Political Officer in Sikkim, in 1902 (previously in 1891); in part by Mr. Douglas Freshfield and a party of mountaineers in 1899 (*vide* "Round Kangchenjunga" by Douglas W. Freshfield), but no botanical collections have ever been obtained from this area with the exception of a few plants which were collected by Colonel now Frank Younghusband of the Tibet Frontier Commission in 1903, from the neighbourhood of the Naku La, and which are now in the Calcutta Herbarium.

With a view to studying the flora of this area and of bringing back as complete a representation of the vegetation as possible, it was the good fortune of the present writers to be deputed there for the months of July-August 1909.

Preliminary arrangements involved considerable time and labour. We shall refer here only to such points as may be of service to any one proposing to travel in that area.

The tent ought to be carefully chosen for lightness and size. Except on the flat areas by the Llonakh river, it is almost impossible to find a level piece of ground on which to pitch a tent of any size. Especially in the lower Llonakh valley and the upper Zemu, is it difficult to get a camping ground. In many places no path whatever, so that the heavy tent which requires

several men to carry is here simply a source of trouble. C. had been frequently on the Singalela and other spurs before and his conclusion is that light Willesden canvas sleeping-tents are the most satisfactory, total weight each 20 lbs., triangular with only one aperture, the floor being continuous with the sides. Canvas sheets fifteen feet square of the same material give the hardy Lepcha collectors a shelter which they much appreciate as they are readily transformed into tents with the aid of some poles from the forest.

As for carriers they must be hired in Darjeeling. Local men can be got stage by stage to take goods to Cheungtong, but up to Lachen and Thango the supply is uncertain and in Zemu and Llonakh itself there are no inhabitants to hire. In upper Sikkim the inhabitants are few and often 'not at home' being chiefly herdsmen, and the traveller who relies on local supply of coolies may experience exasperating delay. When we wished an extra man or so, we sometimes were unable to obtain him not from any unwillingness on the part of the people but simply because coolies were not available. Our own party numbered 20 coolies eight Lepcha collectors and boys and three personal servants and the 20 coolies represent about a minimum. Not only had most of our own supplies to be carried but we had to feed the men also. The country produces little or nothing for the stranger as there is little trade and the inhabitants grow only what they require. Up to Gangtok the coolie train can obtain provisions—beyond that one must provide for them. The traveller himself may obtain an occasional fowl of uncertain age and certain toughness and sometimes eggs. At Lachen in July-August very excellent potatoes may be purchased and a few beans and turnips. In the Zemu valley—nothing. It may happen that a flock of sheep be grazing there—probably not more than one flock—and sheep, milk, and butter, thus be available. Partridges and pigeons are not scarce. In the Llonakh during the short summer many herds of yak and sheep come across the border and the Tibetan attendants are very obliging and willing to trade. Barter is not necessary—they have learnt to recognise a rupee. A good sheep may be had here for R4; wild geese, ducks, pigeons are not uncommon. Wild sheep—*Ovis nahura*—are seen occasionally, but they are not to be reckoned upon as a probable source of supply.

Our staff of coolies was quite inadequate to carry all the impedimenta including collecting materials; so we had the bulk of the stores taken by mules to Lachen as a base and the men went backwards and forwards between Lachen and our shifting camps.

The period of the proposed tour being in the height of the rainy season we anticipated unpleasant experiences until we arrived at the upper valleys where the rainfall is comparatively light. Our fortune, however, was of the best, and from the 30th June to the 28th August we had only one really wet day. There is no guarantee that this is the usual condition of affairs—it is generally very much otherwise. Something is to be said for the plan of starting on a fair morning and travelling up the Tista with the fine weather—sometimes one can thus keep ahead of the next monsoon storm from the south.

The bulk of the baggage having left on June 27th with the majority of the coolies, we started from Darjeeling on the morning of the 30th June. Our objective being the flora of the north-west corner, we made no stop or deviation from the road for botanical purposes until we reached our base Lachen. What we met with by the wayside we secured, if it seemed worth while recording. More ways than one lead to Gangtok and we chose the short and hilly route by Namchi and Song, thus avoiding the Tista valley road which is very unhealthy at this season; the people above Lachen call it the "Valley of Death" which is expressive enough.

We passed Lebong and Badamtam reaching the Manjithan bridge where the frontier was crossed about noon. Then a long climb on the ponies up to Namchi bungalow. The following morning was very wet. We reached Temi at noon, and the weather improving, pushed on to Song which is further away than the mileage given for it. We arrived after dark. This is too long a stage for coolies at this season. Most of ours appeared next morning. We may be prejudiced but the Sikkim mile is hereabouts not a constant.

The forest above Song is very fine and is a good district for orchids. Signs of increasing cultivation are everywhere—soon many districts will be entirely destitute of the dense forests of Hooker's days. It is to the advent of the Nepali cultivator that most of this change is due. We arrived at Gangtok on July the 2nd and found to our annoyance that the advance baggage had got stuck here instead of proceeding on to Lachen. The sirdar in charge had got into difficulties with local mule contractors who were evidently driving a hard bargain with him.

The 3rd July was spent in Gangtok. We here wish to record our indebtedness to Mr. C. H. Bell, I.C.S., the Political Officer of Sikkim, for the facilities afforded us and for the kindness with which he secured for us a favourable reception by the headmen of

the villages up the river. Throughout our relations with the people were of the pleasantest and no difficulties were experienced as far as they were concerned. Here also we sent our ponies back and until we arrived again in Gangtok on August 24th our journey was done on foot with the exception of our three days' visit to the Kangralamo La. Our routes up the Zemu and up the Llonakh were out of the question for ponies, even Sikkim ones.

On July 4th we left Gangtok and took the next stage to Dikchu bungalow. Our route led over the Penlong La (6,250 feet), and then followed a long precipitous descent to Dikchu. Here the first day's rations were given out to the coolies, each man receiving one seer of rice, quarter seer of dal with small additions of ghee, salt, etc.

On the 5th we left Dikchu and proceeded up the valley. The elevation of Dikchu is about 1,500 feet and on the way to our next halting place Sinchik we gradually rose to about 4,000 feet. The road follows the stream for the first four or five miles and then makes a fairly easy ascent. It proved a hot and tiring day, especially at the lower levels. Here and there in the valley bottom were small plantations of *Ficus elastica* introduced by the Sikkim Government. The vegetation was that of the Darjeeling District at a corresponding altitude. *Gesneraceæ* were common along this route decking the cliffs and boulders. Green pigeons were numerous feeding on the fruits of *Macaranga denticulata*. We arrived in the afternoon at Sinchik where the bungalow faces a fine hill clothed with forest with the river between and far below.

On the following morning we marched by way of Tong to Cheungtong at the junction of the Lachen and Lachung rivers. A pleasant winding path to Tong and then a sharp dip to a bridge crossing the Tista. Among the noteworthy plants seen here were *Leptocodon gracilis*, a beautiful but evil-smelling flower, *Didissandra lanuginosa*, *Tylophora tenerrima*, *Baliospermum corymbiferum*, *Woodwardia radicans*. Five miles from the bridge brought us to Cheungtong where there is a new bungalow for the traveller on the flat near the rivers instead of the upper storey of the monastery as in former years. On the 7th we left early following the Lachen branch of the Tista. The tropical and semi-tropical flora of the lower Tista now gives place to a flora characteristic of temperate regions—a transition fully described by Hooker in his Himalayan Journals. Here *Chirita Clarkei* was met with, a rare Gesnerad, and *Decaisnea insignis*, not a common plant in Sikkim—it is seldom sent in by the native seed-collectors though possibly this latter fact is due to its being edible. The same fate

befalls the fruits of the larger *Rubi*, the Lepcha considering it a waste to put such things into drying paper.

So far we had seen little of the leech, that pest of Sikkim jungles. This good fortune followed us throughout the tour, as neither of us, and scarcely any of the coolies, got a single bite. The road between Cheungtong and Lachen is very up-and-down and it was late before we reached Lachen—eight days from Darjeeling for our laden men.

We made our base at Lachen. The next day was spent in overhauling and arranging our stores. These had arrived intact in spite of the shaking given them by the mules over the rough paths. As we anticipated uncertain weather and little shelter in the upper valleys we arranged that one of our Lepcha plant collectors should remain at head-quarters with a lad and attend to the thorough drying of the plants we sent down. It would have been impossible under the conditions which prevail at this season in the Zemu and Llonakh to get our collections properly looked after in camp. The danger from damp would have been too great. Through this precaution we were able to preserve all our collections with little or no damage.

Signs of more ambitious cultivation are evident in Lachen. Fairly well-tended gardens are to be seen in the vicinity of the rough houses. The potatoes to be obtained here are of excellent quality. A flourishing weaving school has been established by the Swedish Mission and turns out rugs, blankets, etc., made from Tibetan wool, dyed with materials extracted from forest plants. At the time of our arrival most of the inhabitants had gone to the high hill pastures in the upper valleys with the flocks and herds. The Phipon or headman came to pay his respects and we arranged with him for a guide who joined us next morning.

On the 9th we left with our camp equipment and enough food for a few days. A march of between two or three miles brought us to Zemu Samdong, *i.e.*, the bridge over the Zemu. We found the latter almost as large and quite as rough a cataract as the Lachen. Here we bade farewell to the road and turned into the Zemu valley proper. The track was of the roughest and impossible for ponies. Our camping ground being uncertain, we had to keep with our coolies and see that they did not linger too far behind. Only once on the expedition did we have to pass the night without our blankets and without any food—and that was a sufficient lesson.

The forest was at first mixed. Gradually the rhododendrons prevailed until ultimately we were almost entirely enclosed by them. In the afternoon we came on the junction of the Llonakh

and Zemu—both foaming cataracts. We crossed the former by a rough bridge and after another half hour's struggle with *Rhododendron Hodgsoni* reached an open tract tenanted by a 'gôt' or flock of sheep and affording a good camping ground at somewhat over 10,000 feet. The attendant shepherds were clad only in a rough coat and a blanket, seemingly most inadequate protection against the rough weather of the Zemu. Tents were pitched in a cold drizzle—no very pleasant welcome to the valley. This proved a very stiff day especially to the laden men on account of the depth of mud among the rhododendron roots—a purgatory of a road which we were to see later on at its worst.

We left our first camp next morning in a drizzle to proceed further up the valley and establish a fixed camp for a week or 10 days. What track there was led through a dense growth of rhododendron, chiefly *R. Hodgsoni*, our enemy of the day before. Here and there were clumps of small bamboos which were dripping wet and added to the discomfort of the thick heavy mud under foot. Occasional logs and branches, wet and slippery, had been placed by the shepherds to improve the track in the worst places. In the undergrowth *Paracarya glochidiatum* was common and in beautiful flower—also *Smilacina oleracea* and species of *Arisaema*. The latter were in demand as an article of food not only by the people of the district but by bears of whose digging operations there were plenty of signs. Our guide presented us with some of the cakes made of these aroids but we did not venture on more than a taste. A few we kept as curios ultimately resembled thick slabs of glue and probably would prove as dangerous to unaccustomed stomachs.

The track continued bad to 11,000 feet but subsequently after crossing the Tumrachen Chu by a rough and very precarious bridge of logs the valley opened out—trees became fewer and the rhododendrons less troublesome. Towards the close of the day we reached a rough shelter of logs at an elevation of just under 12,000 feet. This is the only erection approaching a permanent structure in either the Zemu or the Llonakh valleys and must be but rarely tenanted. It cannot be called a hut—two sets of heavy logs are set against one another, one end is filled with brushwood and the 'house' is complete. Small as were our tents it was difficult to find a level spot of sufficient size for a camp, and the first night our slumbers were disturbed by a tendency to slide down the incline. However we had a lullaby as Hooker had—the continued rumbling of the boulders in the boisterous Zemu resembling thunder in the distance.

The hut rough as it was proved a useful shelter for our men and a convenient place to put some of our stores; so this spot became our head camp for the next fortnight. It was well sheltered with wood and water in plenty. At this height in the valley there are very few large trees and these only in secluded places by the stream. The hill-side is covered with boulders which are usually hidden by a rank growth of small trees and shrubs—sometimes by a wealth of herbaceous plants. In sandy places by the stream *Tamarix*, *Epilobium reticulatum*, *Cardamine macrophylla*, species of *Pedicularis*, *Parochetus communis*, and *Primula sikkimensis* were all common.

On the 11th C. went to the Yumchho La while S. ascended the hill on the north side of the camp to a height of over 14,000 feet. On the way up *Meconopsis nepalensis* was very common and always a conspicuous object. Occasionally the blue *Meconopsis simplicifolia* was seen, but not frequently. The slopes were covered with a dense growth of shrubs and herbs from 1—6 feet high but the number of species was much smaller than we had anticipated.

C. went to the Yumchho La by a track which had been recently cut by the herdsmen through the rhododendrons of just sufficient width to permit of the passage of yaks. This route leads from Llonakh over the Thé La and follows the Tumrachen down to its junction with the Zemu which river is crossed by a rough cantilever bridge not far from the small Tumrachen bridge. The track ascends the ridges on the south side of the Zemu with a directness which is rather fatiguing. On the south side lies the huge mass of Lama Anden covered on the northern side with large glaciers even at 14,500 feet. The path enters a broad valley with cliffs on either side, and this leads to a shallow lake at 15,000 feet, at times no doubt dry. The pass itself is about 15,800 feet. The south side of it had been visited by C. in 1906 approaching from Be and Talung. The night was spent under a rock and the return journey made by the same route on the following day.

Meanwhile on that day S. proceeded two miles up the valley and then ascended the northern side to 15,700 feet. The day was fine and afforded a magnificent view of the whole line from Kangchenjunga to the precipices of Lama Anden—a line whose lowest gap is the Yumchho La and a most efficient screen against the heavier monsoon rains. The vegetation was abundant but not very varied. The impression of the previous day of the comparative dryness was confirmed by the character of the vegetation. The only moist region is that fed directly by the melting of the big glaciers at the head. The slopes up to 15,000 feet were not very

productive. *Umbelliferæ, Compositæ, and Primulaceæ* were meagre in number of species though certain individual species were abundant. This paucity is not to be accounted for by our visit being early in the season. Rhododendrons were plentiful but not dense compared with what they are lower in the valley. *Primula sikkimensis* was abundant, *P. pusilla* less so. Above 15,500 feet the slopes became bare and rocky with here and there plants of *Rheum nobile* and *Cortia Hookeri*. The 13th July was another beautiful day and we began to think the Zemu a much maligned region. Leaving camp soon after 7 A.M. we found 2½ miles up the valley the only surviving snow-bridge on the Zemu and crossed to the other side where there is a capital path—for these regions. This is part of the old track from Thé La *viâ* the Thangchung La and the Zemu glacier to the Yumchho La. At present it is in fair order but the new track lower down already mentioned is safer and is almost certain to replace it. The chief objection to the old route is the uncertainty of the crossing over the lower end of the glacier—if the snow-bridges disappear early it is almost impossible to get across the rivers at the upper end of the valley.

The upper Zemu presents no great difficulties above 12,000 feet—the chief obstacles to the exploration of the valley being first the two days' march from Lachen through the trying rhododendron forests and secondly want of bridges in the upper portion of the river. Any bridge put up in the upper region would be without doubt carried away by the ice and snow of the long winter months. We could see no place where it was possible to ford the river—it is a headlong cataract right up to the spot where it issues from below the glacier. Although it narrows somewhat at its source the lack of timber at that elevation prevents the traveller improvising a temporary bridge. It would seem as if the valley is much more used by the shepherds than it could have been in Hooker's time and the occasional paths 'blazed' by these men render the place much less difficult of access. At the time of Hooker's visit to this valley there was much uncertainty regarding the nomenclature of the various streams, and in his Himalayan Journals the upper Zemu goes under the name of Llonakh, while the Llonakh proper was looked upon by Hooker as the upper portion of the Zemu.

Proceeding by the south side of the Zemu—that is the right bank—we found a track crossing several small streams which were easily forded in the morning, but when we were returning in the evening it was quite a difficult matter as the snow melting under a hot sun considerably increased the depth of the streams. There is no doubt about the daily periodicity of volume in the rivers here.

At about 13,000 feet we came to the base of the Zemu glacier. Here the Zemu stream divides into two, the northern branch known as the Poki Chu disappearing at once below the glacier and reappearing some miles further up, while the southern branch or Chumtha skirts the base of high cliffs. We managed to get across the Chumtha by another snow-bridge which even at this early time in the year was the only one available. We traversed most of the triangular area between these two streams but found only a very scanty flora. Continuing up the glacier we found some 'flats' kept cold and moist by the melting snow. Here the most conspicuous plants were *Primula capitata*, *Picrorhiza Kurrooa*, *Gentiana phyllocalyx*, prostrate *Salices*, *Diapensia*, *Diplarche*. Leaving the glacier we examined several of the ridges and slopes on the south side, ascending almost to the limit of vegetation. This limit, however, was reached much earlier than on the more eastern heights—no doubt the presence of the glaciers and the huge accumulations of snow tend to restrict vegetation to a very short period and to only a few hardy species.

The 14th we spent in the valley bottom in the vicinity of the snow-bridge. *Epilobium reticulatum* Clarke was in fine flower from 11,000 to 13,000 feet. Its height is from 3 to 12 inches and its favourite habitat is the sandy crevices between the loose boulders by the stream. It is very handsome, with very large flowers for the size of the plant. The 15th opened with a steady drizzling rain, but afterwards cleared. C. again ascended the main stream while S. followed a tributary up the hill to the north.

The smaller rivulet-beds usually gave an easy route up the hills and contained a number of small species among the stones—species which had no chance of survival in the dense shrubby vegetation on the slopes. The hills on this side do not much exceed 16,000 feet, and the amount of snow remaining in July is small and confined to a few hollows at the top. We found that most of these streams ran dry at about 500 to 1,000 feet above the Zemu, affording a strong contrast to those on the opposite side and at the head of the valley which are supplied by the huge Zemu glacier and the snowy slopes of a much higher range and with a northern exposure to delay the melting until the short flowering season. Among the rarer plants of the day's collection was *Primula elongata*.

Meanwhile C. had reached the Thangchung La about 17,000 feet. Evidently the route—Kambajong to Talung—over this pass was beginning to lose favour as there was no sign of a used track up from the Zemu glacier, though a few overgrown 'clearings' and

the walls of deserted cattle 'corrals' were evidence that it had been a regular route not long before. The rhododendron scrub was here troublesome but on the pass there was no snow. The ridge was practically barren.

On the 16th with continued fine weather we ascended to the top of the hill behind the camp, taking all our collectors. This is about equal in height to the Thangchung La. The top was rocky and bare with no snow even at 17,000 feet, while opposite and 2,000 feet lower the slopes were covered.

On the 17th we crossed the snow-bridge again and ascended the old yak-track leading to the Yumchho La. The persistence of the snow-bridge up to the middle of July is further evidence of the absence of heavy rains in the upper valley at this time of the year. The tunnel of the bridge was very little larger than the usual daily volume of the stream and there could have been no flood during the previous two months. We found the southern slopes more thickly covered with rhododendrons. Snow lay at 15,000 feet and on the way to the pass we had to cross over fields of it sloping at an awkward angle. A false step would have meant a long slide of several hundred yards with ugly pinnacles of rock projecting here and there. One of two of the coolies showed a little hesitation at the unusual conditions—they would have preferred to tackle a precipitous cliff or swaying cane-bridge.

Crossing the Yumchho La we descended into the valley on the other side for about 1,000 feet. Here we met with the herdsmen and yaks of the Talung monastery. This valley is much wetter with large tracts of marshy land in which Primulas flourish. Here we found several species which do not appear to cross into the Zemu. *Primula Dickieana* and its variety *Pantlingii* were in special abundance, the whole sward being covered with them like an English meadow with cowslips. There seems no doubt that *P. Pantlingii* is only a form of *P. Dickieana*. Intermingled were whitish-yellow, yellow, mauve and purple forms and with umbels varying from one to six flowers.

Return the same day was out of the question, so we had to camp with our men under an over-hanging boulder with our blankets as our only protection.

On the following morning we made a survey of the vegetation of the Talung side of the pass including that of two shallow lakes which like most of these high altitude 'tarns'' were practically barren. Recrossing the La and the snow-fields we descended to where the snow-bridge ought to have been. To our dismay almost

the whole mass had disappeared down the Zemu and a racing current of icy water lay between us and our camp.

There was nothing for it but to trudge again some miles upstream to where, just below the glacier, by a curious accident two mighty boulders over 20 feet high had fallen from the hillsides and made a natural bridge with the pent-up Zemu foaming below. Scrambling up the wet and slippery face of the first boulder we made a hazardous descent by means of a notched pole to the flank of the other. These same boulders had proved of equal service to Freshfield's party some years before and are heavy enough to withstand the ice and snow of many years to come.

On the 19th C. crossed the glacier and ascended the Poki Chu for some miles. *Primula bellidifolia* was found near the head of the valley. The slopes around the glacier were particularly unproductive and further advance west up the glacier did not hold out much prospect to the botanist.

The next day was spent arranging the collections and getting ready for departure. On the 21st we descended to the junction of the Tumrachen Chu and on the following day, S. followed up that stream while C. explored the top of Nachegoh. The Tumrachen valley is narrow and precipitous up to 13,000 feet and the track keeps well away from the steep river banks. *Abies Webbiana* and *Juniperus* were common. Above that height the valley is open affording good pasturage almost up to the La.

Nachegoh took C. five hours' stiff climbing, mostly through rhododendron scrub. Large areas here and there had been cleared in previous years by the shepherds and these yielded herbaceous plants, mostly prevalent species. The top was sparingly snowed, and scored extensively by landslides and screes. Snow and sleet were falling—a foretaste of Llonakh where every month even in summer has its snowstorms.

Before ascending the Llonakh it was necessary to visit our base and secure what we had already obtained. On the 23rd we marched to the site of our first camp near the junction of the Zemu and Llonakh, deposited the tents, etc., and proceeded through the lower valley to Lachen. There was evidence that much rain had fallen while we had been in the comparatively dry upper valley. The road was worse than ever. In some parts of the track the water was above our knees. The bungalow with its comfortable fire was a welcome change.

It may be expedient here to pass in brief review the vegetation of the Zemu valley.

The Zemu area may be divided botanically into three regions—a temperate forest region from 8—11,000 feet, a subalpine shrub region from 11—14,000 feet, and an alpine region from 14—17,000 feet. On entering the valley at Zemu Samdong, 8,000 feet, the slopes are steep and the bottom of the valley dark and thickly wooded. The forest is mixed. Along with the conifers—*Picea, Larix, Tsuga, Abies, Juniperus,* there occur numerous species belonging to the following genera:—*Berberis, Ilex, Euonymus, Acer, Rubus, Neillia, Rosa, Spiræa, Pyrus, Ribes, Pentapanax, Viburnum, Lonicera, Gaultheria, Rhododendron, Enkianthus, Litsæa, Daphniphyllum, Elæagnus, Corylus, Betula, Alnus.* Gradually as we ascend the *Rhododendrons* and *Coniferæ* tend to prevail and at 10—11,000 feet the forest is chiefly composed of them. At 11,000 feet the character of the valley begins to change. The tall *Rhododendrons* disappear, their place being taken by intermediate forms such as *R. Wightii* and *R. campanulatum,* which are quite as difficult a barrier. The *Coniferæ* too begin to thin off. The valley opens out, becomes lighter and is more sheltered from the monsoon rains. The main current of the monsoon rainstorms in this region seems to pass up the Lachen and not to affect the Zemu and Llonakh much above their junction. Herbaceous species become more prominent, especially at the open areas near the river which have been cleared by the herdsmen or by landslips.

From 11—14,000 feet, up to the base of the glacier, the small shrubs prevail—the large trees persist only in sheltered corners, generally near the stream. At 12,000 feet most have disappeared. The floor of the upper valley is filled with a chaos of boulders covered with straggling *Berberis, Pyrus, Cotoneaster, Ribes, Lonicera, Rhododendron, Salix,* from two to ten feet high. *Meconopsis, Cardamine, Corydalis, Lychnis, Astragalus, Potentilla, Sedum, Epilobium, Heracleum, Angelica, Saussurea, Primula, Pedicularis, Salvia, Polygonum, Rheum, Polygonatum* form the bulk of the herbaceous flora. From 14,000—18,000 feet—about the limit of vegetation—the prevailing genera are *Anemone, Corydalis, Draba, Potentilla, Saxifraga, Sedum, Cortia, Nardostachys, Cremanthodium, Saussurea, Leontopodium, Anaphalis, Rhododendron, Cassiope, Diplarche, Diapensia, Primula, Androsace, Gentiana, Swertia, Picrorhiza, Lagotis, Pedicularis, Polygonum, Rheum, Salix, Juncus, Carex, Poa.*

The lower valley is a wet forest, the upper valley, protected by the giant ridge from Lama Anden to Kangchenjunga, is comparatively dry.

In this upper region three distinct divisions may be noted:

I. The slopes from Nachegoh to the Thangchung La are open, free from snow at an early date, with tiny rivulets which soon become dry in the summer. The north side of the valley is remarkable for the persistence, up to nearly 17,000 feet, of species usually considered as belonging to lower altitudes. The typical 13,000 feet flora sends up representatives to nearly the top of the ridge and the plants characteristic of extreme alpine Sikkim are slow to appear.

II. The southern slopes, lying under the brow of the mighty range are sheltered from the sun and retain here and there the snow even in July down to 14—15,000 feet. Rhododendrons here tend to assert themselves to the exclusion of other genera and the slopes lack the variety of the north side, though alpines are more prevalent and appear at a much lower altitude.

III. The bleak area at the top of the valley where owing to the proximity of the glacier, the limit of vegetation appears to be reached sooner. The flora of this area approaches that of the second but is scantier.

Taken as a whole the valley is undoubtedly a transition from the moist prolific area such as prevails to the south and is typified by Jongri, to the dry area of Tibetan Sikkim lying beyond the Thé La. Though much poorer in species than the Jongri area it has on the whole more affinities with it than with the Llonakh. The lack of epiphytic forms, the comparatively scarcity of ferns, mosses, lichens, show an approximation, however, to what we found in the dry areas of Llonakh.

The Zemu valley forms undoubtedly the dividing line between these two types of vegetation; its flora is that of an attenuated Jongri while the Llonakh flora though less rich in species has a 'facies' of its own.

The valley is a very short one and gives no opportunity for a particularly varied flora. The above generalisations are, we think, as complete as the subject demands.

After one day at Lachen and one to reach the junction of the Zemu and Llonakh, we commenced the ascent of the latter. There were sheep-tracks for the first mile and then undisturbed rhododendron jungle. We kept at first to the right bank; the left is closed at 11,000 feet by a huge precipice. With much labour we reached 12,700 feet where the right bank becomes locked in by precipices. We collected materials for a bridge and camped among the

rhododendron scrub. Next morning a precarious bridge of short logs tied with cord was made with much difficulty across the stream to a huge projecting boulder and up this we all scrambled, the baggage being divided into small packages and slung across by a rope. A long struggle with rhododendron jungle followed, the path having to be hewn with the Ghurka 'kookrie'. It took us all day to gain 1,000 feet of altitude. The Tibetan guide assured us that no inhabitant ever took the route we were attempting and left us under no misapprehension as to the general opinion of our wisdom. We cannot recommend the route. To go however by the Thé La means too many stages from the Lachen base and we did not know enough of the Nangma La to risk that route. But if that pass is clear, the easiest route to Llonakh is to go first to Thango and then across to Teble by the above pass.

Fortunately the weather was fine or our passage through the rhododendrons would have upset our coolies altogether. We halted for the next two days, the men going back for stores while we explored the ridges of Rongsa. Saxifrages were abundant. The vegetation was little different from that of the Zemu at the same height. C. ascended to the top of the ridge—over 16,000 feet. The most interesting plants were *Delphinium glaciale*, *Myosotis Hookeri*, and *Veronica lanuginosa*.

Transit by this route was so difficult and dangerous that we sent the majority of the men back with instructions to try the Nangma La with their next load of supplies. A practicable road could be made up the valley but two or three bridges would be required. No good wood can be got at the places where a bridge is necessary. The improvised bridge by which we crossed to the left bank was a rickety structure of gnarled birch poles with a cord here and there. It was carried away two days later. Fortunately Lepchas and Nepalis are experts at crossing unsteady bridges even when loaded.

On the 30th we continued our march. At 13,800 feet the valley contracts and deep gorges and screes run down to the main stream. These screes were in places a blaze of colour from *Primula sikkimensis*, *Pedicularis*, *Potentilla*, *etc.* It was possible now to travel at a fair pace by the stream. Here and there cliffs projecting into the stream necessitate considerable detours. At one spot the baggage had to be subdivided and hauled by ropes up the cliff face while the men had the same help to scramble up by. At last towards evening we reached 14,500 feet and entered the Llonakh 'flats'. From the first it was evident that the climate

and natural features were quite different from anything we had met with so far.

We spent the following two days exploring the flats and screes near the junction of the two streams, the Lungma Chu and the Naku Chu, whose union gives the Llonakh. Both streams are turbulent and icy cold but as they have not the violent downhill rush of the Llonakh they can be forded at several places in their course. Caution is necessary as at this time of the year the volume is considerable.

These flats form a wonderful expanse of gently undulating ground in the midst of the highest peaks in the Himalayas. They extend up both the affluents of the Llonakh, but those along the Lungma Chu are more extensive than those up the Naku Chu and vary in breadth from one to three miles. They are the level floor formed by the action of some huge glacier or rather set of converging glaciers that have long ago disappeared or are now represented by comparatively small glaciers at the heads of all the valleys. There is no area in Sikkim which is quite the parallel of the Llonakh area. Should climatic conditions ever permit of the disappearance of the huge Zemu glacier, a similar basin would no doubt be found to lead up to the base of Kangchenjunga.

Here and there on the flanks are huge moraines,—accumulations of mighty boulders,—with a very limited flora sheltering in the crevices. These moraines begin at 14,500 feet and extend up to the existing glaciers. Once inside the Llonakh area the traveller finds his road easy as there is only the fording of the icy streams to hinder his march. The lower hills skirting the flats are rounded and smoothed as by a plane; covered with snow for nearly nine months of the year and with a short dry summer they have not lost the outlines given them by the action of the ice-field of previous ages. Above these hills the higher peaks have the craggy outlines and jagged rocks of the typical East Himalaya. The flats themselves are not continuous. Here and there the valleys contract to defiles and these lead to other flats at higher levels. At some intermediate epoch these flats were glacial lakes and in places the depth of alluvium is considerable. The streams of to-day are scoring deep channels in this alluvium. This is specially noticeable at the junction of the two streams where the river lies quite twenty feet below the level of the surrounding plain. High up in the side valleys the same formation is being worked out on a much reduced scale. Small lakes in shallow basins are found regularly a short way below the foot of each glacier.

The flats show evidence of strong persistent winds. The vegetation is almost entirely of the tussock type. The junipers and rhododendrons form mound-like projections on the plain, and their branches are gnarled and prostrate. Neither shrub nor herb raises itself more than a few inches above the general level of the plain. Only in the shelter of some huge boulder or by the cliffs do we find a plant one foot high. Our camp for the first two days was pitched in the centre of this open area but the night winds with occasional snow soon persuaded us to seek a more sheltered position near Teble where wood and water were more convenient and where the yak-herds could supply us with fresh milk and butter. The dwarf juniper provides excellent fuel and is fairly plentiful. It does not seem to be much used by the yak-herdsmen who prefer the dried yak-dung.

During our stay of nearly a fortnight in this valley the weather continued wonderfully regular. The morning broke clear with a north wind which prevailed until the afternoon. Then about 2 or 3 P.M. the south wind began to steal up the Llonakh gorge, bringing clouds from the valley below. With this wind came sometimes a gentle shower, sometimes mist and sleet. But the total rainfall is slight and we had reason to congratulate ourselves on finding one place in the East Himalayas where one may escape the full fury of the monsoon rains. The nights were piercingly cold with generally hoar-frost and occasionally a light fall of snow. The dawn brought gloriously clear views of the mighty ranges to the west and north.

Tibetan and Sikkimese herdsmen with sheep and yaks are scattered throughout the area and the total must be near one thousand yaks and twice as many sheep, the majority of which come from the vicinity of Khambajong over the Naku La. The pasturage seems sparse and poor from lack of grasses but it is evidently much valued. The yaks and sheep are in good condition and those of the latter which we tested had an excellent flavour.

Shifting camp on the 2nd August, we explored the lower end of the Naku Chu valley and the ridges to the east. Two or three miles up the stream we came upon a succession of swamps, more or less divided by lateral moraines. Over these swamps yaks were grazing while on the scattered lakelets were numerous wild geese and ducks some of which provided for us a pleasant change from tinned provisions. At the north end of the swamp is a square erection of rough stones possibly a blockhouse but called by our Tibetan guide and by a Khambajong family encamped near it the "Gumpa" and said to have been erected to mark off the La hen

grazing ground to the south from the Tibetan to the north. This cannot be the rule now as we found Khambajong herdsmen at the extreme western part of Llonakh.

On the 3rd S. devoted his time to the marsh land which is of a type not seen elsewhere in Sikkim and contained *Hippuris*, *Glaux*, and other plants not previously recorded from this side of the Himalaya. Meanwhile C. as the better mountaineer left early to ascend the Naku La. Neither of us and few of the coolies suffered much at any time from the altitude. C. was sick once or twice on the tour when 16,000 feet was first reached, while S. did not experience more than a tightness round the head. Above 16,000 feet the chief disability was scantness of breath and the loaded men could only make a few yards at a time.

The marshes are not productive of many species and the few available are mostly of West Himalayan and Tibetan type—*Ranunculus aquatilis* in the pools, *Dilophia salsa*, a plant of the Tibetan salt marshes, *Primula tibetica* in profusion and fine clumps of yellow *Pedicularis*. Grasses and carices were disappointingly few and scarcely in flower. The slopes immediately above the river have a very piebald appearance—the dark tufts of juniper and rhododendron occupy in patches about one-sixth of the area, while large moraines and scattered boulders cover the rest. Among these stones a few hardy xerophytes are to be obtained but much of the area is quite barren. The juniper mounds shelter one or two species which do not dare to face the conditions unprotected. *Callianthemum* we found invariably thus.

Meanwhile C. had a long and arduous march to the Naku La. This is over 18,000 feet and is practicable for ponies and yaks. It is the easiest means of access to Llonakh—permissible, however, only to Tibetans. The river valley is a succession of flats interrupted by moraines and defiles. Most of the side streams enter on the left bank, only one of any size from the right which is much shut in with steep stony hills. The main stream comes from the south-west side of the Chumiumo glacier. The vegetation corresponds closely with that of the lower reaches except near the top of the pass where several interesting plants of Tibetan type were secured.

The 4th was a drizzling day with occasional showers of sleet. Fording the icy Naku Chu opposite Teble, three to four feet deep, we traversed the long line of hills and moraines which lead to the Ghoraphu valley. Next day we entered the Lungma Chu (Langbu Chu) valley, followed it up for four miles where we

divided forces, C. crossing the stream and ascending the Thé La while S. continued directly up the valley. Here the broad outlet of the Ghoraphu Chu cuts across the main valley; this side valley might easily be mistaken for the main one as the latter is here narrowed and passes through a rocky defile up to which several parallel moraines lead. At its junction with the main stream the Ghoraphu is waist-deep but on ascending the side valley for half a mile the stream opens out into stony flats and may be easily forded. The Lungma Chu valley as far as Zanak was found to be of similar type to the Naku Chu—a succession of flats interrupted by occassional defiles and moraines. There is one very extensive lake-basin half way along its course where the depth of alluvium is considerable and where the river is cutting a deep channel. There is an interesting flora on these areas though it is sparse.

The other party had considerable difficulty in fording the Lungma Chu which was rapid and waist-deep. With joined hands C. and three men got through but the remaining three of the party with the clothes of the first batch preferred to go a mile up stream before risking it. These frequent crossings of glacier-fed streams were not altogether unpleasant in the sunny mornings but in the evening-mist or sleet only the sight of a roaring camp-fire reconciled one to it. The flora of the Thé La recalled that of the Thangchung La with its characteristic woolly *Saussureæ* and *Tanacetum*.

Next day S. ascended the valley of the Ghoraphu Chu to Korayedu—a long march presenting no difficulties beyond the fording of streams. It is chiefly in the intermediate valleys such as the lower Zemu that the most toilsome travelling has to be done. Above 14,000 feet the rhododendron scrub is much attenuated and in these higher Llonakh pastures almost absent. The valley continues for two or three miles a broad flat waste of stones with the stream broken up into numerous branches and in many places meandering unseen below huge accumulations of boulders. At 14,800 feet the stream divides, the larger branch taking a north-west course. The vegetation is that of the main Llonakh but sparser and more stunted. At 15,500 feet on the main branch we find the usual succession of marshes ending finally in a lake with a ring of cliffs and glaciers at the head of the valley with no apparent pass.

Meanwhile C. went due west up the main valley to where the smaller streams run down from the Jongsong La and the Choten-Nyima La. The herdsmen know of no regularly-used pass at this

corner and they all come by the Naku La. On the higher hills here, once away from the vicinity of the yak-herds, flocks of *Ovis nahura* are occasionally seen. In the sandy tracks by the stream colonies of the Tibetan Marmot are fairly common.

We were not quite satisfied that we had got all that was to be obtained from the higher cliffs. Supplies, however, were short and the Nangma La (Lungnak La) trying to laden coolies. It was agreed that C. should take the five fittest men and the available provisions, camp as far up the west valley as possible, and give two or three days to the higher cliffs and screes while S. made two forced marches down to Lachen with the remaining men and one day's rations. On the 8th August therefore S. crossed the Nangma La, 17,590 feet, a very stony pass but not difficult in good weather, though not practicable for ponies. A change is seen in the vegetation on crossing the ridge. The valley leading down to Thango and the Lachen is narrow, sheltered, and moist with no trace of the stunted Llonakh vegetation.

C. was successful in traversing the upper valley to nearly 18,000 feet—to the limit of vegetation. Heavy falls of snow covered his temporary camp and made collecting difficult. A fairly complete collection of the limited flora was, however, secured. Ascending the main valley on the 8th he pitched his camp on the river terrace at the highest level for juniper. In the afternoon the screes around the glacier to the north were explored but sleet and snow prevented much botanizing. Flocks of wild sheep and herds of wild goats were not uncommon and in such weather are easily approached. The herdsmen at the highest Dok reported that yaks carrying rice from Khangbachen (Nepal) in exchange for salt had arrived *vid* the Jongsong La, the first arrival of the season and probably the last. In the morning the camp was covered with snow. The lower stream and flats were traversed and by 1 P.M. the permanent snow was reached. Avalanches were frequent. Alternate sleet and snow drove the party back to camp. On the following day in rather better weather the Jongsong La side was visited and explored up to the limit of vegetation. The slopes here are scarcely free from snow for sufficient time to give an opportunity to even the hardiest plants. Several inches of snow fell on the 11th and it was evident that nothing more could be done. A return was made by two long marches to Thango.

The upper part of the Lungma Chu is scarcely so rapid as the Naku Chu. The lake basins in its course are not swampy to the extent which prevails in the Naku valley. Tracts of alluvium in

the higher regions seemed promising ground to explore but the results were disappointing. Few species survive to 16,500 feet and the ground above 17,000 feet is rarely clear of snow. It seemed to be a region where meteorological conditions hovered perpetually in the balance. The south wind prevailing for a short time would melt the thinner areas of snow and failing would give place to the north wind and a further sheet of snow. The soil does not appear unpromising,—there are many feet of alluvium in places—but the climatic conditions are too adverse. The proximity of the large glaciers is another factor just as at the head of the Zemu valley.

Thus far we have given at some length an account of the various days' marches. So little information is available in books regarding possible routes in the Zemu and Llonakh that we trust what we have given may be of some use to any one proposing to travel there. Our subsequent tour in the upper Lachen valley, a region which is fairly well known, does not require much detailed account. We wished to include this part of the valley chiefly for comparison with the Zemu and Llonakh. Meeting at Thango on the 12th we spent three days in going and returning to Kangralamo La (Koru La). Botanizing at the top was much hindered by driving showers of sleet and snow. Many interesting plants were secured in the neighbourhood of Giagong and on the hills round Thango. Lachen was reached on the 16th. Our arrangements permitted of a two days' visit to the Lachung valley. The usual stages brought us back to Darjeeling territory by the 26th August.

General aspect of the Llonakh Flora.

The physical features of the area have already been noted. Its vegetation may be divided into three groups, though these overlap considerably. I. The plants of the open flats and marshes. II. The plants of the moraines and screes. III. The extreme alpines of the upper cliffs.

The flora of the flats is the least sparse. Trees and shrubs have almost disappeared. Dwarf junipers, rounded and gnarled, are common; *Rhododendron lepidotum* and *R. Anthopogon* sparingly; *Berberis*, *Spiræa*, *Potentilla fruticosa*, *Lonicera*, *Hippophæ*, *Salix*, occasional, dwarf and prostrate. Among the herbaceous species the *Arenarias* are the most striking with their hemispheric mounds decked with beautiful white flowers. *Ranunculus*, *Caltha*, *Poterium filiforme*, *Saxifraga pallida*, *Primula sikkimensis*, *P. tibetica*, *Pedicularis* flourished in the moister areas. On the drier flats were *Delphinium*, *Hypecoum*, *Lepidium*, *Arabis glandulosa*, *Viola kuna-*

warensis, Stellaria decumbens, Stracheya, Guldenstædtia, Astragalus, Oxytropis, Saxifraga flagellaris, and its allies, white crusts of *Antennaria muscoides, Anaphalis xylorhiza,* many species of *Saussurea* and *Artemisia, Campanula, Cyananthus, Androsace Selago, Lancea tibetica,* the tiny sweet-smelling form of *Elsholtzia eriostachya, Urtica* and *Microgynæceum* near the Yak-doks, *Allium.*

The plants of the screes, sheltered from the wind by huge boulders attained sometimes a foot in height but the scanty water supply precluded everything but a few types. In addition to the junipers and dwarf rhododendrons the most prominent were *Anemone, Callianthemum, Draba, Saxifraga, Sedum, Trigonotis, Onosma, Swertia multicaulis, Picrorhiza, Eriophyton, Polygonum tortuosum, Allium.*

On the higher cliffs the prevalent plants were *Meconopsis horridula, Draba, Braya. Thlaspi, Cochlearia, Potentilla microphylla,* and *P. fruticosa* with their varieties, *Saxifraga imbricata, S. ramulosa, S. saginoides, Cortia, Allardia,* woolly *Saussureæ, Primula muscoides, Androsace Selago, Myosotis Hookeri, Veronica lanuginosa, Polygonum nummularifolium, P. Hookeri, Rheum nobile, R. spiciforme.* As will be seen from the concluding lists the flora has a strong admixture of West Himalayan and Tibetan species. The Llonakh in climate and vegetation has much more affinity with Tibet than Sikkim. The flora of Thango and Kangralamo has very much the same western and northern 'facies' but the area is narrower, more sheltered and more humid than the open Llonakh flats. The following species of West Himalayan and Tibetan plants were found on the tour, and are we believe additions to the list of Sikkim plants:—

Thalictrum tsangense, Ranunculus aquatilis, Isopyrum microphyllum, Corydalis Hendersonii, C. Hookeri, C. mucronifera, Braya tibetica, Dilophia salsa, Capsella Thomsoni, Viola kunawarensis, Arenaria Littledalei, Arenaria densissima, Oxytropis tatarica, Oxytropis sulphurea, Spiræa ulicina, Coluria longifolia, Hippuris vulgaris, Callitriche verna, Lonicera rupicola, Lonicera spinosa, Saussurea Stella, Primula tibetica, Androsace Chamæjasme var. *coronata, Glaux maritima, Microula Benthami Pedicularis Oederi, Pedicularis rhinanthoides, Pedicularis alaschanica, Dracocephalum heterophyllum, Plantago tibetica, Polygonum tortuosum, Rheum spiciforme, Hippophæ rhamnoides, Urtica hyperborea, Urtica dioica, Stipa purpurea.*

A considerable number of new species were found including four interesting saxifrages. These new species are described in the list appended to this paper.

General Survey.

In the following brief review of the chief natural orders and genera, we are not taking into account the vegetation below 11,000 feet. The region below that height was hurriedly passed through and only a tithe of its flora appears in the list. On the other hand we believe that the record of the alpine flora to which we devoted most of our energies, is fairly complete for the area in question.

Ranunculaceæ are only moderately represented. Form of *Anemone demissa* and the smaller alpine *Ranunculi* especially *Ranunculus pulchellus* are very common. Aconites are almost entirely absent from the grazing grounds of the Llonakh. *Delphinium cæruleum* is widespread but not abundant. Among the few shrubby plants of the higher regions are the smaller species of *Berberis* which persist far into the upper Llonakh valleys where they are much dwarfed and generally prostrate. *Meconopsis* is well represented in quantity by the three common species—the yellow *M. nepalensis* ranging the lowest, the blue *M. simplicifolia* next, while *M. horridula* occupies the rough stony screes in most inclement situations. The genus *Corydalis* is very prevalent and rich in species. The *Cruciferæ* are represented chiefly by *Drabæ* while *Cardamine macrophylla* is luxuriant in the moister valleys. Other genera are very sparingly present. *Lychnis*, *Stellaria*, and *Arenaria* are strongly represented in species and in numbers, the many forms of *Stellaria decumbens* being specially prevalent while the tufted *Arenarias* form one of the most characteristic features of the Llonakh.

Impatiens so prominent a genus in Sikkim persists only in the lower wooded portion of the Zemu while *Geranium collinum* reaches the upper Llonakh. *Leguminosæ* are only moderately frequent in the upper regions and are chiefly species of *Astragalus* and *Oxytropis*. *Potentillas* form one of the conspicuous features of the vegetation with many species and these very variable. *P. fruticosa*, *P. microphylla*, *P. peduncularis* *P. ambigua*, *P. eriocarpa* are the most prominent. With the exception of prostrate *Spiræas* and *Cotoneasters* other genera are almost absent except in the wooded lower valleys.

Saxifraga is another dominant genus. Almost all the Himalayan species of saxifrage are to be found in this fairly restricted area. Though never in profusion, they deck both the screes and the flats by the river, as well as the bleak crests of the passes.

Dwarf species of *Parnassia* are common while *Chrysosplenium* ascends to the inclement rocks beside the snow. The majority of the Himalayan species of *Sedum* appear in the area, some in profusion. *Umbelliferæ* are not so prominent a feature as in the Sandakphu—Phallut region. In the lower Zemu up to 13,000 feet the slopes yield *Bupleurum, Chærophyllum, Selinum, Archangelica, Heracleum*, but on the open wind-swept areas of Llonakh only the prostrate *Cortia, Pleurospermum Hookeri*, and lowly *Trachydiums* have much chance of survival.

Dwarf forms of *Lonicera* penetrate far into the bleaker valleys, becoming prostrate and spiny near the frontier. On the Zemu slopes *Lonicera hispida* is common, with several of its congeners. With the exception of *Galium* and that sparingly, *Rubiaceæ* are absent from the higher altitudes.

Compositæ are abundant and among them *Saussurea* is predominant. *Aster* and *Erigeron* are poorly represented, *Senecio* few as compared with the moister Jongri area, *Anaphalis* and *Artemisia* are common towards the dry Tibetan region, while *Cremanthodia* are conspicuous features of the screes. *Saussureas* are everywhere—the woolly forms are unfailingly present at the top of the rocky ridges.

Codonopsis and *Cyananthus* were well represented in numbers but not in species. *Rhododendrons* are as prominent as in other parts of Sikkim but limited as regards number of species. *Primulaceæ* are very abundant especially in the upper Zemu. *Primula sikkimensis, P. capitata, P. pusilla*, forms of *P. nivalis* are in profusion. *Gentiana phyllocalyx, G. amœna, G. tenella, G. crassicaulis*, and *Swertia multicaulis* are all widespread, and in places abundant.

Small forms of *Eritrichium* and *Trigonotis* are the chief representatives of the *Borragineæ* while the rounded cushions of *Myosotis Hookeri* are met with occasionally on the exposed ridges.

Pedicularis is another of the dominant genera of the region. The species occur in great profusion and with their bright colours are a conspicuous feature in the sparse Llonakh vegetation. Five or six genera of *Labiatæ* are not uncommon but on the whole the order is not well represented. Dwarf species of *Polygonum* and two stout *Rheums* are common. Prostrate species of *Salix* are prevalent right up to the melting snows, while in the lower valleys shrubs of six to twelve feet are scattered among the boulders.

Species of *Habenaria* and *Cypripedium* sparingly represent the *Orchideæ*. *Polygonatum, Smilacina, Allium, Lloydia, Clintonia* ascend far up the valleys. *Junci, Carices,* and *Gramineæ* are much less prominent than we anticipated, the higher ridges yielding but a poor harvest of *Monocotyledones*. Yaks and sheep may flourish on the grazing grounds of Llonakh but scarcely on the 'grass' of that area.

Ephedra and the dwarf *Junipers* ascend to over 15,000 feet, the limit of the latter being the limit of available wood for the camp-fire. Ferns are scarce in the Zemu as Hooker points out in his Journals. In the upper Llonakh they are rarer still, only three species being met with. The dominant genera of the area are *Arenaria, Potentilla, Saxifraga, Saussurea, Rhododendron, Primula, Pedicularis.*

The accompanying map is the most recent available. Our route is marked in red. Authorities differ regarding the altitude of some of the peaks and passes. Thus Freshfield gives 17,300 feet as the correct altitude of the Naku La, 16,752 feet for the Thé La. As our aneroid reads only to 15,000 feet, we have no valid data to quote. We tried to verify the names given to the various yak-stations in the survey map, but without success. The average Tibetan interrogated knew little beyond Naku La and Llonakh. At any rate these names are not current among the temporary inhabitants as far as we could discover. One or two of these 'doks' may be occupied summer after summer but there is nothing to show that the majority are definite 'stations', and likely to retain a permanent name. We mention this because the presence of these names on the map gives the impression that these places are as definite as for example the villages round Gangtok.

We are indebted for much kind assistance in the identification of our specimens. The types in the Calcutta Herbarium are not as complete as could be desired especially of the rarer alpines collected by Sir Joseph Hooker and of the plants of the Tibetan plateau. The authorities at Kew have kindly compared many of our plants with the original types and have favoured us with an opinion on most of the new plants submitted.*

M. Bonati has reported on the genus *Pedicularis*; M. Hamet is working up the *Crassulaceæ;* Mr. I. H. Burkill has taken the *Gentianaceæ*, while the late Mr. Robert Pantling examined the *Orchideæ*. We have to thank Major A. T. Gage, Director of the Botanical Survey, for his help and interest throughout.

* The general account is the work of both authors; for any inaccuracies in the list and for the description of the new species I am responsible.—W. W. S.

DICOTYLEDONES.

I.—RANUNCULACEÆ.

1. Clematis Linn.

1. Clematis montana Ham.

Zemu Valley and Thango, 10-13,000 ft., No. 1193.

2. Clematis zemuensis W. W. Smith sp. nov.

Species *C. puberulæ* H.f. & T. affinis sed foliis bipinnatis vel biternatis, floribus stricte umbellatis et prælonge pedicellatis, filamentis latis perbrevibus distinguitur.

Frutex sarmentosus gracilis pubescens. *Folia* 10-12 cm. longa, 6-8 c.m. lata, bipinnata vel biternata, segmentis 2-3·5 c.m. × 1-1·5 cm. ovatis vel ovato-lanceolatis, acute lobatis vel serratis, subapiculatis, pubescentia vel subglabra; petiolus ad 3 cm. *Inflorescentia* axillaris; pedunculus prælongus ad 10 cm. pubescens; supra in 2-7 pedicellos stricte et umbellate divisus; pedicelli ad 7 cm. longi duabus linearibus bracteis (·5 cm.). *Sepala* 1·5 cm. × ·5 cm., patentia, oblongo-lanceolata, extra molliter pubescentia, 5-nervia, luteo-albi. *Stamina* 5-7 mm. glabra; filamenta plana antheris breviora, connectivo non producto. *Achænia* immatura in caudam (5 mm.) albo-plumosam producta.

Zemu Valley, 9,000 ft., No. 2671. Only the one shrub seen.

3. Clematis Buchananiana DC.

Llonakh, 11,000 ft., No. 1735.

2. Thalictrum Linn.

4. Thalictrum elegans Wall.

Llonakh and Thango, 12-15,000 ft., Nos. 1751, 2103, 2473.

5. Thalictrum cultratum Wall.

Zemu, Llonakh, and Thango, 10-13,500 ft., Nos. 1221, 1757, 2471, 2675. Common.

Sub-sp. **tsangense** Brühl.

Upper Llonakh, 16,500 ft., No. 2,311. Sparingly. A Tibetan plant, recorded previously from the neighbourhood of Khambajong. If *T. platycarpum* H.f. & T. be an alpine state of *T. cultratum* Wall. the above sub-species would be a still more reduced form. There are, however, as Brühl points out, (Ann. Roy. Bot. Gard. Calc. Vol. V, p. 72) considerable differences in the ripe fruit.

6. **Thalictrum Chelidonii** DC.

Zemu Valley and Thango, 9-12,000 ft., Nos. 2294, 2674. Common.

7. **Thalictrum virgatum** H. f. & T.

Lachen, 7,000 ft., No. 939.

8. **Thalictrum alpinum** Linn.

Yumchho La, Zemu, Llonakh, Naku La, 14-16,000 ft. Frequent.

9. **Thalictrum** sp.

T. alpini Linn. valde affinis ; forsan varietas.

Nana procumbens. Folia bipinnata segmentis linearibus vel angusto-cuneatis.

Very much resembling a reduced *Thalictrum alpinum* Linn. but with different leaf segments and very small flowers. It is not quite matched by any specimen at Kew or Calcutta.

10. **Thalictrum saniculæforme** DC.

Below Lachen, 7,000 ft., No. 912. Apparently rare in Sikkim, as the above is the only type in Herb. Calc. from the area.

11. **Thalictrum javanicum** Bl.

Tong to Lachen. 5-8,000 ft.

12. **Thalictrum foliolosum** DC.

Lachen, 8-9,000 ft.

3.—Anemone Linn.

13. **Anemone vitifolia** Ham.

Cheungtong and Lachen, 6-9,000 ft. Common.

14. **Anemone obtusiloba** Don.

Yumchho La, Zemu, and Llonakh, 14-16,000 ft. Not common.

15. **Anemone trullifolia** H. f. & T.

Zemu and Llonakh valleys, Thango, 14-15,000 ft., Nos. 1711, 2011. Not common.

16. **Anemone rivularis** Ham.

Lachen, 8,000 ft., No. 969.

17. **Anemone demissa** H. f. & T.

Zemu Valley and Llonakh, 13-16,000 ft. The common Anemone throughout the two valleys and very variable in size and hairiness and in number and colour of the flowers.

var. **monantha** Brühl

Zemu Valley, 14,500 ft., No. 1362. Not uncommon along with the type.

18. Anemone sp.

A. demissae H. f. & T. valde affinis et forsan varietas. *Folia* glabra; *scapus* infra involucrum floremque capillis albis patentibus indutus; *flores* atro-purpurei; stylus aduncus; *fructus* immaturus hirsutus.

This Anemone appears very different in the field from the others but is, notwithstanding the somewhat hairy ovary, possibly a form of *A. demissa* H. f. & T. var *monantha.*

Yumchho La, 15,000 ft., Nos. 1240, 1292. Sparingly.

19. Anemone polyanthes Don.

Above Lachen, 12,500 ft.

4. Adonis Linn.

20. Adonis sp.

A. chrysocyathi H. f. & T. valde affinis; forsan subspecies; parvis floribus, brevi stylo recto, distinguitur. *Folia* multifida *A. chrysocyathi* more. *Flores* 2 cm. diametientes. *Stylus* obtusus perbrevis dum *A. chrysocyatho* longus, attenuatus, revolutus.

Usually very dwarf, (6 cm.) and the flowers less than half those of *A. chrysocyathus*. Possibly the East Himalayan form of that species but the achenes are unlike those of the Western plant at any stage.

Yumchho La, 15,000 ft., No. 1285.

5. Callianthemum C. A. Meyer.

21. Callianthemum cachemirianum Camb.

Llonakh and Thango, 13-15,000 ft., Nos. 2109, 2565. Found very sparingly and usually under the shelter of the dwarf Juniper bushes. In the Flora of British India Vol. I, p. 15, the colour is given as white. In the Sikkim specimens the petals, as noted in the field, are purple outside and pink within.

6. Ranunculus Linn.

22. Ranunculus aquatilis Linn.

var. **trichophylus.**

Llonakh and Giagong, 15-16,000 ft., No. 1887. In marshy ground and small lakes, not found in Sikkim except near the Tibetan frontier.

23. Ranunculus Cymbalariæ Pursh.

Llonakh and Kangralamo, 15-17,000 ft., Nos. 1900, 1910, 2446.

24. **Ranunculus pulchellus** C. A. Mey.

Zemu and Llonakh, 10-16,000 ft. Common.

var. **longicaulis.**

Llonakh. No. 2086.

var. **sericeus.**

Zemu and Llonakh. Very common above 14,500 ft., Nos. 2089, 2451, etc.

25. **Ranunculus hyperboreus** Rotlb.

Common in the Llonakh marshes, 14,500 ft.

26. **Ranunculus affinis** Br.

Zemu, Llonakh, Thango, Giagong, 13-16,000 ft., Nos. 1290, 1503, 2031. Common.

27. **Ranunculus hirtellus** Royle.

Llonakh, 14,500 ft. Frequent.

28. **Ranunculus diffusus** DC.

Lachen. 7-9,000 ft., No. 917.

29. **Ranunculus flaccidus** H. f. & T.

Zemu Valley, 10-11,000 ft., No. 1078.

7. Oxygraphis Bunge.

30. **Oxygraphis glacialis** Bunge.

Naku La, Llonakh, 17,500 ft., No. 1958. Sparingly.

8. Caltha Linn.

31. **Caltha palustris** Linn.

Zemu Valley, 10,000 ft., No. 2672.

32. **Caltha scaposa** H. f. & T.

Llonakh, 14-17,000 ft., Nos. 1925, 1942, 2212. Common.

9. Trollius Linn.

33. **Trollius pumilus** Don.

Llonakh, 14,500 ft., No. 1852. Sparingly.

10. Isopyrum Linn.

34. **Isopyrum microphyllum** Royle.

Llonakh, 16-17,000 ft., No. 2313. A west Himalayan and Tibetan plant, not previously recorded from Sikkim.

Not identical with I. *grandiflorum* Fisch.

11. Delphinium Linn.

35. Delphinium cæruleum Jacq.

Frequent in the Llonakh Valley from 14,500-17,000 ft. Nos. 1935, 2017, 2102, 2131.

36. Delphinium glaciale H. f. & T.

Rongsa, Llonakh, 15,500 ft., No. 2017. Sparingly.

12. Aconitum Linn.

37. Aconitum luridum H. f. & T.

Nangna La and Thango. Sparingly.

38. Aconitum laciniatum Stapf.

Zemu, 11,000 ft.

39. Aconitum spicatum Stapf.

Thango, 14,000 ft.

40. Aconitum Hookeri Stapf.

Thango, 14,000 ft.

13. Cimicifuga Linn.

41. Cimicifuga fœtida Linn.

Zemu Valley, 12,000 ft., No. 1640. Occasional.

II.—MAGNOLIACEÆ.

14. Magnolia Linn.

42. Magnolia Campbellii H. f. & T.

Cheungtong and Lachen 6-8,000 ft.

43. Magnolia globosa H. f. & T.

Zemu Valley and Lachung, 9-10,000 ft., Nos. 2593, 2728

15. Michelia Linn.

44. Michelia lanuginosa Wall.

Cheungtong, 6,000 ft.

16. Schizandra Michaux.

45. Schizandra grandiflora H. f. & T.

Zemu, 10,000 ft., No. 2729.

III.—MENISPERMACEÆ.

17. Stephania Lour.

46. Stephania rotunda Lour.

Tong, 4,500 ft., No. 861.

IV.—BERBERIDEÆ.

18. Decaisnea H. f. & T.

47. **Decaisnea insignis** H. f. & T.
Lachen, 8-10,000 ft., No. 954. Not common.

19. Berberis Linn.

48. **Berberis nepalensis** Spreng.
Cheungtong and Lachen, 6-8,000 ft. Frequent.

49. **Berberis umbellata** Wall.
Lachen, 8,000 ft.

50. **Berberis aristata** DC.
var. **micrantha.**
Lachen and Zemu, 8-10,000 ft., Nos. 976 2754.

51. **Berberis Wallichiana** DC.
Lachen and Zemu, 8-10,000 ft., No. 1056.
var. **atro-viridis.**
Lachen, 10,000 ft., No. 2530.

52. **Berberis angulosa** Wall.
Zemu, Llonakh, and Giagong, 12-15,000 ft., Nos. 1199, 1675, 2866 Ribu.

53. **Berberis macrosepala** H. f.
Zemu, 14-15,000 ft., No. 1492. Not uncommon.

54. **Berberis concinna** H. f.
Llonakh, 14,500 ft., No. 1816.

20. Podophyllum Linn.

55. **Podophyllum emodi** Wall.
Zemu, lower Llonakh, and Thango, 11-14,000 ft. Occasional.

V.—PAPAVERACEÆ.

21. Meconopsis Vig.

56. **Meconopsis horridula** H. f. & T.
Llonakh, 15-16,000 ft., No. 2015. Frequent.

57. **Meconopsis paniculata** Prain.
Zemu Valley, 10-14,000 ft. Very plentiful.

58. **Meconopsis simplicifolia** Walp.
Zemu Valley, 12-16,500 ft., Nos. 1183, 1557. Common.

22. Cathcartia Hook. f.

59. Cathcartia villosa Hook. f.
Zemu Valley, 10,000 ft., No. 1077.

60. Cathcartia lyrata Cummins and Prain.
Nachegoh, 15,000 ft. Only one plant seen.

VI.—FUMARIACEÆ.

23. Hypecoum Tourn.

61. Hypecoum leptocarpum H. f. & T.
Llonakh, Naku La, and Giagong, 14-16,500 ft., Nos. 1848, 1898, 2400. Very common on the Llonakh flats.

24. Dicentra Bork.

62. Dicentra Roylei H. f. & T.
Tista Valley, 4,500 ft., No. 831.

25. Corydalis D. C.

63. Corydalis cashmeriana Royle.
var. **ecristata** Prain.
Zemu Valley, Yumchho La, Llonakh, 14-17000 ft., Nos. 1256, 1574, 2041, etc. Very common among the stones at the higher elevations.

64. Corydalis trifoliolata Franch.
Zemu Valley, 16,000 ft., No. 1416.

65. Corydalis lathyroides Prain.
Zemu Valley, 12,000 ft., No. 1635. Sparingly. Not previously recorded from Sikhim.

66. Corydalis graminea Prain.
Llonakh, 15,000 ft., No. 1883.

67. Corydalis polygalina H. f. & T.
Llonakh, 14,500 ft., No. 2104.

68. Corydalis juncea Wall.
Zemu Valley, 14-16,000 ft., Nos. 1479, 1493.

69. Corydalis flaccida H. f. & T.
Zemu Valley, 12-13,000 ft., Nos. 1153, 1674.

70. Corydalis sp.
Corydalis crithmifoliæ Royle affinis habitu, longitudine, rhizomate; caulinis ternatis foliis, brevi obtuso calcare distincta. *Rhizoma*

fusiforme vetustorum foliorum reliquiis indutum. *Caulis* ad 15 cm. debilis. *Foliorum radicalium* vaginæ marcidæ solum supersunt; *folia caulina* 2-3 in apice collecta, ternata, lateralibus segmentis 1 cm. longis ellipticis integris sessilibus, tertio obovato trifido. *Racemus* 5-6 florifer; *flores* 1·2 cm. longi; *bracteæ* ad 2 cm. longæ, tertio foliorum segmento similes vel oblongæ integræ; pedicelli ad 1·8 cm. *Petala* obtusa cærulea calcare obtuso. Gynæceum *C. crithmifolia.*

Llonakh, 16,000 ft., No. 2237. Not matched at Kew or Calcutta. Specimens are somewhat imperfect.

71. **Corydalis mucronifera** Maxim.

Giagong, 16,500 ft., No. 2456. Sparingly.

A Tibetan plant not previously recorded from Sikkim.

72. **Corydalis Hendersonii** Hems.

Naku La, Llonakh, 17,500 ft., No. 1957.

Not previously found in Sikkim.

DISTRIBUTION.—Tibet, Yarkand, N. W. Himalaya.

73. **Corydalis Casimiriana** Duthie & Prain.

Zemu, 10-13,000 ft., Nos. 1501, 2795.

74. **Corydalis chærophylla** DC.

Zemu, 11,000 ft., No. 1659.

75. **Corydalis Hookeri** Prain.

Upper Llonakh 16,000 ft., No. 2244. Sparingly. Larger than our Tibetan types in the Calcutta Herbarium but referable I think to this species. A Tibetan plant, crossing into Sikkim near the frontier.

76. **Corydalis meifolia** Wall.

var. **sikkimensis**.

Zemu Valley, 14-16,000 ft., Nos. 1435, 1556.

77. **Corydalis Stracheyi** Duthie.

Yumchho La, 15,000 ft., No. 1281.

78. **Corydalis ophiocarpa** H. f. & T.

Zemu Valley, 9,000 ft., No. 2794.

VII.—CRUCIFERÆ.

26. Parrya Br.

79. **Parrya platycarpa** H. f. & T.

Llonakh, 16-17,000 ft., Nos. 2233, 2361. Sparingly near the snow in the more remote valleys. Some of the specimens have fruits longer and narrower and are possibly referable to *Parrya exscapa* Ledeb.

27. Nasturtium Br.

80. Nasturtium palustre DC.

Lachen and Zemu, 8-10,000 ft., Nos. 984, 2677.

81. Nasturtium sp.

Llonakh, 14,000 ft., No. 2073. In a young state and not matched in Calcutta Herbarium.

28. Arabis Linn.

82. Arabis glandulosa Kar. & Kir.

Llonakh, Naku La, and Giagong, 14-17,500 ft., Nos. 1902, 1953, 2397.

29. Cardamine Linn.

83. Cardamine circæoides H. f. & T.

Tong, 5,000 ft., No. 869.

84. Cardamine hirsuta Linn.

var. **sylvatica.**

Zemu and Llonakh, 10-12,000 ft., Nos. 1157, 1746.

85. Cardamine macrophylla Willd.

Zemu and Lower Llonakh, 8-13,000 ft., No. 1012. Very common.

30. Loxostemon H. f. & T.

86. Loxostemon pulchellus H. f. & T.

Zemu, 15-16,000 ft., Nos. 1419, 1577. Not uncommon. In flower only, not in fruit.

31. Draba Linn.

87. Draba alpina Linn.

Very common from 14-17,000 ft., in both valleys.

88 Draba elata H. f. & T.

Zemu, Llonakh, and Thango, 12-15,000 ft., Nos. 1404, 1626, 1648, 2535. Frequent.

89. Draba incana Linn.

Llonakh, 14-15,000 ft., Nos. 2043, 2807 Ribu.

90. Draba lasiophylla Royle.

Zemu, Llonakh, and Giagong, 12-17,000 ft., Nos. 1844, 2042, 2144, 2676. Frequent.

91. Draba tibetica H. f. & T.

Llonakh and Giagong, 15-17,000 ft., Nos. 2304, 2884 Ribu.

92. Draba gracillima H. f. & T.

Zemu, Yumchho La, 10-15,000 ft., Nos. 1160, 1164, 1318, 1601. Frequent.

32. Cochlearia Linn.

93. Cochlearia scapiflora H. f. & T.

Llonakh, 16-18,000 ft., Nos. 1954, 2176.

94. Cochlearia ? serpens W. W. Smith sp. nov.

Planta anomala in genere *Cochlearia* dubie posita. Fortasse genus novum.

Nana, annua, fere glabra, serpens. *Caules* sinuosi intexti, 3-10 cm. longi internodis prælongis. *Folia* sparsa; radicalia desunt; caulina 4-7 mm. longa, plerumque spathulata, trilobata vel tripartita vel rarius integra, petiolo 4-7 mm. *Flores* racemo laxissimo 1-5; bracteæ foliis similes; pedicelli graciles flexiles, in fructu ad 3 cm. longi. *Sepala* 1 mm. longa, elliptica, æqualia. *Petala* 2 mm. longa, fere orbiculata, unguiculata, violacea. *Stamina* recta corollam æquantia filamentis latis. *Ovarii* ovoidei longitudine stylus. *Siliqua* 1-locularis, variabilis, vel brevis, globosa, 1-seminifera, vel elongata oblonga, 3-4-seminifera, 4-7 mm. longa, ± falcata. *Semina* 1-2 mm. longa 1-seriata, nigra testa laevi; cotyledones accumbentes.

Sikkim Himalaya, at Jongri, 14,000 ft. Gammie No. 156, Watt. No. 5795 in Herb. Kew.; Yumchho La, Zemu Valley, 14,000 ft., Nos. 1269, 1544 Smith & Cave. Mr. W. G. Craib after comparison with the types at Kew considers it near *Cochlearia Hobsoni* Pearson if it is a *Cochlearia* but agrees with me that its position is doubtful.

33. Sisymbrium Linn.

95. Sisymbrium himalaicum H. f. & T.

Zemu Valley, 9-13,000 ft., common.

96. Sisymbrium Sophia Linn.

Llonakh, 16,000 ft.

97. Sisymbrium deltoideum H. f. & T.

Llonakh, 14,000 ft. No. 2082. Only seen once.

34. Eutrema Br.

98. Eutrema himalaicum H. f. & T.

Zemu, 13-15,000 ft., Nos. 1495, 1684. Very common along the Tumrachen Chu, a tributary of the Zemu, beside the grazing grounds.

35. Erysimum Linn.

99. Erysimum deflexum H. f. & T.
Giagong 15-16,000 ft., Nos. 2439, 2457.

100. Erysimum funiculosum H. f. & T.
Naku La, Llonakh, 17,000 ft., No. 1937 bis.

101. Erysimum longisiliquum H. f. & T.
Thango, 13,000 ft., No. 2281.

36. Braya Sternb. & Hoppe.

102. Braya rosea Bunge.
Zemu, Yumchho La, and Llonakh, 15-16,000 ft., Nos. 1326, 1512, 1719, 2033.

103. Braya tibetica H. f. & T.
Llonakh, 16-17,000 ft., Nos. 2305, 2351. Previously recorded only from W. Tibet.

37. Capsella Moench.

104. Capsella Bursa pastoris Moench.
Lachen and Thango.

105. Capsella Thomsoni H. f.
Naku La, Llonakh, and Giagong, 15-17,000 ft., Nos. 1926, 2840. A West Tibet plant not previously recorded for Sikkim.

38. Lepidium Linn.

106. Lepidium capitatum H. f. & T.
Llonakh, Giagong, and Kangralamo, 15-16,000 ft., Nos. 1833, 2453.

39. Dilophia Thoms.

107. Dilophia salsa Thoms.
Llonakh, 14,500 ft., No. 1922. Sparingly. A Tibetan plant not previously found within the Indian area. It occurs in the flats by the river. The specimens are in both flower and fruit. In dehiscence the two crested valves come away in a fashion recalling the calyptra of mosses or the capsule of *Anagallis*.

40. Thlaspi Linn.

108. Thlaspi arvense Linn.
Lachen, 8-10,000 ft.

109. Thlaspi alpestre Linn.

Naku La, Llonakh, 15-17,000 ft., Nos. 2117, 2145.

110. Thlaspi cochlearioides H. f. & T.

Yumchho La, Zemu, and Llonakh, 14-15,000 ft., Nos. 1278, 2019, 2025, 2039.

VIII.—VIOLACEÆ.

41. Viola Linn.

111. Viola biflora Linn.

Lachen, Zemu, and Llonakh, 7-16,000 ft., Nos. 937, 1560, 1918. Frequent.

112. Viola kunawarensis Royle.

Llonakh, 14,500 ft., Nos. 1838, 2738. Very dwarf; frequent.

IX.—POLYGALEÆ.

42. Polygala Linn.

113. Polygala arillata Ham.

Tong, Lachen, 5-8,000 ft., Nos. 883, 2750.

X.—CARYOPHYLLEÆ.

43. Gypsophila Linn.

114. Gypsophila cerastioides Don.

Zemu, 9-12,000 ft., Nos. 1033, 1218.

44. Silene Linn.

115. Silene Stracheyi Edgew.

Zemu and Thango, 10-13,000 ft., Nos. 2701, 3092 Ribu.

45. Cucubalus Linn.

116. Cucubalus baccifer Linn.

Lachen and Zemu, 8-10,000 ft., Nos. 972, 2417.

46. Lychnis Linn.

117. Lychnis apetala Linn.

Zemu, Naku La, Llonakh, 13-17,000 ft., Nos. 1472, 1878, 1899. Common.

118. Lychnis nigrescens Edgew.

Zemu, Llonakh, and Thango, 11-16,000 ft., Nos. 2248, 2498. Frequent.

119. Lychnis himalayensis Edgew.

Zemu Valley, 10-12,000 ft., No. 1095.

120. Lychnis brachypetala Hort. Berol.

Naku La, Llonakh, 14-16,000 ft., Nos. 1897, 2242, 2700.

121. Lychnis multicaulis Wall.

Zemu, 11,000 ft., No. 2699.

122. Lychnis indica Benth ?

Lachung, 8,000, No. 2577.

123. Lychnis nutans Benth.

Zemu, 11,000 ft., No. 2698.

47. Cerastium Linn.

124. Cerastium vulgatum Linn.

Lachen, Zemu, Llonakh, and Thango, 7-14,000 ft. Only near the villages, and old cattle-stations.

48. Stellaria Linn.

125. Stellaria paniculata Edgew.

Lachen and Tallum Samdong, 7-12,000 ft.

126. Stellaria media Linn.

Lachen, 8-9,000 ft.

127. Stellaria lanata Hook. f.

Zemu, 10-11,000 ft., Nos. 1159, 1168.

128. Stellaria longissima Wall.

Lachen, 8-11,000 ft., No. 937.

129. Stellaria uliginosa Linn.

Zemu and Llonakh, 12-16,000 ft., Nos. 1874, 2183.

130. Stellaria subumbellata Edgew.

Llonakh, 14-16,000 ft., Nos. 1874, 1977.

131. Stellaria decumbens Edgew.

Zemu, 11-13,000 ft., Nos. 1151, 1409.

var. **minor.**

Zemu, 11,000 ft., No. 1166.

var. **pulvinata**

Thé La, Jongsong La Valley, Llonakh, 16-17,000 ft., Nos. 2180, 2241, 2256, 2327. Common.

var. **polyantha.**

Zemu, Naku La, Llonakh, 12-17,000 ft., Nos. 1338, 1406, 1880, 1929. Common.

var. **acicularis.**

Thé La, Llonakh, and Thango, 14-16,500 ft., Nos. 1827, 2045, 2178. Common.

49. Arenaria Linn.

132. Arenaria musciformis Wall.

Llonakh and Thango, 14-17,000 ft., Nos. 1517, 1729, 1820, 2027, Frequent.

133. Arenaria polytrichoides Edgew.

Zemu and Llonakh, 14-17,000 ft., Nos. 1517, 1729, 1880, 2027, Frequent.

134. Arenaria monticola Edgew.

Thango, 14,500 ft., No. 2545.

135. Arenaria pulvinata Edgew.

Llonakh, 14,500 ft., No. 2095.

136. Arenaria densissima Wall.

Nangma La and Ghoraphu Chu in Llonakh, 15-16,000 ft., Nos. 2199, 2816 Ribu. Rare. Recorded previously from Nepal and Tibet not from Sikkim.

137. Arenaria orbiculata Royle.

Zemu Valley, 12-13,000 ft., Nos. 1232, 1671. Lachung, 8,000 ft. No. 2576.

138. Arenaria ciliolata Edgew.

Naku La, Llonakh, Kangralamo, and Thango, 14-16,000 ft. Nos. 1807, 1850, 1963, 2258, 2567. Common.

139. Arenaria glanduligera Edgew.

Llonakh, 14-17,000 ft., Nos. 2048, 2335. Common.

var. **micrantha.**

Zemu and Llonakh, 15-17,000 ft., Nos. 1466, 1726, 2120, 2364. Very common.

140. Arenaria Stracheyi Edgew.

Llonakh, 14,500 ft., No. 2119. A Tibetan plant. Previously also from Chumbi, not from Sikkim.

141. Arenaria cerastiiformis Williams.

Llonakh, 16-17,000 ft., Nos. 2112, 2346. Recorded from Chumbi and Giagong.

142. Arenaria melandryoides Edgew.

Zemu Valley and Llonakh, 14-17,000 ft., Nos. 1485, 1541, 1783, 1976. Common.

143. Arenaria debilis Hook. f.

Zemu and Llonakh, 14-16,000 ft., Nos. 1415, 1514, 1793.

144. Arenaria Littledalei Hemsl.

Naku La, Llonakh, 16,000 ft., No. 1984. A Tibetan plant, not previously recorded from Sikkim.

145. Arenaria thangoensis W. W. Smith. sp. nov.

A. Littledalei Hems. affinis ; sed pentamera et caule viscoso-pubescente, sepalis ciliatis distincta.

Parva, annua, viscoso-pubescens. *Caulis* 2-3 cm. altus, pluries dichotomus, rigidulus. *Folia* 3-4 mm. longa, opposita, lanceolata, fere sessilia. Cymi pauciflori, pedicelli graciles divaricati, flores parvi. *Sepala* quinque, 1·5 mm. longa, lineari-lanceolata, ciliata ; *petala* nulla ; *stamina* quinque 7-8 mm. longa ; *styli* duo ; *ovarium* ovoideum in fructu calycem excedens, quadrivalve, seminibus paucis.

Thango, 13-14,000 ft., No. 2572.

50. Sagina Linn.

146. Sagina procumbens Linn.

Naku La, Llonakh, 14-16,000 ft.

XI.—TAMARISCINEÆ.

51. Myricaria Desv.

147. Myricaria germanica Desv.

Zemu Valley, 11,000 ft., No. 1101. Frequent.

XII.—HYPERICINEÆ.

52. Hypericum Linn.

148. Hypericum Hookerianum W. & A.

Lachen and Zemu Valley, 7-9,000 ft., Nos. 943, 2758.

49. Hypericum patulum Thumb.
Tong 5,000 ft., No. 879.

150. Hypericum reptans H. f. & T.
Lachen, Zemu, and Lachung, 8-10,000 ft., Nos. 2614, 2746, 2776.

151. Hypericum petiolulatum H. f. & T.
Tong, Lachen, and Zemu Valley, 5-9,000 ft., Nos. 854, 2736.

152. Hypericum elodeoides Choisy.
Zemu, 11,000 ft., No. 2783.

153. Hypericum monanthemum H. f. & T.
Zemu Valley and Thango, 12-13,000 ft., Nos. 1208, 1392, 2537.

XIII.—TERNSTRŒMIACEÆ.

53. Eurya Thunb.

154. Eurya japonica Thunb.
Lachen, 9,000 ft., Nos. 2371, 2743.

54. Actinidia Lindl.

155. Actinidia callosa Lindl.
Lachen, 7,000 ft., No. 946.

XIV.—MALVACEÆ.

55. Dicellostyles Benth.

156. Dicellostyles jujubifolia Benth.
Tong, 5,000 ft., No. 880.

XV.—STERCULIACEÆ.

56. Abroma Jacq.

157. Abroma augusta Linn.
Cheungtong, 5,000 ft.

XVI.—GERANIACEÆ.

57. Geranium Linn.

158. Geranium collinum M.Bieb.
Zemu Valley and Llonakh, 12-16,000 ft., Nos. 1192, 1571, 1861.

159. Geranium Grevilleanum Wall.
Lachen and Lachung, 8-10,000 ft., Nos. 2532, 2616.

160. Geranium nepalense Sweet.
Cheungtong, 6,000 ft.

161. Geranium polyanthes Edgew. & Hook. f.
Zemu Valley, 8-12,100 ft., Nos. 1013, 1190.

58. Oxalis Linn.

162. Oxalis Acetosella Linn.
Zemu, 8,500 ft., No. 1023.

59. Impatiens Linn.

163. Impatiens sulcata Wall.
Zemu, 12-13,000 ft., Nos. 1654, 1655.

164. Impatiens radiata Hk. f.
Cheungtong, Lachen, and Zemu, 10-12,000 ft., Nos. 905, 2377, 2846.

165. Impatiens longipes H. f. & T.
Above Lachen.

166. Impatiens drepanophora Hk. f.
Tong, 5,000 ft., No. 850.

167. Impatiens spirifer H. f. & T.
Tong, 5,000 ft., No. 859.

168. Impatiens puberula DC.
Tong, 5,000 ft., No. 870.

169. Impatiens decipiens Hk. f.
Tista Valley, 4,000 ft., No. 805.

170. Impatiens falcifer Hk. f.
Zemu Valley, 1,0000 ft., No. 2836.

XVII.—RUTACEÆ.

60. Evodia Forst.

171. Evodia rutæcarpa H .f. & T.
Lachung, 9,000 ft., No. 2620.

61. Zanthoxylum Linn.

172. Zanthoxylum oxyphyllum Edgew.
Zemu, 9,000 ft., No. 2784.

62. Skimmia Thunb.

173. **Skimmia Laureola** Hook. f.
Above Lachen, 10-11,000 ft.

XVIII.—ILICINEÆ.

63. Ilex. Linn.

174. **Ilex intricata** Hook. f.
Zemu, 10,000 ft., No. 1075.

175. **Ilex fragilis** Hook. f.
Lachen 8,000 ft., No. 2851.

XIX.—CELASTRINEÆ.

64. Euonymus Linn.

176. **Euonymus frigidus** Wall.
Zemu, 9-10,000 ft., No. 1051.

177. **Euonymus Hamiltonianus** Wall.
Tista Valley, 4-5,000 ft., No. 834.

65. Celastrus Linn.

178. **Celastrus stylosa** Wall.
Lachen, 8,000 ft., No. 964.

XX.—RHAMNEÆ.

66. Berchemia Neck.

179. **Berchemia floribunda** Wall.
Zemu Valley and Lachung, 9-10,000 ft., Nos. 2598, 2785.

180. **Berchemia lineata** DC.
Zemu Valley, 9,000 ft., No. 2852.

67. Gouania Linn.

181. **Gouania leptostachya** DC.
Tong, 4,500 ft., No. 862.

XXI.—SAPINDACEÆ.

68. Acer Linn.

182. **Acer Hookeri** Miq.
Lachung, 8,000 ft., No. 2582.

183. Acer stachyophyllum Hiern.
Zemu, 9,000 ft., No. 2777.

184. Acer villosum Wall.
Zemu, 9,000 ft., No. 2735.

185. Acer pectinatum Wall.
Zemu, 8-10,000 ft., Nos. 1009, 1039, 2773.

186. Acer Campbellii Hook. f. & T.
Cheungtong, 6,000 ft.

187. Acer Papilio King.
Zemu, 11,000 ft., No. 1104.

XXII.—SABIACEÆ.

69. Meliosma Bl.

188. Meliosma dilleniæfolia Wall.
Lachen, 8-9,000 ft., No. 956.

XXIII.—CORIARIEÆ.

70. Coriaria Linn.

189. Coriaria nepalensis Wall.
Lachen, Zemu Valley, and Thango, 8-11,000 ft., Nos. 988, 2525. Common.

XXIV.—LEGUMINOSÆ.

71. Piptanthus D. Don.

190. Piptanthus nepalensis D. Don.
Zemu, 9,000 ft, No. 2772.

72. Thermopsis R. Br.

191. Thermopsis barbata Royle.
Thango, 13,000 ft., No. 2285.

73. Parochetus Ham.

192. Parochetus communis Ham.
Zemu Valley, 8-12,000 ft., Nos. 1014, 1155, 2741. Common.

74. Indigofera Linn.

193. Indigofera Dosua Ham.
var. **tomentosa.**
Tista Valley, 3-4,000 ft., No. 819.

75. Caragana Lam.

194. Caragana crassicaulis Benth.
Zemu and Llonakh, 14-16,000 ft., Nos. 1489, 1715, 1777, 2793. Frequent.

76. Guldenstædtia Fisch.

195. Guldenstædtia himalaica Baker.
Llonakh, 14-15,000 ft., Nos. 1843, 2100.

77. Astragalus Linn.

196. Astragalus pycnorhizus Wall.
Zemu and Llonakh, 9-13,000 ft., Nos. 1047, 1207, 2774. Frequent.

197. Astragalus zemuensis W. W. Smith. sp. nov.
Species *A. pycnorhizi* Wall. affinis ; foliolis albo-hirsutis, magnis connatis stipulis, fructu majore inter alia distinguenda est.
Radix lignosa fusiformis. *Caules* plures decumbentes, ad 6 cm. longi, internodis multum contractis, vetustorum foliorum reliquiis induti. *Folia* 5-7 cm. longa, 11-13 foliolis ellipticis integris 6-7 mm. longis, albo-hirsutis ; petiolo 3-4 cm. longo ; stipulis 3-4 mm. longis connatis vaginantibus in duos lobos lineares divisis, albo-hirsutis. *Pedunculi* folia æquantes vel minores, 2-4 floriferi, sparse adpresse pubescentes ; pedicelli 2 mm. longi bracteis lineari-lanceolatis hirsutis. *Calyx* 7-8 mm. longus albis nigrisque capillis sparse vestitus lobis linearibus fere tubum aequantibus. *Corolla* 1 cm. longa purpurea. *Gynæceum A. pycnorhizi*. *Legumen* 3-4 cm. longum, 1-1·2 cm. latum breviter stipitatum ellipticum, inflatum, primo nigro-hirsutum, demum glabrescens, ±20 seminibus.

Zemu Valley, 12,000 ft., No. 1222.

198. Astragalus confertus Benth ?
Naku La, Llonakh, 14-16,000 ft., Nos. 1830, 1853, 1990.

199. Astragalus sp.
Sepo La, 17,000 ft., No. 2396 near *A. hypoglottoides* Baker.

200. Astragalus lessertioides Benth.
Zemu Valley, Naku La, Llonakh, 12-16,000 ft., Nos. 1224, 1773.

201. Astragalus strictus Grah.
Llonakh, 14,16,000 ft., No. 1774.

202. Astragalus sikkimensis Benth.
Zemu and Llonakh, 12-13,000 ft., Nos. 1209, 2775.

203. Astragalus floridus Benth.
Llonakh, 14,500 ft.

204. Astragalus chlorostachys Lindl.
Lachen, 8,000 ft., No. 968.

205. Astragalus xiphocarpus Benth.
Llonakh, 14,500 ft., No. 2722 Ribu.

206. Astragalus stipulatus D. Don.
Cheungtong and Lachen, 7-8,000 ft., Nos. 2609, 3022 Ribu.

207. Astragalus sp.
Thango, 14,000 ft., No. 2839 Ribu. Not matched in Calc. Herb. In fruit only.

78. Oxytropis D.C.

208. Oxytropis lapponica Gaud.
var. **xanthantha** Baker.
Llonakh, 14,500 ft., Nos. 1859, 2099.

209. Oxytropis sulphurea Ledeb.
Llonakh, 14-16,000 ft., Nos. 1889, 2243. A Siberian and Tibetan plant.

210. Oxytropis tatarica Jacq.
Llonakh, 15,000 ft., Nos. 2142, 2728 Ribu. A Tibetan and West Himalayan plant, not previously recorded from the Sikkim area. The pods of the Sikhim plant have however two seeds only.

79. Hedysarum Linn.

211. Hedysarum sikkimense Benth.
Zemu and Llonakh, 12-14,000 ft., Nos. 1136, 2056.

80. Stracheya Benth.

212. Stracheya tibetica Benth.
Naku Chu, Llonakh, 14-15,000 ft., Nos. 1832, 1890.

81. Desmodium Desv.

213. **Desmodium tiliæfolium** G. Don.
Cheungtong, 6,000 ft.

82. Pueraria DC.

214. **Pueraria peduncularis** Grah.
Lachen, 7,000 ft., No. 931.

83. Mezoneurum Desf.

215. **Mezoneurum cucullatum** W. & A.
var. **grandis.**
Tong. 4-5,000 ft., No. 875.

XXV.—ROSACEÆ.

84. Prunus Linn.

216. **Prunus rufa** Wall.
Lachen, 10,000 ft.

217. **Prunus Puddum** Roxb.
Cheungtong to Lachen 5-8,000 ft.

218. **Prunus nepalensis** Ser.
Above Lachen, 10,000 ft.

85. Maddenia Hook. f. & T.

219. **Maddenia himalaica** H. f. & T.
Zemu Valley, 8-9,000 ft., No. 995.

86. Spiraea Linn.

220. **Spiraea Aruncus** Linn.
Zemu Valley, 9-13,000 ft., Nos. 1141, 2765. Occasional.

221. **Spiraea bella** Sims.
Lachen, Zemu Valley, and Lachung, 8-12,000 ft., Nos. 1040, 1092, 1176, 2599. Frequent.

222. **Spiraea micrantha** Hook. f.
Lachen and Zemu, 8-9,000 ft., No. 2705.

223. **Spiraea arcuata** Hook. f.
Zemu Valley and lower Llonakh, 13-14,000 ft., Nos. 1692, 2706.

224. **Spiraea ulicina** Prain.
Jongsong La Valley and Goraphu Chu, Llonakh, 16,000 ft. Nos. 2222, 2328. A Tibetan plant not previously recorded from Sikkim.

87. Rubus Linn.

225. Rubus reticulatus Wall.
Zemu Valley, 10,000 ft., No. 2712.

226. Rubus fragarioides Bertol.
Zemu Valley, 13-14,000 ft., Nos. 1351, 1382.

227. Rubus lineatus Reinw.
Tong. 5,000 ft.

228. Rubus niveus Wall.
Zemu and Llonakh, 8-12,000 ft., Nos. 1027, 1744.

229. Rubus lasiocarpus Smith.
Tong, 5,000 ft.

88. Neillia Don.

230. Neillia rubiflora Don.
Zemu, 8-9,000 ft., No. 1019.

89. Coluria Br.

231. Coluria longifolia Maxim.
Naku La, 16,000 ft., No. 237 Younghusband.

90. Fragaria Linn.

232. Fragaria vesca Linn.
var. **nubicola.**
Cheungtong and Lachen, 6-7,000 ft., No. 896, 942.

91. Potentilla Linn.

233. Potentilla Sibbaldi Haller.
Zemu and Llonakh, 14-16,000 ft., Nos. 1342, 2703.
var. **micrantha.**
Zemu, 16,000 ft., No. 1421.

234. Potentilla perpusilloides W. W. Smith, sp. nov.

Sectionis *Sibbaldiæ* species et *Potentillæ perpusillæ* Hook. f. affinis; floribus majoribus, solitariis, sessilibus, pentameris, albis, distinguitur.

Magnitudo habitusque *Potentillæ perpusillæ* consimiles. *Folia* ad 6 mm., ternata, segmentis ad 3 mm., longis, *Potentillæ perpusillæ* more 3-5 fidis; interdum subglabra, interdum marginibus longe-ciliatis. *Sepala* et epicalycis segmenta ad 2 mm. longa, marginibus ciliatis.

Petala calycem duplo excedentia, ad 4 mm. longa, orbicularia, alba. *Stamina* decem perbrevia. *Achænia* ± 12 glabra.

Sikkim Himalaya in the Zemu valley at an elevation of 14-15,000 ft Very near but not the *Potentilla perpusilla* of Hooker, being distinguished by the glabrate leaves and the white pentamerous corolla, which much exceeds the calyx.

235. **Potentilla purpurea** Royle.

Zemu and Llonakh, 15-16,000 ft., Nos. 1488, 1581, 2200. The Sikkim specimens have entire leaflets and the flowers tetramerous but are referable, I believe, to this species.

236. **Potentilla albifolia** Wall.

Zemu and Llonakh, 14-15,000 ft., No. 1254.

237. **Potentilla fruticosa** Linn.

Zemu and Llonakh, 11-16,000 ft. Very common over the whole area and one of the conspicuous plants of the arid region.

var. **armerioides.**

Upper valleys of Llonakh, 16,500-17,000 ft., No. 2330.

238. **Potentilla ambigua** Camb.

Zemu and Llonakh, 10-16,000 ft., Nos. 1068, 1197, 1424, 1505, 1760. Frequent.

239. **Potentilla eriocarpa** Wall.

Zemu and Llonakh, 12-15,000 ft., Nos. 2037, 2197, 2702. A conspicuous plant in crevices of the cliffs.

240. **Potentilla Mooniana** Wight.

Zemu Valley, 10-12,000 ft., Nos. 1028, 1678.

241. **Potentilla fulgens** Wall.

Tong, Lachen, Thango, 5-13,000 ft. Frequent.

242. **Potentilla Leschenaultiana** Ser.

var **bannehalensis** ?

Thango, 14,000 ft., No. 2534. Doubtful.

243. **Potentilla Griffithii** Hook. f.

Lachen, Zemu, and Llonakh, 8-15,000 ft., Nos. 1849, 2136, 2704, Frequent.

244. **Potentilla pedunculoris** Don.

Zemu Valley, 12-16,000 ft., Nos. 1196, 1360, 1548. Frequent.

var. Clarkei.

Zemu and Llonakh, 14-15,000 ft., Nos. 1283, 2092.

245. Potentilla leuconota Don.

Llonakh, 12-16,000 ft., No. 1770.

246. Potentilla microphylla Don.

Zemu and Llonakh, 15-16,000 ft., Nos. 1279, 1422, 1445, 1506, etc. Frequent.

var. **glabriuscula** Wall.

Zemu Valley, 13,000 ft., Nos. 1378, 1536.

var. **achilleæfolia.**

Zemu and Llonakh, 15-17,000 ft., Nos. 1258, 1570, 2008. Frequent.

var. **commutata.**

Zemu and Llonakh, 14-17,000 ft., Nos. 1348, 2182.

247. Potentilla sericea Linn.

var. **compacta** var. nov.

Planta forsan ad *P. sericeam* referenda sed *Potentillis* in Herb. Kew. et Herb. Calc. omnibus dissimilis.

Perpusilla in globum compacta, 6 cm. diametiens, supra solum 2·5-3 cm. extendens. *Radix* crassus. *Caulis* in 5-10 ramos columnæformes, arcte compressos, vetustis foliis indutos, divisus. *Folia* divisa *P. sericeæ* more segmentis 2-3 mm. longis, argenteo-capillatis. *Flores* inter folia sparsi, solitarii, 3-4 mm. diametientes, ad 5 mm. pedicellati. *Corolla* vix calycem excedens.

The upper valleys of Llonakh, Sikkim, 14,500—15,000 feet, Nos. 1907, 2210.

This Potentilla has the compact 'rosette' habit of the typical Llonakh flora, forming small white mounds like 'incrustations' on the flat wind-swept areas. It is probably a very reduced form of *P. sericea.* In view of the polymorphic character of this latter species and the many specific names already attached to its various forms, I think it better to give the Llonakh plant varietal rank only.

248. Potentilla argyrophylla Wall.

var. **leucochroa.**

Zemu, 14,500 ft., No. 1373.

249. Potentilla nivea Linn.

Llonakh, 14-16,000 ft., Nos. 1888, 2010, 2038.

92. Agrimonia Linn.

250. Agrimonia Eupatorium Linn.

Chungtong, Lachen, and Zemu, 6-11,000 ft., No. 2707.

93. Poterium Linn.

251. Poterium filiforme Hook. f.
Llonakh, 14,500 ft., No. 2088. Frequent on the marshy flats.

252. Poterium diandrum Wall.
Zemu Valley, 12-13,000 ft. Frequent.

94. Rosa Linn.

253. Rosa macrophylla Lindl.
Lachen and Zemu, 8-10,000 ft., Nos. 955, 2708.

254. Rosa sericea Lindl.
Lachen and Zemu, 8-13,000 ft., Nos. 996, 1070, 1188, etc. Common.

95. Pyrus Linn.

255. Pyrus sikkimensis Hook. f.
Lachen and Zemu Valley, 8-9,000 ft., Nos. 992, 2438, 2711.

256. Pyrus vestita Wall.
Zemu, 9,000 ft., No. 2710.

257. Pyrus foliolosa Wall.
Zemu, 9-10,000 ft., No. 1060.

258. Pyrus microphylla Wall.
Zemu and lower Llonakh 9-14,000 ft., Nos. 1061, 1245.

259. Pyrus Wallichii Hook. f.
Lachen, 8,000 ft., No. 949.

96. Cotoneaster Linn.

260. Cotoneaster frigida Wall.
above Lachen, 10,000 ft.

261. Cotoneaster acuminata Lindl.
Lachen, Zemu, and Thango, 7-13,000 ft., Nos. 993, 1535, 3071 Ribes. Sometimes prostrate at the higher elevations.

262. Cotoneaster microphylla Wall.
Zemu and Thango, 11-14,000 ft., Nos. 1201, 1211, 2713.

XXVI.—SAXIFRAGACEÆ.

97. Astilbe Ham.

263. Astilbe rivularis Ham.
Zemu, 9,000 ft., No. 2761.

98. Saxifraga Linn.

264. Saxifraga cernua Linn.

Llonakh and Thango 14,500-15,000 ft., Nos. 1924, 2150, 3088 Ribu. Sparingly.

Recorded from Eastern Nepal and Chumbi Valley as well as from the West Himalaya.

265. Saxifraga palpebrata H. f. & T.

Llonakh and Thango, 13-14,000 ft., No. 2568. Occasional. Not quite the typical form as the leaves are elliptic and sparingly ciliate.

266. Saxifraga llonakhensis W. W. Smith. sp. nov.

Species ad *S. palpebratam* H. f. & T. spectans sed longis rectis stylis distinctus. Laxe caespitosa, *Caules* complures ad 2-3 cm. longi, (interdum basi foliis vetustis delapsis 2-3 cm. longitudini addenda), debiles, foliosi, fere glabri. *Folia basalia* plerumque desunt; *folia caulina inferiora* multi, 4-5 mm. longa, 1 mm. lata, laxe imbricata, lineari-lanceolata, revoluta, ciliata, interdum aristata; *superiora* similia laxiora. *Pedunculus* ad 1 cm. longus capillis albis (glanduligeris, atro-capitatis) usque ad calycem sparse indutus. *Sepala* ad 3 mm., ovata vel oblonga, obtusa, glabra. *Petala* 4-5 mm. longa, obovata 3-nervia, lutea. *Ovarium* auguste ovatum, stylis parallelis subæquum. *Semina* vix matura.

In Llonakh, and near Thango, N. W. Sikkim, at an elevation of 14,000 ft., Nos. 2049, 2686.

In appearance this species seem to approach *S. palpebrata* and in the leaf recalls *S. aristulata.* Unlike anything in Herb. Kew, or Herb. Calc. and much smaller than its apparent allies.

267. Saxifraga cordigera H. f. & T.

Zemu, Llonakh and Thango 14,000-15,500 ft., Nos. 1467, 1606, 1608, 2265, 2492. Frequent.

268. Saxifraga Lychnitis H. f. & T.

Thé La, Naku La, Llonakh, Giagong, 14-17,000 ft., Nos. 1943, 1963, 2185, 2347, 2688. Not uncommon in moist ground by the side of streams.

269. Saxifraga viscidula H. f. & T.

Llonakh and Thango, 13,500-16,500 ft., Nos. 2317, 2571.

270. Saxifraga aristulata H. f. & T.

Zemu, Llonakh, and Thango, 13-17,000 ft., Nos. 1528, 2044, 2359, 2466. Frequent.

271. Saxifraga saginoides H. f. & T.

Zemu, Llonakh, and Thango, 12-17,000 ft., Nos. 1568, 1730, 1797, 2217, 2326, etc. Very common.

272. Saxifraga Caveana W. W. Smith, sp. nov.

Species *S. saginoides* Hk. f. & T. affinis sed ovatis foliis, et majoribus floribus facile distincta.

Densissime caespitosa; caudiculi arcte imbricato-foliosi; scapi breves (5 mm. vel minores) uniflori laxe rufescenti-pilosi. *Folia* ad 7 cm. longa, ad 4 mm. lata, ovata vel ovato-lanceolata, obtusa; vagina lata ciliata. *Sepala* ad 5 mm. longa, oblonga, obtusa, eglandulosa. *Petala* ad 8 mm. longa, obovata, 5-nervia, sepalis multo majora, lutea. *Capsula* ovata stylis brevibus divaricatis coronata.

Thé La, and Ghoraphu Chu, Llonakh, N. W. Sikkim, at an elevation of 15,500-16,500 ft., Nos. 2181, 2194.

273. Saxifraga Hirculus Linn.

var. **indica**

Naku Chu, Llonakh, 14-17,000 ft., Nos. 2014, 2091, 2694.

274. Saxifraga subdioica (Hook. f.) Engler.

Chortenima La, Naku La, Llonakh, 15-17,000 ft., Nos. 1931, 2302, 2356, 2695.

275. Saxifraga nutans H. f. & T.

Llonakh and Thango, 13-16,000 ft., Nos. 2122, 2238, 2279, 2538.

276. Saxifraga diversifolia Wall.

Zemu, Llonakh, and Thango, 10-15,000 ft., Nos. 1694, 2284, 2696,

var. **parnassifolia**.

Lachen, 9,000 ft., No. 2369.

277. Saxifraga corymbosa H. f. & T.

Thango, 14,000 ft., No. 2697.

278. Saxifraga strigosa Wall.

Tallum Samdong and Thango, 10-14,000 ft., Nos. 2409, 2529.

279. Saxifraga pallida Wall.

Very common throughout the area from 13-17,000 ft., Nos. 1542, 2013, 2208, 2333, etc.

280. Saxifraga micrantha Edgew.

Zemu, Llonakh, and Thango, 11-15,000 ft., Nos. 1170, 1752, 2562. Frequent.

281. Saxifraga imbricata Royle.

Zemu, Llonakh, and Thango, 13-16,000 ft., Nos. 1323, 2564.

var. with reddish leaves and no apical pores.

Ghoraphu Chu, Llonakh, 15,700 ft., No. 2201.

282. Saxifraga hemisphaerica H.f. & T.

Jongsong La Valley, Llonakh, 17,000 ft., No. 2325.

283. Saxifraga perpusilla H. f. & T.

Nachegoh and Thangchung La in Zemu Valley, 16,000 ft., Nos. 1490, 1491, 1721.

284. Saxifraga coarctata W. W. Smith, sp. nov.

Species nana sectionis 'Microphylla'.

Densissime caespitosa caudiculis brevissimis (1·5-2 cm.). *Folia* densissime imbricata, ad 5 mm. longa, coriacea, elliptica vel spathulata, integra vel apice breviter tridentata sparse ciliata vel glabra. *Caules floriferi* breves imbricatis foliis omnino vestiti. *Flores* solitarii sessiles. *Sepala* 1-1·5 mm. fere orbicularia, sparse glandulosa. *Petala* 2-3 mm. fere orbicularia, alba. *Staminorum* filamenta lata, calycem æquantia. *Capsula* immatura stylis erectiusculis brevibus (·5 mm.) coronata.

Yumchho La, 15,000 ft., Nos. 1322, 1329.

285. Saxifraga inconspicua W. W. Smith, sp. nov.

Species *Saxifragæ microphyllæ* Royle, valde affinis sed minor; habitu, foliis etiam minutioribus, glabris pedunculis distincta est.

Perpusilla glaberrima, dense caespitose, foliis arcte imbricatis 2-3 mm. longis, lineari-oblongis, obtusis, *Sedi albi* more carnosulis. *Caules floriferi* uniflori brevissimo pedunculo (1-2 mm.) omnino glabri. *Sepala* 1·5-2 mm. erecta glaberrima, foliis similia. *Petala* aequilonga et sepalis similia, augustiora. *Capsula* stylis brevibus erectiusculis coronata.

Yumchho La, Sikkim, at an elevation of 14-16,000 ft., Nos. 1524, 1538.

This saxifrage I at first in the absence of any types at Calcutta ascribed to *S. microphylla* to which it is very closely allied. On a specimen however being sent to Kew for comparison with the original types of *S. microphylla* it was considered to be distinct. It is the smallest described species of *Saxifraga*. It forms a crustaceous covering to the rocks in the vicinity of the pass. In shape and consistency the leaves suggest those of a small *Sedum*; they have a shining greenish lustre; the upper half is closely packed with chlorophyll-containing cells while the lower half is transparent and bladdery. The greenish sepals and petals are remarkably like the leaves in shape, consistency and colour.

826. Saxifraga Jacquemontiana Done.

Zemu, Llonakh, and Thango, 14-17,000 ft., Nos. 1515, 1723, 1809, 1970, 2188, 2692. Frequent.

287. Saxifraga Stella-aurea H. f. & T.

Zemu, Llonakh, and Thango, 14-17,000 ft., Nos. 1353, 1364, 1367, 1469, 1802, 2047, 2184. Frequent.

288. Saxifraga ramulosa Wall.

Llonakh, 15-17,000 ft., Nos. 2127, 2316, 2362. Sparingly.

289. Saxifraga umbellulata H. f. & T.

Llonakh, Thango, and Giagong, 13-16,000 ft., Nos. 2159, 2223, 2366, 2455, 2558, 2723. Frequent on the Llonakh flats, sparingly elsewhere.

290. Saxifraga brachypoda Don.

Llonakh, 12,000 ft., No. 1769. Sparingly.

291. Saxifraga fimbriata Wall.

Llonakh and Thango, 13-15,000 ft., Nos. 2276, 2467, 2559.

292. Saxifraga filicaulis Wall.

Thango, 14,000 ft., No. 2536.

293. Saxifraga hispidula Don.

Llonakh, 13,000 ft., No. 1772.

294. Saxifraga Brunoniana Wall.

Zemu, Llonakh, and Thango, 10-13,000 ft., Nos. 1230, 1394, 1740, 2373. Not uncommon.

295. Saxifraga pilifera H. f. & T.

Llonakh, 14,500-17,000 ft., Nos. 1808, 2084, 2101, 2146, 2336. Frequent on the Llonakh screes but not seen in the other valleys.

296. Saxifraga flagellaris Willd.

Llonakh and Thango, 14-17,500 ft., Nos. 1831, 1950, 1991, etc. Frequent.

297. Saxifraga purpurascens H. f. & T.

Zemu and Thango, 12-15,000 ft. Frequent.

99. Tiarella Linn.

298. Tiarella polyphylla Don.

Lachen, 8,000 ft., No. 945.

100. Chrysosplenium Linn.

299. Chrysosplenium nepalense Don.

Zemu Valley, 9-10,000 ft., No. 1031.

300. Chrysosplenium alternifolium Linn.

Llonakh, 14-15,000 ft., No. 1842.

301. Chrysosplenium carnosum H. f. & T.
Zemu, Llonakh, and Thango, 14-15,500 ft., Nos. 1319, 1440, 2253, 2519. Frequent on the rocky screes.

101. Parnassia Linn.

302. Parnassia mysorensis Heyne.
Zemu Valley, 11-13,000 ft., Nos. 1244, 1452.

303. Parnassia nubicola Wall.
Zemu and Llonakh, 11-14,000 ft., Nos. 1436, 1736.

304. Parnassia ovata Ledeb.
Zemu and Llonakh, 12-15,000 ft. Frequent.

305. Parnassia pusilla Wall.
Zemu and Thango, 14-16,000 ft., Nos. 1438, 1611, 2518.

102. Hydrang Linn.

306. Hydrangea altissima Wall.
Lachen and Tallum Samdong, 8-11,000 ft.

103. Deutzia Thunb.

307. Deutzia corymbosa Br.
Lachen and Zemu, 7-9,000 ft., Nos. 932, 2762.

104. Philadelphus Linn.

308. Philadelphus coronarius Linn.
Lachen and Zemu, 7-10,000 ft., No. 934.

105. Ribes Linn.

309. Ribes glaciale Wall.
Zemu Valley, 9-11,000 ft., No. 1057.

310. Ribes desmocarpum H. f. &. T.
Zemu Valley, 8-10,000 ft., Nos. 1018, 1041.

311. Ribes luridum H. f. &. T.
Zemu Valley, 11-13,000 ft., Nos, 1198, 1205.

312. Ribes Griffithii Hook. f. & T.
Zemu Valley, 12-13,000 ft., No. 1138.

XXVII.—CRASSULACEÆ.

All the Calcutta material of this order is at present on loan in Europe, for monographic purposes. I have been unable therefore to compare my specimens with herbarium types. M. Hamet however, who is

monographing the order for the *Pflanzenreich* and to whom I sent duplicates of all my numbers, nearly 60, has kindly sent me a preliminary note saying that the majority of the Himalayan species are represented in this collection from Llonakh. A detailed list is not yet available.

The following I noted as certainly present.

106. Sedum Linn.

313. **Sedum quadrifidum** Pall.

314. **Sedum himalense** Don.

Zemu, Llonakh, 12-17,000 ft. Common.

315. **Sedum bupleuroides** Wall.

Zemu, Llonakh, 11-14,500 ft., Nos. 1105, 1756, 2727. Frequent.

316. **Sedum elongatum** Wall.

Zemu, Llonakh, 11-12,000 ft., Nos. 1649, 1741.

317. **Sedum fastigiatum** H. f. & T.

318. **Sedum humile** H. f. & T.

319. **Sedum asiaticum** DC.

Zemu, Llonakh, Nos. 1621, 2726. Frequent.

320. **Sedum trifidum** Wall.

Common in the lower Zemu, 8-10,000 ft.

321. **Sedum trullipetalum** H. f. & T.

Llonakh, Thango, Giagong, 14-16,000 ft. Nos. 1904, 2468.

322. **Sedum Jaeschkei** Kurz?

Thango, 14,000 ft., No. 2507.

323. **Sedum multicaule** Wall.

Cheungtong, Lachen 5-8,000 ft., Nos. 888, 2427, 2602.

324. **Sedum perpusillum** H. f. & T.

Naku Chu, Llonakh, 17,000 ft.

107. Triactinia H. f. & T.

325. **Triactinia verticillata** H. f. & T.

Lower Zemu and Llonakh, 9-11,000 ft., Nos. 1055, 1739. Frequent.

XXVIII.—DROSERACEÆ.

108. Drosera Linn.

326. **Drosera peltata** Sw.

Lachen, 8-9,000 ft., Nos, 2411, 2749.

XXIX.—HALORAGEÆ

109. Hippuris Linn.

327. Hippuris vulgaris Linn,

Llonakh, 14,500-15,500 ft., Nos. 1886, 2137. Sparingly in the lakes and marshes of the Naku Chu and Ghoraphu Chu. Not recorded previously from Sikkim. Kashmir is the only other locality within the Indian area.

110. Callitriche Linn.

328. Callitriche stagnalis Scop.

Lachen, 8-9,000 ft., No. 2415.

329. Callitriche verna Linn.

Llonakh, 14,500 ft., No. 2225. Not previously found in the East Himalaya.

XXX.—MELASTOMACEÆ.

111. Sarcopyramis Wall.

330. Sarcopyramis nepalensis Wall.

Lachen and Zemu, 7-9,000 ft. Frequent.

XXXI.—ONAGRACEÆ.

112. Epilobium Linn.

331. Epilobium reticulatum Clarke.

Zemu Valley, 10-13,000 ft., Nos. 1142, 1172, 1374, 2730. Frequently among the stones by the river.

332. Epilobium roseum Schreb.

var. **Dalhousieanum.**

Zemu, 10,000 ft., No. 2788.

var. **cylindricum.**

Zemu, 9-10,000 ft., No. 2787.

333. Epilobium origanifolium Lamk.

Zemu, 9-11,000 ft., Nos. 1054, 1111, 1173.

var. **Balansæ.**

Zemu, 12,000 ft., No. 1387.

334. **Epilobium alpinum** Boiss.
Zemu and Llonakh, 12-16,000 ft., Nos. 1249, 1299, 1794, 2068.

335. **Epilobium tetragonum** Linn.
Lachen and Zemu, 8-9,000 ft.

113. Circæa Linn.

336. **Circæa lutetiana** Linn.
Lachen and Zemu, 7-9,000 ft., Nos. 2429, 2752.

337. **Circæa alpina** Linn.
Lachen and Zemu, 8-12,000 ft., Nos. 1115, 1651, 2755.

XXXII.—SAMYDACEÆ.

114. Casearia Jacq.

338. **Casearia** sp.
In fruit only, not matched in Herb. Calc. Lachen 8,000 ft., No. 967.

XXXIII.—CUCURBITACEÆ.

115. Trichosanthes Linn.

339. **Trichosanthes palmata** Roxb.
Tista Valley, 4,500 ft., No. 332.

116. Zehneria Endl.

340. **Zehneria umbellata** Thw.
Cheungtong, 6,000 ft.

117. Thladiantha Bunge.

341. **Thladiantha dubia** Bunge.
Tong, 4,500 ft., No. 855.

XXXIV.—BEGONIACEÆ.

118. Begonia Linn.

342. **Begonia Josephi.** A. D. C.
Lachen, 8,000 ft., No. 2414.

343. **Begonia rubro-venia** Hook.
Tista Valley, 3,000 ft., No. 828.

XXXV.—UMBELLIFERÆ.

119. Hydrocotyle Linn.

344. Hydrocotyle javanica Thunb.
Cheungtong, Lachen, and Lachung, 4-900 ft. Common.

345. Hydrocotyle rotundifolia Roxb.
Cheungtong, 7,000 ft., No. 3083 Ribu.

120. Sanicula Linn.

346. Sanicula europaea Linn.
Lachen and Zemu Valley, 8-10,000 ft., No. 2800. Common.

121. Vicatia DC.

347. Vicatia millefolia Clarke.
Zemu Valley, 12-15,000 ft., Nos. 1377, 1565. Sparingly.

122. Trachydium Lindl.

348. Trachydium novem-jugum Clarke.
Lonakh, 14,000 ft., No. 1785. Sparingly.

349. Trachydium hirsutulum Clarke. ?
Zemu, Llonakh, Thango, and Yumchho La, 13,000-14,500 ft., Nos. 1248, 1449, 2012, etc. Fairly common.

350. Trachydium obtusiusculum Clarke.
Zemu and Llonakh Valleys, 12-14,500 ft., Nos. 1227, 2006. Not uncommon.

123. Bupleurum Linn.

351. Bupleurum Candollii Wall.
Lachen and Zemu, 8-9,000 ft., No. 2799. Frequent.

352. Bupleurum longicaule Wall.
Thango, 13-14,000 ft., No. 2864. Ribu.

124. Pimpinella Linn.

353. Pimpinella bella Clarke.
Zemu Valley, 12,000 ft., No. 2805. Sparingly.

354. Pimpinella Hookeri Clarke.
Zemu and Lachung, 9-10,000 ft., No. 2597. Sparingly.
var. **graminifolia**.
Along with the typical form; No. 2714.

355. **Pimpinella tenera** Benth.
Yumchho La, Zemu, and Llonakh, 10-15,000 ft., Nos. 1119, 1165, 1437, etc. Very common.

356. **Pimpinella diversifolia** DC.
Cheungtong and Lachen, 4-8,000 ft., not common in this area.

125. Chærophyllum Linn.

357. **Chærophyllum villosum** Wall ?
Cheungtong, Lachen, and Zemu, 6-11,000 ft., Nos. 908, 2804. Plentiful near the roads and footpaths. The Sikkim plant is glabrous and seems to me distinct from the West Himalayan and Khasian form, to which the specific name is applicable enough.

126. Œnanthe Linn.

358. **Œnanthe Thomsoni** Clarke.
Common in the damp forest at 4-6,000 ft.

127. Selinum Linn.

359. **Selinum tenuifolium** Wall.
Zemu, 10-12,000 ft., No. 1679. Common.

360. **Selinum papyraceum** Clarke.
Thango, 13,000 ft., No. 2521. Sparingly.

128. Cortia DC.

361. **Cortia Hookeri** Clarke.
Common at 13-17,000 ft., throughout the area. Nos. 1261, 1314, 1475, etc.

129. Pleurospermum Hoffm.

362. **Pleurospermum dentatum** Benth.
Zemu, 10-12,000 ft., No. 1660. Frequent.

363. **Pleurospermum apiolens** Clarke.
Thango, 14,000 ft., No. 2561. Sparingly.

364. **Pleurospermum Hookeri** Clarke.
Zemu, Llonakh, and Thango, 13-16,500 ft., Nos. 1689, 1869, 2057, etc. Very common.

130. Archangelica Hoffm.

365. **Archangelica officinalis** Hoffm.
var. **himalaica.**
Zemu, 10-13,000 ft., No. 1530. Common.

131. Heracleum Linn.

366. **Heracleum nubigenum** Clarke.
Yakthang, 13,000 ft., No. 2949 Ribu.

367. **Heracleum Brunonis** Benth.
Thango, 13-14,000 ft., Nos. 2286, 2488, 2539. Common in the Lachen Valley but not seen in the Zemu or Llonakh.

368. **Heracleum sublineare** Clarke.
Zemu and Thango, 12-13,000 ft., No. 1634. Common.

369. **Heracleum obtusifolium** Wall.
Thango, 12-14,000 ft., No. 2288.

370. **Heracleum nepalense** Don.
Common up to 12,000 ft.
var. **bivittata.**
Common.

132. Caucalis Linn.

371. **Caucalis Anthriscus** Scop.
Tong and Cheungtong, 5-7,000 ft. Occasional.

XXXVI.—ARALIACEÆ.

133. Aralia Linn.

372. **Aralia Pseudo-ginseng** Benth.
Zemu Valley, 8-9,000 ft., No. 2781. Sparingly.

373. **Aralia cissifolia** Griff.
Zemu Valley, 11-13,000 ft., Nos. 1090, 1191. Common.

374. **Aralia cachemirica** Dene.
Lachen and Zemu, 8-9,000 ft. Nos. 985, 2786. Plentiful.

34. Pentapanax Seem.

375. **Pentapanax Leschenaultii** Seem.
Zemu, 8-10,000 ft., Nos. 1010, 1072. Common.

135. Trevesia Vis.

376. **Trevesia palmata** Vis.
Cheungtong, 6,000 ft., No. 902. Occasional.

136. Brassaiopsis Dene & Planch.

377. **Brassaiopsis alpina** Clarke.
Zemu, 10-11,000 ft., No. 2782.

878. **Brassaiopsis hispida** Seem.
Cheungtong, 7,000 ft.

XXXVII.—CORNACEÆ.

137. Marlea Roxb.

379. **Marlea begoniæfolia** Roxb.
Tista Valley, 1-5,000 ft., No. 806. Very common.

XXXVIII.—CAPRIFOLIACEÆ.

138. Sambucus Linn.

380. **Sambucus javanica** Bl.
Tista Valley, 3-6,000 ft. Frequent.

381. **Sambucus adnata** Wall.
Cheungtong and Lachen, 6-7,000 ft., Nos. 904, 2601.

139. Viburnum Linn.

382. **Viburnum stellulatum** Wall.
var. **glabrescens.**
Zemu, 10-11,000 ft., No. 2632.

383. **Viburnum cordifolium** Wall.
Zemu, 9-10,000 ft., No. 1074.

384. **Viburnum erubescens** Wall.
Zemu and Llonakh, 8-11,000 ft., Nos. 997, 1069, 1737. Frequent.

140. Triosteum Linn.

385. **Triosteum hirsutum** Wall.
Zemu Valley and Thango, 10-13,000 ft., Nos. 1135, 1661.

141. Lonicera Linn.

386. **Lonicera macrantha** DC.
Namchi, 4,000 ft., No. 840.

387. **Lonicera acuminata** Wall.
Zemu, 10,000 ft., No. 2633.

388. **Lonicera hispida** Poll.
Zemu, Llonakh, and Thango, 13-15,000 ft., Nos. 1246, 1434, 1461, 2063. Frequent and variable.

389. **Lonicera tomentella** H. f. & T.
Zemu and Thango, 8-13,000 ft., Nos. 1008, 2855 Ribu.

390. Lonicera angustifolia Wall.
Zemu Valley, 10-15,000 ft., Nos. 1175, 1549.

391. Lonicera rupicola H. f. & T.
Above Thango, 14,000 ft., No. 2903 Ribu. A Tibetan plant.

392. Lonicera spinosa Jacq.
Llonakh, 15,500 ft., No. 2229. A West Himalayan and Tibetan plant, not previously recorded from Sikkim.

393. Lonicera parvifolia Edgew.
Zemu and Llonakh, 14-15,000 ft., Nos. 1327, 1885.
var. **Myrtillus**.
Zemu, 11-13,000 ft., Nos. 1102, 1200, 1226.

394. Lonicera obovata Roxb.
Zemu, 13,000 ft., No. 1460.

395. Lonicera decipiens H. f. & T.
Zemu, 9-10,000 ft., No. 1046.

142. Leycesteria Wall.

396. Leycesteria formosa Wall.
Lachen, 8-9,000 ft., No. 963.

XXXIX—RUBIACEÆ.

143. Hymenopogon Wall.

397. Hymenopogon parasiticus Wall.
Cheungtong and Lachen, 7-8,000 ft., No. 911.

144. Argostemma Wall.

398. Argostemma verticillatum Wall.
Tista Valley, 3,000 ft., No. 802.

145. Anotis DC.

399. Anotis ingrata Wall.
Tong, 4-5,000 ft. No. 856.

146. Ophiorrhiza Linn.

400. Ophiorrhiza Treutleri Hook. f.
Namchi, 4,000 ft., No. 843.

147. Mussaenda Linn.

401. Mussaenda Roxburghii Hook. f.
Tista Valley, 3-4,000 ft., No. 809.

148. Chasalia Comms.

402. **Chasalia curviflora** Thw.
Tista Valley, 3,000 ft., No. 825.

149. Leptodermis Wall.

403. **Leptodermis lanceolata** Wall.
Lachung, 9,000 ft., No. 2830.

150. Rubia Linn.

404. **Rubia cordifolia** Linn.
Lachen and Zemu, 7-10,000 ft., No. 2715. Frequent.

151. Galium Linn.

405. **Galium rotundifolium** Linn.
Tista Valley, 3-4,000 ft., No. 811. Frequent.

406. **Galium triflorum** Michx.
Zemu Valley, 8-13,000 ft., No. 1025, 1521.

407. **Galium Aparine** Linn.
Zemu Valley, 9-10,000 ft., No. 2716.

408. **Galium asperifolium** Wall.
Cheungtong, Lachen, Zemu, 6-12,000 ft., Nos. 907, 951, 1234.

409. **Galium acutum** Edgew.
Lachen and Zemu, 8-10,000 ft., No. 2418.

XL.—VALERIANACEÆ.

152. Nardostach DC.

410. **Nardostachys Jatamansi** DC.
Zemu and Llonakh, 13-17,000 ft., Nos. 1250, 1550, 1959, 2085. Very common.

153. Valeriana Linn.

411. **Valeriana Wallichii** DC.
Cheungtong, Lachen, Zemu, 6-10,000 ft., Nos. 903, 2820.

412. **Valeriana Hardwickii** Wall.
Zemu, Thango, 9-15,000 ft. Frequent.

XLI.—DIPSACEÆ.

154. Triplostegia Wall.

413. **Triplostegia glandulifera** Wall.
Lachen, Zemu, and Thango, 8-14,000 ft., Nos. 1592, 2527, 2551.

155. Morina Linn.

414. Morina longifolia Wall.
Thango, 11-13,000 ft., Nos. 2523, 2753.

415. Morina betonicoides Benth.
Zemu Valley, 11-16,000 ft., Nos. 1089, 1477.

156. Dipsacus Linn.

416. Dipsacus inermis Wall.
Cheungtong, Lachen, Zemu, 7-9,000 ft., Nos. 2607, 2751

157. Scabiosa Linn.

417. Scabiosa Hookeri Clarke.
Llonakh, 14-15,000 ft., Nos. 2154, 2737. Frequent.

XLII.—COMPOSITÆ.

158. Eupatorium Linn.

418. Eupatorium cannabinum Linn.
Lachen and Zemu, 7-10,000 ft., No. 2625. Frequent.

159. Myriactis Less.

419. Myriactis nepalensis Less.
Lachen and Zemu, 8-10,000 ft., No. 2626.

160. Aster Linn.

420. Aster diplostephioides Benth.
Llonakh and Thango 14-16,000 ft., Nos. 1788, 1865, 2003, 2061 2125, 2474. Frequent.

421. Aster sikkimensis H. f. & T.
Yakthang, 13,000 ft., No. 2953 Ribu.

161. Brachyactis Led.

422. Brachyactis menthodora Benth.
Thango, 12-13,000 ft., No. 2280.

162. Erigeron Linn.

423. Erigeron multiradiatus Benth.
Zemu, Llonakh, Thango, 12-14,000 ft., Very common.

163. Microglossa DC.

424. Microglossa albescens Clarke.
Lachen and Zemu, 8-9,000 ft., No 2624. Frequent.

164. Antennaria Gaertn.

425. **Antennaria muscoides** H. f. & T.

Llonakh, Giagong, 14,500-1,700 ft., Nos. 1836, 2206, 2443, 2447. Not seen in the moister Zemu Valley.

165. Leontopodium Br.

426. **Leontopodium alpinum** Cass.

Zemu, Llonakh, Thango, 14-17,000 ft. Very common and very variable.

var. **Stracheyi** Hook. f.

Above Lachen, No. 2984 Ribu.

427. **Leontopodium fimbrilligerum** J. R. Drummond.

Llonakh, 15,500 ft., No. 2231.

166. Anaphalis DC.

428. **Anaphalis nubigena** DC.

Zemu Valley and Llonakh, 12-17,000 ft. Common.

var. **intermedia** Hook f.

With the type.

429. **Anaphalis Royleana** DC.

Zemu, Llonakh, Thango, 12-14,000 ft. Frequent.

var. **concolor** Hook f.

Thango, 13-14,000 ft., Nos. 2490, 2516.

430. **Anaphalis triplinervis** Clarke.

Lachen, 7,000 ft., No. 929.

431. **Anaphalis xylorhiza** Schultz-Bip.

Nachegoh, Llonakh, Kangralamo, 14-16,000 ft., Nos. 713, 1873, 2074, 2132, 2143. Common in Llonakh. Sparingly elsewhere.

432. **Anaphalis araneosa** DC.

Below Thango, 11,000 ft., No. 2522.

167. Inula Linn.

433. **Inula Hookeri** Clarke.

Zemu Valley, 9-10,000 ft., No. 2404.

168. Carpesium Linn.

434. **Carpesium cernuum** Linn.

Zemu Valley, 8-13,000 ft. Common.

435. **Carpesium abrotanoides** Linn.

Cheungtong, 7,000 ft., No. 2606.

169. Adenocaulon Hook.

436. Adenocaulon bicolor Hook.
Lachen and Zemu, 8-9,000 ft., No. 2434.

170. Allardia Dcne.

437. Allardia glabra Dcne.
Upper Llonakh valleys, 14,500-16,000 ft., Nos. 1964, 2202, 2247, 2301.

171. Tanacetum Linn.

438. Tanacetum nubigenum Wall.
Llonakh, Thango, 13-15,000 ft., Nos. 2546, 2820 Ribu.
439. Tanacetum gossypinum H. f. & T.
Upper Llonakh valleys, 14,500-17,000 ft., Nos. 1801, 2029, 2190, 2245.

172. Artemisia Linn.

440. Artemisia salsoloides Willd.
Llonakh, 15-16,500 ft., Nos. 2139, 2177. A west Tibetan and Siberian plant.
441. Artemisia parviflora Roxb.
Lachen and Lachung, 7-10,000 ft. Frequent.
442. Artemisia stricta Edgew. ?
Llonakh, 15,000 ft., No. 2116.
443. Artemisia biennis Willd.
Giagong, 15,000 ft., No. 2469.
444. Artemisia vulgaris Linn.
Tista Valley and Lachen, 4-8,000 ft. Frequent.
445. Artemisia Campbellii H. f. & T.
Llonakh, Thango, 14-17,000 ft., Nos. 1916, 1936, 2156, 2470.
446. Artemisia Moorcroftiana Wall. ?
Llonakh, 15,000 ft., No. 2759 Ribu.
There remain one or two *Artemisias* which I have failed to identify definitely.

173. Cremanthodium Benth.

447. Cremanthodium Decaisnei Clarke.
Llonakh, 15-16,000 ft., Nos. 1939, 1974, 2264, 2352. Frequent. The large leaved glabrous *C. reniforme* Bth. was not observed in any of the valleys.

448. **Cremanthodium Thomsoni** Clarke.

Zemu and Llonakh, 12-15,000 ft., Nos. 1301, 1605, 1616, 1753, 1782. Frequent.

449. **Cremanthodium cuculliferum** W. W. Smith, sp. nov.

Species *C. discoidei* Maxim. valde affinis.

Cauliculus ad 15 cm. longus, sinuosus, 1—2-foliatus, capillis albis nigrisque intermixtis superne indutus, inferne glabrior. *Folia radicalia* (3-5) ad 4 cm. longa, ovato-oblonga, sinuata, obtusa, glabra, chartacea, rugosa; petiolus 2-3 cm. longus, interdum late dilatatus, interdum augustior, revolutus. *Folia caulina* 1-2, minora, erecta, lineari-oblonga, obtusa basi vaginante amplexicaulia, inferius glabrius, superius interdum nigro-villosissimum bracteiforme capitulo proximum. *Capitulum* 2-2·5 cm. diametiens, involucro segmentis acutis nigro-villosissimo, ligulis nullis, pappo albo.

Naku La, Llonakh, 17,500 ft., No. 1956.

Very near Przewalski's plant of *C. discoideum* Maxim. found in the province of Kansu in Western China; but not matching it as represented in Kew or in Calcutta Herbaria.

450. **Cremanthodium palmatum** Benth.

Zemu, Llonakh and Thango, 12-14,000 ft., Nos. 1619, 1691, 1771, 2081, 2501. Not uncommon.

451. **Cremanthodium oblongatum** Clarke.

Zemu and Llonakh, 12-16,000 ft., Nos. 1393, 1496, 1705, 2213. Not uncommon.

452. **Cremanthodium** sp.

Chhortenima Valley, Llonakh, 16,500 ft., No. 2303.

174. Doronicum Linn.

453. **Doronicum Hookeri** Clarke.

Tumrachen Valley and Thango, 12-14,000 ft., Nos., 1696, 2289.

175. Gynura Cass.

454. **Gynura angulosa** DC.

Tong, 5,000 ft., No. 884.

176. Senecis Linn.

455. **Senecio graciliflorus** DC.

Zemu, 10-12,000 ft., No. 1664.

456. Senecio bracteolatus Hook. f.
Zemu Valley, Naku Chu, Llonakh, 13-17,500 ft., Nos. 1408, 1952.

457. Senecio diversifolius Wall.
Zemu Valley, 9-11,000 ft., Nos. 1071, 1704, 2402.

458. Senecio Ligularia Hook. f.
Lachen and Zemu, 8-10,000 ft., Nos. 1002, 2432.

459. Senecio retusus Wall.
Zemu, Llonakh, Thango, 11-15,000 ft., Nos. 1106, 1703, 1765, 2384. Frequent.

460. Senecio calthæfolius Hook. f. ?
Zemu, 14,000 ft., No. 1347.

461. Senecio scandens Don.
Above Lachen, 9-10,000 ft.

462. Senecio alatus Wall.
Zemu and Llonakh, 9-11,000 ft. Frequent.

463. Senecio quinquelobus Hook. f. & T.
Zemu and Thango, 9-12,000 ft., Nos. 1584, 2405.

464. Senecio acuminatus Wall.
Zemu, 8-10,000 ft., Nos. 2403, 2622.

177. Cnicus Linn.

465. Cnicus eriophoroides Hook. f.
Zemu Valley, 9-10,000 ft., No. 1037.

466. Cnicus Wallichii DC.
Lachen and Zemu, 8-9,000 ft., No. 2431.

178. Saussurea DC.

467. Saussurea obvallata Wall.
Zemu, Llonakh, Thango, 12-16,000 ft., Nos. 1332, 1683. Frequent.

468. Saussurea uniflora Wall.
Zemu and Llonakh, 11-14,000 ft., Nos. 1327, 2069. Frequent.

469. Saussurea wernerioides Schultz-Bip.
Upper Valleys of Llonakh, 15,500-16,500 ft., Nos. 2219, 2322.

470. Saussurea sp.
Species *Saussureæ subulatæ* Clarke affinis, forsan varietas, sed bracteis flaccidis et hirsutis distincta. *S. subulatæ* omnes typi in Herb. Calc. bracteas rigidas glabrasque habent.
Llonakh, 15-17,000 ft., Nos. 1951, 2140, 2315.

471. **Saussurea Sughoo** Clarke.

Very common throughout Llonakh and very variable. Also abundant at Giagong and Kangralamo, 14-16,000 ft., Nos. 1706, 1786, 2028, 2149, 2342, 2442. I make out about half a dozen forms which run into one another.

472. **Saussurea Yakla** Clarke.

Llonakh, 15,000 ft., No. 2367.

473. **Saussurea taraxicifolia** Wall.

var. **depressa** Hook. f.

Thango, 13-14,000 ft., No. 2499.

474. **Saussurea Kunthiana** Clarke.

Zemu, Llonakh, Thango, 13-17,000 ft., Nos. 1573, 1884, 1932, 2268. Frequent.

var. **major** Hook. f.

Above Thango, 13-14,000 ft., No. 2541.

475. **Saussurea polystichoides** Hook. f.

Llonakh and Thango, 14-15,000 ft., Nos. 1499, 2485.

476. **Saussurea Stella** Maxim.

Upper Valleys of Llonakh, 15,500-16,000 ft., Nos. 1894, 2215. A Tibetan plant, not previously recorded from Sikkim.

477. **Saussurea Andersoni** Clarke.

Zemu, Llonakh, Thango, 12-14,500 ft., Nos. 1336, 1707, 2483.

478. **Saussurea Hookeri** Clarke.

Llonakh, 14,500-17,000 ft., Nos. 2162, 2224, 2320, 2343.

479. **Saussurea hieracoides** Hook. f.

Thango, 14,000 ft., No. 2385.

480. **Saussurea Candolleana** Wall.

Zemu, 11-12,000 ft., No. 1666.

481. **Saussurea hypoleuca** Spreng.

Zemu, 10-11,000 ft., No. 1732.

482. **Saussurea deltoidea** Clarke.

Lachen, 7-9,000 ft.

483. **Saussurea denticulata** Wall.

Lachen and Zemu, 8-11,000 ft., Nos. 1658, 2425.

484. **Saussurea gossypiphora** Don.

Zemu, Llonakh and Thango, 14-17,000 ft., Nos. 1331, 1427, 1498, 2191. Frequent.

485. **Saussurea sacra** Edgew.

Llonakh, 16,000 ft., No. 1500.

486. Saussurea tridactyla Schultz-Bip.
Llonakh, 17,000 ft., Nos. 2193, 2337.

487. Saussurea tanguensis J. R. Drummond.
Thé La, Jongsong La Valley, Llonakh, 15,000-16,000 ft., Nos. 2161, 2357. A very peculiar plant with bright red pappus.

179. Gerbera Gronov.

488. Gerbera Kunzeana Br. & Asch.
Below Thango, 13,000 ft., No. 2940 Ribu.

180. Picris Linn.

489. Picris hieracioides Linn.
Cheungtong, Lachen and Zemu, 7-9,000 ft., Nos. 2605, 2627.

181. Crepis Linn.

490. Crepis fuscipappa Benth.
Lachen, Zemu, 8-10,000 ft., Nos. 981, 2628.

491. Crepis gracilipes Hook. f.
Llonakh and Giagong, 15-16,000 ft., Nos. 1892, 1982, 2454.

492. Crepis depressa H. f. & T.
Llonakh, 16,000 ft., No. 2711 Ribu.

493. Crepis glomerata Dene.
Zemu, Llonakh, Thango, 13-16,000 ft. Frequent.

182. Taraxacum Hall.

494. Taraxacum officinale Wigg.
var. **parvula** Hook. f.
Llonakh, 14-17,000 ft., Nos. 1835, 1891, 2060, 2621.

183. Lactuca Linn.

495. Lactuca graciliflora DC.
Lachen, 8-10,000 ft.

496. Lactuca hastata DC.
Below Thango, 11,000 ft., No. 2524.

497. Lactuca macrorhiza Hook. f.
Lachen, Lachung, 9-10,000 ft., Nos. 2300, 2526.

498. Lactuca Lessertiana Clarke.
Llonakh, Giagong, 14-15,000 ft., Nos. 1791, 2460.

499. **Lactuca macrantha** Clarke.
Zemu, Thango, 12-14,000 ft., Nos. 1652, 2475.

500. **Lactuca bracteata** H. f. & T.
Lachen, 8-10,000 ft., No. 2433.

501. **Lactuca Dubyæa** Clarke.
Llonakh, Thango, 12-13,000 ft., Nos. 1763, 2283, 2295.

184. Sonchus Linn.

502. **Sonchus arvensis** Linn.
Tong, 4-5,000 ft., No. 871.

XLIII.—CAMPANULACEÆ.

185. Leptocodon H. f. & T.

503. **Leptocodon gracilis** H. f. & T.
Tong, Cheungtong, 5-7,000 ft., No. 849.

186. Codonopsis Wall.

504. **Codonopsis affinis** H. f. & T.
Lachen, 10,000 ft., No. 2372.

505. **Codonopsis Benthami** H. f. & T.
Lachen & Zemu, 8-10,000 ft., Nos. 975, 986.

506. **Codonopsis subsimplex** H. f. & T.
Zemu, 13,000 ft., No. 1653.

507. **Codonopsis thalictrifolia** Wall.
Zemu, Llonakh, 12-14,500 ft., Nos. 1670, 1759, 2124.

508. **Codonopsis fœtens** H. f. & T.
Yumchhe La, Tumrachen, Zemu, Llonakh, 13-14,500 ft., Nos. 1298, 1603, 1762, 1784.

187. Cyananthus Wall.

509. **Cyananthus pedunculatus** Clarke.
Llonakh, Thango, 13-15,000 ft., Nos. 2005, 2266, 2533. Frequent.

510. **Cyananthus incanus** H. f. & T.
Llonakh, Thango, 14-16,000 ft., Nos. 1860, 2076, 2141, etc. Frequent. Not seen in the Zemu Valley. *C. inflatus* H. f. & T. common in Sikkim was not found either in Zemu or Llonakh.

188. Campanula Linn.

511. **Campanula colorata** Wall.
Tong, Lachen, Zemu, 5-9,000 ft. Common.

512. Campanula aristata Wall.

Zemu, Llonakh, Thango, 13-15,000 ft., Nos. 1238, 1458, 1628, etc. Frequent.

513. Campanula modesta H. f. & T.

Zemu, Llonakh, 14-17,000 ft., Nos. 1357, 1375, 1781, 2331, 2353.

XLIV.—VACCINIACEÆ.

189. Vaccinium Linn.

514. Vaccinium sikkimense Clarke.

Zemu Valley, 12,000 ft., No 1596.

515. Vaccinium serratum Wight.

Tong, 5,000 ft., No. 885.

516. Vaccinium glauco-album Hook. f.

Zemu, 8-9,000 ft., No. 989.

XLV.—ERICACEÆ.

190. Gaultheria Linn.

517. Gaultheria nummularioides Don.

Lachen, Zemu Valley, and Lower Llonakh, 7-12,000 ft., No. 936. Frequent.

518. Gaultheria trichophylla Royle.

Yumchho La, Zemu and Thango, 11-15,000 ft., Nos. 1225, 1325, 2517. Very common.

519. Gaultheria pyrolæfolia Hook. f.

Zemu Valley and Thango, 12,500-14,500 ft., Nos. 1130, 1369, 2509. Generally distributed but not common.

520. Gaultheria fragrantissima Wall.

Lachen, Zemu Valley and Lachung, 7,000-9,000 ft., Nos. 970, 991, 2578. Common.

521. Gaultheria Hookeri Clarke.

Lachen and Zemu Valley, 8-9,000 ft., No. 1026. Occasional.

191. Cassiope D. Don.

522. Cassiope fastigiata D.Don.

Zemu Valley, 11-15,000 ft., Nos. 1114, 1123. Common.

523. Cassiope selaginoides H. f. & T.

Zemu Valley, 11-15,000 ft., Nos. 1124, 1368. Much more sparingly than the preceding. Both are found up to and along the sides of the Zemu glacier.

192. Pieris D. Don.

524. **Pieris ovalifolia** D. Don.

Lachen, Zemu and Lachung, 7-10,000 ft., Nos. 2718, 2719. Common.

525. **Pieris villosa** Hook. f.

Lachen, 9,000 ft. Sparingly.

526. **Pieris formosa** Don.

Lachen and Zemu, 8-10,000 ft., Nos. 962, 2720. Frequent.

193. Enkianthus Lour.

527. **Enkianthus himalaicus** H. f. & T.

Lachen, Zemu Valley, and Lachung, 8-10,000 ft., Nos. 1016, 1062, 2592. Not uncommon.

194. Diplarche H. f. & T.

528. **Diplarche multiflora** H. f. & T.

Zemu Valley and Yumchho La, 12-15,000 ft., No. 1272.

529. **Diplarche pauciflora** H. f. & T.

Zemu Valley, 14-15,000 ft., Nos. 1363, 1539. Both species extend up to and along the sides of the Zemu glacier and form a conspicuous feature of the sparse vegetation beside the melting snow on the surrounding slopes.

195. Rhododendron Linn.

530. **Rhododendron vaccinioides** Hook. f.

Lachen, 8,000 ft., No. 948.

531. **Rhododendron grande** Wight.

Lachen.

532. **Rhododendron Hodgsoni** Hook. f.

Very common above Lachen and in Lower Zemu Valley, forming the chief constituent of the Rhododendron "jungle" from 9-11,000 ft.

533. **Rhododendron Falconeri** Hook. f.

Frequent, especially above Lachen.

534. **Rhododendron arboreum** Sm.

Zemu Valley 8-10,000 ft., No. 2780.

535. **Rhododendron campanulatum** Don.

Zemu Valley and Yumchho La, 11-14,000 ft., Nos. 1204, 1304, 1252. Very common and along with *R. Wightii* forms dense 'jungle' on the slopes of the higher valleys.

536. **Rhododendron Wightii** Hook. f.
Zemu. Very common.

537. **Rhododendron campylocarpum** Hook. f.
Zemu, 11,500-15,000 ft., Nos. 1235, 1431, 1677. Common.

538. **Rhododendron Thomsoni** Hook. f.
Zemu, 9-10,000 ft., No. 1043.

539. **Rhododendron barbatum** Wall.
Above Lachen.

540. **Rhododendron ciliatum** Hook. f.
Zemu, 9,000 ft., No. 2778.

541. **Rhododendron camelliæflorum** Hook. f.
Zemu and Lachung, 9-10,000 ft., Nos. 2591, 2779.

542. **Rhododendron pumilum** Hook. f.
Yumchho La and Upper Zemu, 14-15,000 ft., Nos. 1309, 1598. This Rhododendron is very sparingly distributed in Sikkim and has been recorded only two or three times since Hooker's explorations. It occurs here and there on the south side of the Zemu valley on open rocky slopes where the more prevalent species begin to thin off.

543. **Rhododendron lepidotum** Wall.
Very common and along with *R. Anthopogon* forming the highest belt of Rhododendrons at 14-16,000 ft.

544. **Rhododendron Anthopogon** D. Don.
Very common.

545. **Rhododendron Maddeni** Hook. f.
Tong, 5,000 ft., No. 881.

546. **Rhododendron cinnabarinum** Hook. f.
Zemu and Lachung, 10-12,000 ft., Nos. 1177, 1633, 2619.

547. **Rhododendron** sp. in fruit.
near **R. Dalhousiæ** Hook. f. Doubtful; Zemu, 11,400 ft., No. 1097.

196. Pyrola Linn.

548. **Pyrola rotundifolia** Linn.
var. **asarifolia.**
Lachen, 8-9,000 ft., No. 966.

XLVI.—MONOTROPACEÆ.

197. Monotropa Linn.

549. **Monotropa uniflora** Linn.
Lachen and Zemu, 8-9,000 ft., No. 2759.

XLVII.—DIAPENSIACEÆ.

198. Diapensia Linn.

550. Diapensia himalaica H. f. & T.

Zemu and Yumchho La., 14-16,500 ft., Nos. 1276, 1361, 1540. Extends sparingly along the slopes above the Zemu glacier.

XLVIII.—PRIMULACEÆ.

199. Primula Linn.

551. Primula reticulata Wall.

Zemu Valley, 12-15,000 ft., Nos. 1128, 1429, 1502.

552. Primula denticulata Wall.

Lachen and Lower Llonakh, 8-11,000 ft.

553. Primula atrodentata W. W. Smith, sp. nov.

P. Schlagintweitianæ Pax, affinis sed bracteis lineari-lanceolatis longe-acuminatis, floribus minoribus diversa.

Minor, gracilis, efarinosa, pubescens. *Rhizoma* esquamosum, vetustis foliis nigris flaccidis indutum. *Folia* cum floribus nascentia, ad 2 cm. longa, 1 cm. lata, angusto-spathulata, obtusa, in petiolum brevissimum contracta, argute denticulata, minutissime puberula. *Scapus* folia longe superans, 6-8 cm. altus, capitulum densum gerens; *bracteæ* 5 mm. longæ, lineari-lanceolatæ, longe-acuminatæ, non-gibbosæ, nigricantes; pedicelli fere nulli. *Flores* erecti. *Calycis* 4-5 mm. longi tubus breviter campanulatus, ad medium fissus; lobi lineari-lanceolati, acuminati, nigrescentes. *Corollæ* lilacinæ tubus calycem duplo superans, gracilis; lobi obcordati emarginati.

Zemu and Llonakh, 14,500-16,000 ft., Nos. 1478, 1812, 2007. Perhaps the East Himalayan form of *P. Schlagintweitiana* Pax. It matches a somewhat incomplete specimen in Herb. Kew, collected by Hooker in Lachen, 13,000 ft., not named.

554. Primula capitata Hook.

Throughout the Zemu and Llonakh valleys, 12-15,000 ft., Nos. 1088, 1355, 1625, 2059. Frequent and variable.

555. Primula bellidifolia King.

Zemu, Llonakh, 13-14,500 ft., Nos. 1624, 2058. Rare.

556. Primula concinna Watt.

Zemu, Llonakh, 15-16,000 ft., Nos. 1263, 1718, 2022.

557. Primula glabra Klatt.

Yumchho La, 15,000 ft., No. 1315.

558. Primula involucrata Wall.

Zemu, Llonakh, 13-14,000 ft., Nos. 1609, 2079.

559. Primula tibetica Watt.

Llonakh, 14-15,000 ft., Nos. 1851, 2087.

560. Primula Caveana W. W. Smith, sp. nov.

Species ad sectionem *Callianthorum* Pax, pertinens, *Primulæ hazaricae* et *P. Jaffreyanæ* affinis; longis petiolis, pedicellis glandulosis, calyce farinoso fere ad imum fisso distincta.

Minute pubescens. *Rhizoma* permultis vetustis foliis persistentibus indutum. *Folia viridia* 4-8, obovata vel suborbicularia, obtusa, denticulata, membranacea, subtus albo-farinosa; lamina ad 4 cm. longa, ad 1·5 cm. lata, sensim attenuata in petiolum alatum 3-6 cm. longum basi late vaginantem. *Scapus* folia paullo tantum excedens, 5-8 cm. altus, 2-4 flores gerens. *Bracteæ* lineares 7-8 mm. glanduloso-pubescentes; pedicelli 1-1·5 cm. longi, graciles. *Calycis* 5-8 mm. longi tubus anguste campanulatus, ultra medium fissus; lobi lineari-lanceolati, acuti, pubescentes, dense farinosi. *Corollæ* pallide purpureæ tubus calycem 2-3-plo superans, 1·5-1·8 cm. diametiens; lobi obcordati, integri vel breviter erosi. *Capsula* calyce inclusa, globosa.

Among rocks and boulders in the upper Llonakh valley, Sikkim, 15,000 ft., Nos. 1810, 2111. Very near *Primula Jaffreyana* King, which however is glabrous, much less farinose and with calyx distinctly ribbed. The previous season's leaves and fruits are remarkably persistent, probably protected by the snow which lasts for nearly nine months in this region.

561. Primula obtusifolia Royle.

Yumchho La, Zemu, 12-16,500 ft., Nos. 1236, 1345, 1554, 1555, 1587. Frequent.

562. Primula elongata Watt.

Zemu, 14-15,000 ft., Nos. 1430, 1519, 1531, 1532.

563. Primula nivalis Pall.

var. **macrophylla.**

Upper valleys of Llonakh, 15-16,000 ft., Nos. 2160, 2195, 2196, 2338.

var. **macrocarpa.**

Thango, 14,000 ft., No. 2494.

564. Primula sikkimensis Hook. f.

Zemu and Llonakh, 11-15,000 ft., Nos. 1094, 1289, 1389, 1614. Frequent.

567. **Primula Dickieana** Watt.

South of Yumchho La, 13-14,000 ft., Nos. 1305, 1311, 1604, 1610. Common in this locality, not seen elsewhere.

var. **Pantlingii** (King sp.)

With the type and not separable except by number of flowers in the umbel.

568. **Primula pusilla** Wall.

Zemu and Llonakh, 12-16,000 ft., Nos. 1257, 1302, 1423. Frequent.

569. **Primula sapphirina** H. f. & T.

Zemu and Llonakh, 14-16,000 ft., Nos. 1294, 1314, 1418, 2275.

570. **Primula uniflora** Klatt.

North and South sides of Yumchho La, 14-15,000 ft., Nos. 1297, 1313, 1446, 1599.

571. **Primula petiolaris** Wall.

Zemu, 13,000 ft., No. 1682.

572. **Primula flagellaris** W. W. Smith, sp. nov.

Ab omnibus *Primulis* adhuc cognitis facile distincta prælongis nudis stolonibus. Ad sectionem *Minutissimarum* Pax spectat; *Tenellarum* sectioni tamen propinqua.

Parva, stolonifera; stolones ad 10 cm. longi, flagelliformes, omnino nudi, *Saxifragæ flagellaris* more; in omnibus speciebus *Minutissimarum* stolones abbreviati foliosi sunt, ut cl. Pax monstrat (Monogr. Primulacearum, Das Pflanzenreich, p. 95). *Folia* parva, 1-2 cm. longa, 4-8 mm. lata, sensim in brevem petiolum 2-6 mm. contracta, lanceolata vel obovata, subacuta vel apice subrotundata, basi cuneata, subtus albo-farinosa, pro magnitudine grosse argute dentata. *Scapus* brevis ad 6 mm. longus, gracilis, inter folia fere occultus, uniflorus; bractea linearis 1 mm. longa, infra calycem 2-3 mm. inserta. *Calycis* 3 mm. longi tubus campanulatus, puberulus, fere ad imum fissus; lobi linearioblongi, obtusi. *Corollæ* purpureæ tubus calycem multo superans, gracilis, 8-9 mm. longus; limbus 1 cm. diametiens; lobi obcordati, emarginati. *Capsula* ovoidea calycem aequans; semina non visa.

At 12,000 ft., on hill near mouth of Zemu Valley, in the direction of Lachen, No. 2631. Very sparingly. A very distinct plant with long runners terminating in small plants after the fashion of *Androsace geraniifolia* and the flagellate Saxifrages.

573. **Primula Hookeri** Watt.

Yumchho La, 14-15,000 ft.

574. **Primula** sp. aff. **Hookeri.**

Yumchho La, 15,000 ft., No. 1528.

The calyx-lobes are denticulate but the plant agrees very closely with P. Hookeri and is probably not distinct.

575. **Primula muscoides** Hook. f.

Zemu and Llonakh, 14-16,000 ft., Nos. 1316, 1508, 1522, 2260, 2512.

576. **Primula tenuiloba** (Hook. f.) Pax.

Folia breviter petiolata. *Flores* ad 4 mm. pedicellati. *Corollæ* tubus extus molliter hirsutus.

This does not quite agree with the type of *Primula tenuiloba* at Kew but is too near to be considered distinct. Yumchho La, Nachegoh, and Nangma La, 15,500-16,500 ft., Nos. 1317, 1509, 1717, 2272. Near the summit of bleak passes, very plentiful at Nangma La. Not a common plant in Sikkim but of wide distribution, occurring in much the same habitats as *Primula muscoides*.

200. Androsace. Linn.

577. **Androsace geraniifolia** Watt.

Lachen, 8-9,000 ft., No. 979.

578. **Androsace strigillosa** Franch.

Thango, 13-14,000 ft., Nos. 2375, 2491, 2555.

579. **Androsace Hookeriana** Klatt.

Yumchho La, Zemu, Thango, 13-16,000 ft., Nos. 1334, 1484, 1698, 2487, 2511.

580. **Androsace Chamæjasme** Host.

var. **coronata** Hook. f..

Upper valleys of Llonakh, 15-16,500 ft, Nos. 2198, 2310. Not previously found in the Eastern Himalayas.

581. **Androsace Selago** H. f. & T.

Zemu, Llonakh, 14,500-17,000 ft., Nos. 1487, 1805. Frequent.

582. **Androsace Poissonii** Kunth.

Upper Valleys of Llonakh, 15,500-16,000 ft., Nos. 1966, 2204.

583. **Androsace Lehmannii** Duby.

Zemu Valley, 12-16,000 ft., Nos. 1335, 1567, 1622.

201. Bryocarpum. H. f. & T.

584. **Bryocarpum himalaicum** H. f. & T.

Lachen and Zemu, 8-10,000 ft., No. 1063.

202. Lysimachia Linn.

585. **Lysimachia chenopodioides** Watt.
Lachung, 8-9,000 ft., No. 2789. Not previously found in Sikkim.

586. **Lysimachia alternifolia** Wall.
Tong, 5,000 ft., No. 867.

587. **Lysimachia japonica** Thunb.
Tong, Lachen, 4-8,000 ft., Nos. 860, 2630.

203. Glaux Tournef.

588. **Glaux maritima** Linn.
Llonakh, 14,500 ft., No. 1919. New to the East Himalaya.

XLIX.—MYRSINACEÆ.

204. Mæsa Forsk.

589. **Mæsa rugosa** Clarke.
Cheungtong, 5-6,000 ft., No. 894.

205. Ardisia Swartz.

590. **Ardisia humilis** Vahl.
Namchi, 4,000 ft., No. 841.

L.—OLEACEÆ.

206. Jasminum Linn.

591. **Jasminum humile** Linn.
Lachen, 8,000 ft, No. 2790.

LI.—ASCLEPIADACEÆ.

207. Cynanchum Linn.

592. **Cynanchum Vincetoxicum** Pers.
Zemu Valley, Lachen and Lachung, 7-10,000 ft., Nos. 2589, 2732, 2744.

593. **Cynanchum auriculatum** Royle.
Zemu Valley, 9,000 ft., No. 2740.

208. Tylophora Br

594. **Tylophora tenerrim** Wight.
Tong, 5,000 ft., No. 889.

209. Hoya Br.

595. **Hoya Edeni** King.
Tong, 5,000 ft., No. 891.

596. **Hoya longifolia** Wall.
Namchi, 4,000 ft., No. 846.

210. Ceropegia Linn.

597. **Ceropegia pubescens** Wall.
Cheungtong, 6,000 ft., No. 923.

598. **Ceropegia Hookeri** Clarke.
Zemu, 9,000 ft., No. 2822.

599. **Ceropegia macrantha** Wight.
Tong, 5,000 ft., No. 868.

LII.—LOGANIACEÆ.

211. Buddleia Linn.

600. **Buddleia Colvillei** Hook. f.
Zemu and Lachen, 9,000 ft., No. 2739.

601. **Buddleia macrostachya** Benth.
Lachen, 8-9,000 ft.

LIII.—GENTIANACEÆ.

212. Crawfurdia Wall.

602. **Crawfurdia affinis** Wall.
Lachen, 7,000 ft., No. 944.

213. Gentiana Linn.

603. **Gentiana Thomsoni** Clarke.
Llonakh, 16,000 ft., No. 2234.

604. **Gentiana tenella** Fries.
var. **sikkimensis** Clarke.
Yumchho La, Zemu, Llonakh, and Thango, 13-16,000 ft., Nos. 1450, 1543, 1588, 1669, 1796, 2484. Frequent.

605. **Gentiana** sp. aff. **G. tenella** Fries.
Llonakh, No. 2760, Ribu.

606. **Gentiana bryoides** Burkill.
Zemu, 11-12,000 ft., No. 1096.

607. **Gentiana crassuloides** Bur. & Franch.

Zemu, Llonakh, and Thango, 13-15,000 ft., Nos. 1286, 1591, 2401, 2723.

608. **Gentiana infelix** Clarke.

Yumchho La, Zemu, Llonakh, 14-15,000 ft., Nos. 1274, 1288, 1525, 2275.

609. **Gentiana micans** Clarke.

Naku La, Llonakh, 15,000 ft., No. 2745 Ribu.

610. **Gentiana Elwesii** Clarke.

Llonakh, and Nangma La, 14-15,000 ft., Nos. 1792, 2277.

611. **Gentiana amœna** Clarke.

Thé La, Naku La, Llonakh 15-17,000 ft., Nos. 1928, 2174, 2308, 2323.

612. **Gentiana phyllocalyx** Clarke.

Yumchho La, Zemu, Thango, 13-16,000 ft., Nos. 1129, 1271, 1349, 1565, 2503. Abundant in the Upper Zemu.

613. **Gentiana tubiflora** Wall.

Zemu and Llonakh, 15-16,000 ft., Nos. 1728, 1978, 2171, 2271.

614. **Gentiana ornata** Wall.

Llonakh, 15-16,000 ft., No. 2307.

var. **meiantha** Clarke ?

Giagong, 15,000 ft., No. 2463.

615. **Gentiana nubigena** Edgew.

Jongsong La Valley, Llonakh, 16,500 ft., No. 2319.

616. **Gentiana robusta** King.

Llonakh, Thango, 14-16,000 ft., Nos. 2135, 2856 Ribu.

617. **Gentiana detonsa** Fries.

var. **Stracheyi** Clarke.

Zemu, Llonakh, Thango, 13-14,000 ft., Nos. 1697, 2064, 2569.

214. **Parajæschkea** Burkill. Genus novum.

Herba annua diffusa. *Sepala* libera. *Corollæ* tubus infundibuliformis; lobi lati, conspicue contorti. *Staminum* filamenta perbrevia, inter corollæ lobos inserta; pollen sphæroideo-tetrahedroideum. *Stylus* brevis: placentæ inconspicuæ: semina (matura non visa) læviora.

Genus novum ex affinitate *Gentianæ*: differt staminum insertione. Cum *Jæschkea* habitu corollaeque lobis non quadrat; cum *Latouchea* calyci ovarioque non quadrat.

618. **Parajæschkea Smithii** Burkill, sp. nov.

Planta annua, omnino glabra. *Radix* singula. *Caules* plures, diffusi, quadrangulares ad 6 cm. alti, sat foliosi. *Folia* oblan-

ceolato-ovata vel obovata, sessilia, vix subamplexicaulia, crassiuscula, ad 6 mm. longa, ad 3-5 mm. lata, apice obtusissima vel rotundata, marginibus in angulas caulinas decurrentibus. *Flores* in apicibus internodiorum ad 7 mm. longorum producti, pallide cœrulei. *Sepala* 5, libera, exteriora obovato-oblanceolata obtusiuscula, interiora duo oblanceolata acutiuscula, 6 mm. longa, 2-2·5 mm. lata, trinervia. *Corollæ* tubus ad 4 mm. longus, basi decem glandulis notatus, filamentorum cruribus adnatis percursus, lobi 5; contorti, cuspidato-rotundati, margine minutissime serrulato et enim apicem versus aliquomodo undulato, 2 mm. longi. *Stamina* 5, filamentorum partes liberæ vix 1 mm. longæ; antheræ dorsifixæ: pollen sphæroideo-tetrahedroideum. *Ovarium* elongatum, ad 6 mm. longum: stylus 1 mm. longus: placentæ inconspicuissimæ. *Semina* ovoidea, læviora.

Llonakh, 15,000 ft., No. 2133.

215. Pleurogyne Eschsch.

619. Pleurogyne sikkimensis Burkill.
Naku La, Llonakh, 15-16,000 ft., No. 2774 Ribu.

620. Pleurogyne lloydioides Burkill.
Thango, 14,000 ft., No. 2482.

620b. Pleurogyne aff. **P. Thomsoni** Clarke.
Naku La, 15,000 ft., No. 2763 Ribu.

216. Swertia Linn.

621. Swertia dilatata Clarke.
Cheungtong, 6,000 ft., No. 2610.

622. Swertia Hookeri Clarke.
Zemu Valley, 11-14,000 ft., Nos. 1220, 1623.

623. Swertia cuneata Wall.
Below Giagong, 14,000 ft., No. 2879 Ribu.

624. Swertia multicaulis Don.
Zemu, Llonakh, and Thango, 14-17,000 ft., Nos. 1310, 1425, 2725. Frequent.

217. Halenia Borckh.

625. Halenia elliptica Don.
Lachen and Zemu, 7-10,000 ft., Nos. 2406, 2722. Common.

LIV.—BORAGINACEÆ.

218. Cynoglossum Linn.

626. Cynoglossum furcatum Wall.
Tista Valley up to Lachen, 3-8,000ft., No. 808.

627. **Cynoglossum denticulatum** DC.
Lachen, Zemu, 8-12,000 ft., Nos. 1001, 1093, 1154.

219. Paracaryum Boiss.

628. **Paracaryum glochidiatum** Benth.
Zemu, 8-12,000 ft., Nos. 1022, 1388, 1650. Very common.

220. Eritrichium Schrader.

629. **Eritrichium spathulatum** Clarke. var. ?
Llonakh, 14,800 ft., No. 2147. The Llonakh plant is not quite the typical form found to the north (Khambajong in Tibet) and to the East (Thango in Sikkim). It is a compact little form, with usually only 1-3 flowers in the inflorescence which scarcely, if at all, exceeds the rosette of leaves.

630. **Eritrichium ? acaule** W. W. Smith sp. nov.
Habitu et nuculis facile ab omnibus himalaicis Eritrichiis distinctum; non sine dubio huic generi relatum.

Nanum, perenne, pilis brevibus patulis hirsutum, fere acaule; vel interdum *caules* plures decumbentes ad 2 cm. longi. *Folia radicalia* 7-10 mm. longa, elliptica vel spathulata, in petiolum (5-10 mm.) attenuata; *caulina* rara minora. *Flores* vel solitarii scapi more longe-pedunculati vel 2-4 in apice ramorum racemo contracto, fere sessiles, aggregati. *Calycis* 5-partiti sepala 1-1·5 mm. longa, corollæ tubum æquantia, lanceolata acuta vel subobtusa, sparse albo-hirsuta. *Corollæ* lobi rotundati. *Stamina* 5, tubo medio affixa, filamentis brevibus. *Nuculæ* 4, ovoideæ, glabræ, margine glochidiato dentato subcyathiferæ.

Naku La, Llonakh, Sikkim, 17,500 ft., No. 2811, in Kew and in Calcutta Herbaria.

631. **Eritrichium pustulosum** Clarke.
Zemu Valley, Naku La, Llonakh, Giagong, 13-17,000 ft., Nos. 1237, 1955, 2052, 2440. Not uncommon.

632. **Eritrichium pygmæum** Clarke.
Llonakh, Thango, 14-15,000 ft., Nos. 1837, 2394. Rare.

633. **Eritrichium Munroi** Clarke.
Zemu, Llonakh, 11-15,000 ft., Nos. 1219, 1395, 1486, 1572, 2046, 2066. Frequent.

var.
Llonakh, 14-16,000 ft., Nos. 1813, 1829, 2240. More erect and with longer inflorescence than the type.

var.
Thango, 13,000 ft. Fruits minutely pubescent.

634. Eritrichium tibeticum Clarke.
Zemu, Llonakh, 11-15,000 ft., Nos. 1158, 1354, 1686, 1708.
var. **minor.**
Naku La, Llonakh, 15,500-17,000 ft., Nos. 1876, 1938.

221. Microula Benth.

635. Microula Benthami Clarke.
Naku La, Llonakh, Giagong, 16-17,000 ft., Nos. 1949, 2395. A Tibetan plant which crosses over into Sikkim near the frontier. We have no previous specimen from Sikkim.
636. Microula sikkimensis (Clarke) Hemsl.
Thango, 13-14,000 ft., Nos. 2376, 2379.

222. Trigonotis Stev.

637. Trigonotis microcarpa Benth.
Cheungtong, 6,000 ft., No. 593.
638. Trigonotis rotundifolia Benth.
Llonakh, 14,500 ft., No. 1811.
639. Trigonotis sp. near **rotundifolia** Benth.
Perhaps only a variety of the above; forms a compact rosette nearly 10 cm. in diameter; the inflorescences very short and with smaller flowers than the type. Goraphu Chu, Llonakh, 15,700 ft., No. 2220.
640. Trigonotis multicaulis Benth.
Yumchho La, Zemu, Llonakh, 12-14,500 ft., Nos. 1181, 1607, 1921. Not quite the type; but both *T. rotundifolia* and this species seem to be variable: further material in good fruit is necessary for the limitation of the Himalayan species of this genus.
641. Trigonotis ovalifolia Benth.
Tista Valley, Lachen to Thango, 8-13,500 ft.

223. Myosotis Linn.

642. Myosotis Hookeri Clarke.
Rongsa, Naku La, Llonakh, 15-17,000 ft., Nos. 2035, 2806. Sparingly near the snow.

224. Onosma Linn.

643. Onosma Hookeri Clarke.
Llonakh, 15-16,000 ft., Nos. 1864, 2110.
644. Onosma bicolor Wall.
Lachen, Zemu, 8-9,000 ft., Nos. 952, 2802.

LV.—CONVOLVULACEÆ.

225. Porana Burm.

645. **Porana racemosa** Roxb.
Cheungtong, 6,000 ft., No. 2573.

226. Cuscuta Linn.

646. **Cuscuta reflexa** Roxb.
Lachen, 8,000 ft., No. 3054 Ribu.

647. **Cuscuta europæa** Linn.
Lachen and Zemu, 8-9,000 ft., No. 2760.

LVI.—SOLANACEÆ.

227. Solanum Linn.

648. **Solanum crassipetalum** Wall.
Tista Valley, 3-4,000 ft., No. 812.

LVII.—SCROPHULARIACEÆ.

228. Scrophularia Linn.

649. **Scrophularia pauciflora** Benth.
Zemu Valley, 12-13,000 ft., No. 1145.

650. **Scrophularia elatior** Benth.
Zemu Valley, 10,000 ft., No. 2679.

229. Mazus Lour.

651. **Mazus surculosus** Don.
Cheungtong and Lachen, 6-8,000 ft., Nos. 920, 961.

230. Lancea Hook. f. & T.

652. **Lancea tibetica** H. f. & T.
Llonakh, Giagong, 14,500-15,000 ft., Nos. 1857, 2209.

231. Lindenbergia Lehm.

653. **Lindenbergia urticæfolia** Lehm.
Cheungtong, 6,000 ft., No. 898.

232. Vandellia Linn.

654. **Vandellia nummulariæfolia** Don.
Tista Valley, 4-5,000 ft., No. 847.

233. Hemiphragma Wall.

655. Hemiphragma heterophyllum Wall.
Lachen and Lachung, 8-9,000 ft., Nos. 2615, 2998 Ribu.

234. Picrorhiza Royle.

656. Picrorhiza Kurrooa Benth.
Zemu, Llonakh, 13-16,000 ft., Nos. 1343, 1965, 2251. Frequent.

235. Veronica Linn.

657. Veronica himalensis Don.
Zemu Valley, 11-12,000 ft., Nos. 1107, 1214.

658. Veronica ciliata Fisch.
Zemu, Llonakh, Thango, 13-16,000 ft., Nos. 1629, 1828, 2062, 2148, 2292. Frequent.

659. Veronica lanuginosa Benth.
Zemu, Llonakh, 15-16,000 ft., Nos. 1476, 2023.

660. Veronica cana Wall.
Zemu Valley, 10-12,000 ft., Nos. 1109, 1161.

661. Veronica capitata Benth.
Zemu Valley, 14,000 ft., No. 1352.

236. Euphrasia Linn.

662. Euphrasia officinalis Linn.
Zemu, Llonakh, 12-15,700 ft., Nos. 1589, 2218, 2678. Frequent

237. Pedicularis Linn.

663. Pedicularis rhinanthoides Schrenk.
Naku Chu, Llonakh, 17,000 ft., No. 1945. New to Sikkim.

664. Pedicularis longifolia Rudolph.
Tumrachen Chu, Llonakh, Thango, 13-16,000 ft., Nos. 1695, 1908, 2090, 2246. A very conspicuous and common plant in the Llonakh marshes and plentiful also by the wayside below Thango. Usually a bright yellow.

665. Pedicularis siphonantha Don.
Zemu, Thango, 11-16,000 ft., Nos. 1127, 1156, 1260, 1546. Frequent.

666. Pedicularis megalantha Don.
Zemu Valley, 8,500 ft., No. 1003.

667. Pedicularis bella Hook. f.
Llonakh, 14-16,000 ft., Nos. 1988, 2078, 2121, 2360. Frequent.

668. **Pedicularis nepalensis** Prain.
Thé La, Naku Chu, Llonakh, 16-16,500 ft., Nos. 1971, 2179.

669. **Pedicularis Elwesii** Hook. f.
Zemu, Llonakh, Thango, 12-16,500 ft., Nos. 1212, 1566, 1787, 1969, 2340. Frequent.

670. **Pedicularis integrifolia** Hook. f.
Llonakh, 14,500 ft., Nos. 1862, 1915.

671. **Pedicularis instar** Prain.
Llonakh, 14,000 ft., No. 1780.
var. **paradoxa.**
Llonakh, 14,000 ft., No. 2077.

672. **Pedicularis gracilis** Wall.
Zemu Valley, 11-13,000 ft., Nos. 1455, 2683.

673. **Pedicularis porrecta** Wall.
Zemu Valley, 11,000 ft., No. 1171.

674. **Pedicularis confertiflora** Prain.
Naku Chu, Llonakh, Thango, 13-16,000 ft., Nos. 1893, 1993, 2354, 2550.

675. **Pedicularis flexuosa** Hook. f.
Zemu and Llonakh, 12-15,000 ft., Nos. 1370, 1724, 2685.
var.
Zemu Valley, 11,800 ft., No. 1213.

676. **Pedicularis furfuracea** Wall.
Lachen, Zemu, 8-10,000 ft., Nos. 1064, 2681.

677. **Pedicularis Pantlingii** Prain.
Lachen, Zemu, 9,500-11,000 ft., Nos. 971, 1000, 1656, 2680.

678. **Pedicularis microcalyx** Hook. f.
Llonakh, 14,000 ft., No. 2682.

679. **Pedicularis carnosa** Wall.
Lachen, Lachung, 9-10,000 ft., Nos. 2422, 2579.

680. **Pedicularis** sp. near **odontophora** Prain.
Zemu Valley, 10,800 ft., No. 1734. If found to be distinct from *P. odontophora* Prain, M. Bonati proposes to describe this species under the name of *P. Smithiana* Bonati.

681. **Pedicularis** sp. near **albiflora** Prain.
Thango, 14,000 ft., No. 2504. M. Bonati believes this to be distinct from *P. albiflora.*

682. **Pedicularis Wallichii** Bunge.
Zemu, Llonakh, 14-15,000 ft., Nos. 1259, 1435, 2002.

683. Pedicularis excelsa Hook. f.
Zemu, Llonakh, 9-11,000 ft., Nos. 1738, 2401.

684. Pedicularis lachnoglossa Hook. f.
Llonakh, 15,500 ft., No. 1863.

685. Pedicularis trichoglossa Hook. f.
Zemu, Llonakh, Thango, 12-16,000 ft., Nos. 1267, 1762, 1872, 1967, 2557. Frequent.

686. Pedicularis Clarkei Hook. f.
Zemu Valley 14,000 ft., No. 1253.

687. Pedicularis schizorhyncha Prain.
Thango, 14,000 ft., No. 2504 in part.

688. Pedicularis alaschanica Maxim.
Naku Chu, Llonakh, 15-16,000 ft., Nos. 1979, 2134. New to Sikhim.

689. Pedicularis Roylei Maxim.
Llonakh, 15-16,000 ft., Nos. 2034, 2259.

690. Pedicularis diffusa Prain.
Zemu Valley, 10-11,000 ft., Nos. 1147, 1178.

691. Pedicularis denudata Hook. f.
Zemu Valley, 13,000 ft., Nos. 1457, 1526.

692. Pedicularis mollis Wall.
Zemu Valley, 10-12,000 ft., Nos. 1641, 2684.

693. Pedicularis Oederi Vahl.
Nachegoh, Naku La, Thé La, Llonakh, 15-17,500 ft., Nos. 1714, 1901, 1948, 2172, 2306. New to Sikkim.

238. Oreosolen Hook. f.

694. Oreosolen Wattii Hook. f.
Upper Llonakh Valleys, 15-17,000 ft. Nos. 1941, 2214.

LVIII.—OROBANCHACEÆ.

239. Boschniackia C. A. Mey.

695. Boschniackia himalaica H. f. & T.
Zemu Valley, 11-14,000 ft., Nos. 1139, 1380.

LIX.—LENTIBULARIACEÆ.

240. Utricularia Linn.

696. Utricularia Wallichiana Wight.
var. **firmula**.
Lachen, 8-9,000 ft., No. 2413.

697. **Utricularia brachiata** Oliver.
Zemu Valley, 10-11,000 ft., No. 1733.

698. **Utricularia multicaulis** Oliver.
Thango, 13-14,000 ft., No. 2391.

241. Pinguicula Linn.

699. **Pinguicula alpina** Linn.
Llonakh, 16,000 ft., No. 1973.

LX.—GESNERACEÆ.

242. Lysionotus D. Don.

700. **Lysionotus serrata** D. Don.
Lachen, 7,000 ft., No. 2827.

243. Didymocarpus Wall.

701. **Didymocarpus Andersoni** Clarke.
Tista Valley, 4-5,000 ft., No. 833.

702. **Didymocarpus aurantiaca** Clarke.
Tista Valley, 3,000 ft., No. 804.

703. **Didymocarpus oblonga** Wall.
Lachen, 7,000 ft., Nos. 914, 927.

704. **Didymocarpus subalternans** Wall.
var. **curvicapsa**.
Cheungtong 6,000 ft., No. 899.

705. **Didymocarpus leucocalyx** Clarke.
Namchi, 4,000 ft., No. 844.

706. **Didymocarpus pulchra** Clarke.
Tista Valley, 3-4,000 ft., No. 814.

244. Didissandra Clarke.

707. **Didissandra lanuginosa** Clarke.
Tista Valley, Tong, Lachen, 4-7,000 ft., Nos. 822, 874.

245. Chirita Ham.

708. **Chirita Clarkei** Hook. f.
Lachen, 7,000 ft., No. 928.

LXI.—ACANTHACEÆ.

246. Strobilanthes Blume.

709. **Strobilanthes Wallichii** Nees.
Zemu Valley, 9-10,000 ft., No. 1032.

LXII.—SELAGINACEÆ.

247. Lagotis Gærtn.

710. Lagotis glauca Gærtn.
Llonakh, 14-15,000 ft., No. 1798.

711. Lagotis crassifolia Prain.
Zemu, Llonakh, 14-17,000 ft., Nos. 1615, 2358.

LXIII.—VERBENACEÆ.

248. Vitex Linn.

712. Vitex heterophylla Roxb.
Tista Valley, 3,000 ft., No. 801.

LXIV.—LABIATÆ.

249. Plectranthus L'Herit.

713. Plectranthus scrophularoides Wall.
Lachen, 8-9,000 ft., No. 2435.

250. Elsholtzia Willd.

714. Elsholtzia polystachya Benth.
Lachung, 8-9,000 ft., No. 2586.

715. Elsholtzia densa Benth.
Llonakh, Giagong, 15,000 ft., Nos. 2743 Ribu, 2890 Ribu.

716. Elsholtzia eriostachya Benth.
var. **typica**.
Lachen and Thango, 10-14,000 ft. Nos. 2374, 2927 Ribu.
var. **pusilla**.
Llonakh, 14,500 ft., Nos. 1825, 2096, 2226. Frequent.

717. Elsholtzia strobilifera Benth.
Lachen, Thango, 8-13,000 ft. Frequent.

251. Calamintha Mœnch.

718. Calamintha umbrosa Benth.
Cheungtong, Lachen, Zemu, 7-10,000 ft., Nos. 922, 2768. Frequent.

252. Melissa Linn.

719. Melissa parviflora Benth.
Tong, Cheungtong, Lachen, 5-9,000 ft., Nos. 865, 2423, 2831.

253. Salvia Linn.

720. **Salvia glutinosa** Linn.
Zemu Valley, 12,000 ft., No. 2770.

721. **Salvia campanulata** Wall.
Zemu Valley, 9-13,000 ft., Nos. 1048, 1195. Frequent.

254. Nepeta Linn.

722. **Nepeta Thomsoni** Benth.
Thango, 14,000 ft., No. 2382. Rare. A Tibetan plant.

723. **Nepeta lamiopsis** Benth.
Zemu, lower Llonakh, 10-13,000 ft., Nos. 1035, 1185, 1456, 1700. Frequent.

724. **Nepeta discolor** Benth.
Naku La, Llonakh, 16,000 ft., No. 1987.

255. Dracocephalum Linn.

725. **Dracocephalum speciosum** Benth.
Zemu, Llonakh, 13-14,500 ft., Nos. 1690, 1800.

726. **Dracocephalum heterophyllum** Benth.
Giagong, 16,000 ft., No. 2441. A Tibetan plant, occurring sparingly in Sikkim, a few miles from the frontier.

256. Brunella Linn.

727. **Brunella vulgaris** Linn.
Tong, Lachen, 5-8,000 ft., No. 848.

257. Stachys Linn.

728. **Stachys melissæfolia** Benth.
Lachen, Zemu, 8-10,000 ft., Nos. 2421, 2766, 2767.

258. Galeopsis Linn.

729. **Galeopsis Tetrahit** Linn.
Lachen, Thango, 10-13,000 ft. A weed near the villages.

259. Phlomis Linn.

730. **Phlomis macrophylla** Wall.
Zemu, Thango, 9,500-13,000 ft., Nos. 1030, 1662, 1731, 2544, 2717. Frequent.

731. **Phlomis rotata** Benth.
Llonakh, Thango, 14-17,000 ft., Nos. 2309, 2380.

260. Eriophyton Benth.

732. Eriophyton Wallichianum Benth.
Zemu, Llonakh, Thango, 14-16,000 ft., Nos. 1474, 2080, 2113, 2543. Frequent.

261. Gomphostemma Wall.

733. Gomphostemma ovatum Wall.
Tista Valley, 3,000 ft., No. 827.

262. Teucrium Linn.

734. Teucrium palmatum Benth.
Zemu Valley, 9,000 ft., No. 2769.

LXV.—PLANTAGINACEÆ.

263. Plantago Linn.

735. Plantago major Linn.
var. **asiatica.**
Tong to Lachen, 5-8,000 ft., No. 857.

736. Plantago tibetica H. f. & T.
Thango, 14,000 ft., No. 2925 Ribu. Not previously found in Sikkim.

LXVI.—ILLECEBRACEÆ.

264. *Genus?*

737. No. 2094, Llonakh, 14,500 ft., appears to belong to this order, but so far I have failed to match it.

LXVII.—AMARANTACEÆ.

265. Amarantus Linn.

738. Amarantus paniculatus Linn.
Cultivated at Lachung, 9,000 ft., No. 2584.

266. Stilbanthus Hook. f.

739. Stilbanthus scandens Hook. f.
Namchi, 4,000 ft., No. 845.

LXVIII.—CHENOPODIACEÆ.

267. Chenopodium Linn.

740. Chenopodium album Linn.
Lachen in fields, 8-9,000 ft.

741. **Chenopodium Botrys** Linn.
Llonakh, 14-15,000 ft., No. 1997. A very dwarf form.

268. Microgynæcium Hook. f.

742. **Microgynæcium tibeticum** Hook. f.
Naku La, Llonakh, Thango, Giagong, 14-16,000 ft., Nos. 1992, 2726 Ribu, 2881 Ribu. Eaten by the Tibetan herdsmen who give it the name of 'Boktu.'

269. *Genus* ?

743. **Chenopodiaceæ** ?
No. 2812. Llonakh, 15,000 ft. Not yet determined.

LXIX.—PHYTOLACCACEÆ.

270. Phytolacca.

744. **Phytolacca acinosa** Roxb.
Cheungtong, 6-7,000 ft., No. 2611.

LXX—POLYGONACEÆ.

271. Polygonum Linn.

745. **Polygonum islandicum** Hook. f.
Llonakh, No. 207 Younghusband.

746. **Polygonum delicatulum** Meisn.
Lachen, Zemu, Llonakh 9-16,000 ft., Nos. 1411, 1593, 1699, 1877, 2416 Frequent.

747. **Polygonum filicaule** Wall.
Zemu Valley, 9-13,000 ft., Nos. 1034, 1410.

748. **Polygonum viviparum** Linn.
Zemu, Llonakh, Thango, 14-16,000 ft., No. 1790.

749. **Polygonum sphærostachyum** Meissn.
Zemu, Llonakh, 12-16,000 ft., Nos. 1547, 1766, 1913, 2255.

750. **Polygonum perpusillum** Hook. f.
Zemu, Llonakh, Thango, 14-16,000 ft., Nos. 1291, 1417, 1444, 1510, 2505. Frequent.

751. **Polygonum affine** Don.
Nangma La, Llonakh, 15,000 ft., No. 2809 Ribu.

752. **Polygonum vacciniifolium** Wall.
Llonakh, 11-12,000 ft., No. 1743.

753. **Polygonum Emodi** Meisn.
Zemu, Llonakh, 10-11,000 ft., Nos. 2643, 2644.

754. Polygonum microcephalum Don.
Cheungtong, 5,000 ft., No. 2642.

755. Polygonum runcinatum Ham.
Lower Llonakh, 10-11,000 ft.

756. Polygonum arifolium Linn.
Cheungtong, 6,000 ft.

757. Polygonum molle Don.
Lachen, 7,000 ft.

758. Polygonum polystachum Wall.
Zemu Valley, 12-13,000 ft., No. 2640.

759. Polygonum campanulatum Hook. f.
Zemu Valley, 11-12,000 ft., No. 2641. Frequent.

760. Polygonum tortuosum Don.
Llonakh, 15,500 ft., No. 1867. Not previously recorded for Sikkim. A large plant considering the exposed situation.

761. Polygonum sibiricum Laxm.
Llonakh, Giagong, 14,500-17,000 ft., Nos. 1920, 1946, 2398.

762. Polygonum Hookeri Meisn.
Naku La, Llonakh, 15,500-17,000 ft., Nos. 1927, 2344.

763. Polygonum nummularifolium Meisn.
Zemu, Llonakh, Thango, 14-17,000 ft., Nos. 1511, 1569, 1983, 2257, 2514.

272. Fagopyrum Gærtn.

764. Fagopyrum cymosum Meisn.
Tong to Lachen, 5-8,000 ft., Nos. 882, 2670.

765. Fagopyrum tataricum Gærtn.
Cheungtong to Lachen. Cultivated.

273. Rheum Linn.

766. Rheum spiciforme Royle.
Upper valleys of Llonakh, 15-16,000 ft., No. 2114. A plant of the dry western ranges, not previously recorded for Sikkim.

767. Rheum acuminatum H. f. & T.
Zemu Valley, 9-14,000 ft., Nos. 1042, 1595. Frequent.

768. Rheum nobile H. f. & T.
Zemu, Llonakh, Thango, 14-16,000 ft., No. 1268. Frequent.

274. Oxyria Hill.

769. Oxyria digyna Hill.
Zemu, Llonakh, 11-16,000 ft., Nos. 1179, 1961. Frequent.

275. Rumex Linn.

770. **Rumex nepalensis** Spreng.
Tong, Lachen, Zemu, 5-10,000 ft., Nos. 852, 915. Common.

LXXI.—ARISTOLOCHIACEÆ.

276. Aristolochia Linn.

771. **Aristolochia saccata** Wall.
Tong, 5,000 ft.

LXXII.—PIPERACEÆ.

277. Peperomia Ruiz & Pav.

772. **Peperomia Heyneana** Miq.
Tista Valley, 3-4,000 ft., No. 815.

LXXIII.—LAURACEÆ.

278. Machilus Nees.

773. **Machilus Gamblei** King.
Tong, 4,000 ft., No. 876.

279. Litsæa Lamk.

774. **Litsæa citrata** Bl.
Lachung, 9,000 ft., No. 2583.

775. **Litsæa** sp.
Zemu Valley, 9,500 ft., No. 1044.

280. Lindera Thumb.

776. **Lindera heterophylla** Meissn.
Zemu Valley, 10,000 ft., No. 2813.

LXXIV.—THYMELÆACEÆ.

281. Daphne Linn.

777. **Daphne cannabina** Wall.
Tista Valley, 5-6,000 ft. Frequent.

778. **Daphne retusa** Hemsl.
Thango, 14,000 ft., No. 2828 Ribu.

282. Edgeworthia Meissn.

779. **Edgeworthia Gardneri** Meissn.
Gangtok, Tong, 5-6,000 ft. Frequent.

LXXV.—ELÆAGNACEÆ.

283. Elæagnus Linn.

780. Elæagnus latifolia Linn.
Zemu Valley, 8,000 ft., No. 1017.

284. Hippophae Linn.

781. Hippophae rhamnoides Linn.
Llonakh, 15-16,000 ft., Nos. 2227, 2365. Not previously recorded from Sikkim.

782. Hippophae salicifolia Don.
Lachen, Llonakh, 8-12,000 ft., Nos. 983, 2761. Considered by Hooker as probably a form of the above *H. rhamnoides* which replaces it in the drier upper valleys of Llonakh.

LXXVI.—LORANTHACEÆ.

285. Loranthus Linn.

783. Loranthus elatus Edgew.
Zemu Valley, 8,500 ft., No. 990.

LXXVII.—SANTALACEÆ.

286. Thesium Linn.

784. Thesium himalense Royle.
var. **pachyrhiza** Hook. f.
Thé La, Llonakh, Giagong, 15-16,000 ft., Nos. 2173, 2462.

LXXVIII.—BALANOPHORACEÆ.

287. Balanophora Forst.

785. Balanophora involucrata Hook. f.
Lachen and Zemu Valley, 8-9,000 ft., Nos. 1007, 2734.

LXXIX.—EUPHORBIACEÆ.

288. Euphorbia Linn.

786. Euphorbia himalayensis Boiss.
Lachen, Zemu, Llonakh, 9,500-11,500 ft., Nos. 1058, 1745.

787. Euphorbia sikkimensis Boiss.
Cheungtong to Lachen, 7-9,000 ft., No. 892.

88. Euphorbia Stracheyi Boiss.
Zemu, Llonakh, 13-16,000 ft., Nos. 1247, 1481, 1855.

289. Sarcococca Lindl.

789. **Sarcococca pruniformis** Lindl.
Cheungtong, Lachen, 6-9,000 ft., No. 924.

290. Daphniphyllum Bl.

790. **Daphniphyllum himalayense** Muell.-Arg.
Lachen, Zemu, 8-9,000 ft., Nos. 980, 2828. Common.

291. Antidesma Linn.

791. **Antidesma acuminatum** Wall.
Tista Valley, 3-4,000 ft., No. 810.

292. Macaranga Thouars.

792. **Macaranga denticulata** Muell.-Arg.
Tista Valley, 3-4,000 ft., No. 807.

293. Baliospermum Bl.

793. **Baliospermum corymbiferum** Hook. f.
Tista Valley, 4-5,000 ft., No. 853.

LXXX.—URTICACEÆ.

294. Urtica Linn.

794. **Urtica hyperborea** Jacq.
Giagong and Kangralamo, 16,500 ft., No. 2459. Not previously recorded from Sikkim. Occurs rarely but when it does is very conspicuous amid the surrounding dwarf vegetation on the exposed slopes.

795. **Urtica parviflora** Roxb.
Lachung, 8,000 ft.

796. **Urtica dioica** Linn.
Llonakh, 14,500 ft., No. 1834. Not previously recorded from Sikkim. As it was found in the vicinity of a 'dok' or station for yaks, it is probably an introduction from Tibet.

295. Laportea Gaud.

797. **Laportea terminalis** Wight.
Zemu Valley, 9,000 ft., No. 2796.

296. Pilea Lindl.

798. **Pilea approximata** Clarke.
Zemu, Llonakh, 9-11,500 ft., Nos. 1029, 1748.

799. Pilea umbrosa Wedd.
Tista Valley, 4-5,000 ft., No. 830.

800. Pilea sp ?
Yumchho La, 15,000 ft., No. 1328. Very dwarf.

297. Lecanthus Wedd.

801. Lecanthus Wightii Wedd.
Zemu, 8-10,000 ft., No. 2797.

298. Elatostema Forst.

802. Elatostema sikkimense Clarke.
Tong, 4,500 ft., No. 858.

803. Elatostema obtusum Willd.
Zemu Valley, 10,000 ft., No. 1066.

299. Bœhmeria Jacq.

804. Bœhmeria polystachya Wedd.
Lachung, 8-9,000 ft., No. 2826.

300. Pouzolzia Gaud.

805. Pouzolzia viminea Wedd.
Tista Valley, Lachen, 3-8,000 ft., Nos. 817, 982.

LXXXI.—JUGLANDACEÆ.

301. Juglans Linn.

806. Juglans regia Linn.
Cheungtong, 6,000 ft.

LXXXII.—CUPULIFERÆ.

302. Betula Tourn.

807. Betula utilis Don.
Zemu Valley, 8-9,000 ft., No. 994.

303. Alnus Gærtn.

808. Alnus nepalensis Don.
Zemu Valley, 8-9,000 ft.

304. Corylus Linn.

809. Corylus ferox Wall.
Lachen, Zemu, Lachung, 8-9,000 ft., Nos. 1006, 2588, 2748.

LXXXIII.—SALICACEÆ.

305. Salix Linn.

810. **Salix viminalis** Linn.
var. **Smithiana ?**
Zemu Valley, 9-12,000 ft., Nos. 1045, 1132, 1665. Probably *S. eriophylla* of the Khasia Hills.

811. **Salix** sp. near **obscura** Anderss.
Lachen, 9,000 ft., No. 2829.

812. **Salix** sp. near **Daltoniana** Anderss.
Zemu Valley, 12,000 ft., No. 1226 bis.

813. **Salix Serpyllum** Anderss.
Zemu Valley, 12,000 ft., Nos. 1210, 1223.

814. **Salix Lindleyana** Wall.
Llonakh, 12-14,000 ft., Nos. 1767, 2053.

815. **Salix calyculata** Hook. f.
Zemu, Llonakh, Thango, 11-14,000 ft., Nos. 1121, 1133, 1768, 2497. Frequent.

816. **Salix orcophila** Hook. f.
Naku La, Llonakh, 16,000 ft., No. 1995.

817. **Salix Thomsoniana** Anderss.
Zemu Valley, 12-13,000 ft., No. 1134.

818. **Salix** sp. near **Thomsoniana** Anderss.
Llonakh, 15,500 ft., No. 2230.

819. **Salix** sp.
Llonakh, 14,500 ft., No. 2157.

The material of Salix in the Calcutta Herbarium is too inadequate for accurate identification of the species.

306. Populus Linn.

820. **Populus ciliata** Wall.
Cheungtong, Lachen, 6-8,000 ft., Nos. 925, 953.

MONOCOTYLEDONES.

LXXXIV.—ORCHIDACEÆ.

307. Microstylis Nutt.

821. **Microstylis Wallichii** Lindl.
Tista Valley, 4,000 ft., No. 829.

822. **Microstylis muscifera** Ridley.
Lachen, Zemu Valley, 8,000-8,500 ft., Nos. 987, 2653, 2658.

308. Liparis Richard.

823. Liparis perpusilla Hook. f.
Lachen, 8,000 ft., Nos. 2646, 2665.

309. Oreorchis Lindl.

824. Oreorchis foliosa Lindl.
Lachen, Zemu, 8-11,000 ft., Nos. 1117, 2645 bis.
825. Oreorchis micrantha Lindl.
Lachen, 8,000 ft., No. 2645.

310. Bulbophyllum Thouars.

826. Bulbophyllum affine Lindl.
Namchi, 4,000 ft., No. 839.

311. Cirrhopetalum Lindl.

827. Cirrhopetalum parvulum Hook. f.
Lachen, 8,000 ft., No. 2661.
828. Cirrhopetalum caudatum King & Pantl.
Lachen, 8,000 ft., No. 2649.

312. Eria Lindl

829. Eria graminifolia Lindl.
Lachen, 700 ft., No. 913.
830. Eria excavata Lindl.
Cheungtong, 6,000 ft., No. 910.
831. Eria pannea Lindl.
Namchi, 4,000 ft., No. 838.

313. Spathoglottis Bl.

832. Spathoglottis ixioides Lindl.
Lachen, Lachung, 7,500-8,500 ft., Nos. 938, 2666. Frequent locally.

314. Ceratostylis Bl.

833. Ceratostylis teres Reichb. f.
Tista Valley, 3-4,000 ft., No. 821.

315. Cryptochilus Wall.

834. Cryptochilus sanguinea Wall.
Namchi, 4,000 ft., No. 836.

316. Calanthe Br.

835. **Calanthe alismæfolia** Lindl.
Tista Valley, 3,000 ft., No. 823.

836. **Calanthe alpina** Hook. f.
Lachen, Zemu, 8-10,000 ft., Nos. 1024, 2654, 2656, 2660. Frequent.

317. Luisia Gaud.

837. **Luisia inconspicua** Hook. f.
Tista Valley, 3-4,000 ft., No. 813.

318. Sarcochilus Br.

838. **Sarcochilus suaveolens** Hook. f.
Tista Valley, 3-4,000 ft., No. 813.

319. Cleisostoma Bl.

839. **Cleisostoma gemmatum** King & Pantl.
Namchi, 4,000 ft., No. 837.

320. Anæctochilus Bl.

840. **Anæctochilus pumilus** King & Pantl.
Lachen, 8,000 ft., No. 2847.

321. Spiranthes Rich.

841. **Spiranthes australis** Lindl.
Lachen, Lachung, 7-8,000 ft., Nos. 2613, 2667.

322. Listera Br.

842. **Listera tenuis** Lindl.
Lachung, 8,000 ft., No. 2651.

843. **Listera pinetorum** Lindl.
Zemu, 11,000 ft., No. 1118.

844. **Listera Lindleyana** King & Pantl.
Lachung, 8,000 ft., Nos. 2662, 2668.

323. Aphyllorchis Bl.

845. **Aphyllorchis Pantlingii** W. W Smith, sp. nov.
Ab *Aphyllorchide alpina* habitu erecto et bractea et floribus parvis, etiam ab aliis himalaicis congeneribus magna bractea statim distinguitur.

Rhizoma breve, radicibus multis fibrosis fasciculatis globum 3-4 cm. diametientem fingentibus. *Caulis* 15-30 cm. altus, 2-5 mm. diametiens, parte inferiori glaber, parte superiori pubescens rubris squamis indutus, 2—3-foliatus. *Folia* squamiformia subæqualia, obtusa. *Racemi* 10–30-floriferi. rubro-pubescentes. *Flores* 5 mm. diametientes, laxe racemosi vel interdum 2-3 approximati, cum ovario 1 cm. longi ; bractea 5-16 mm. longa, linearis vel lineari-oblonga, acuminata, erecta, ovarium et interdum florem excedens. *Sepala* 3-4 mm. longa, subæqualia, oblonga, obtusa. *Petala* minora, obtusa. *Labellum* variabile esse videtur, nunc oblongum, sepala paullo excedens, nunc angustius, fere duplo, excedens apice involuto bifido. *Capsula* 7-8 mm. longa, 5 mm. lata, ovoidea, costata, areolata, seminibus squamiformibus.

Lachen and Zemu Valley, Nos. 1020, 2657. Named in honour of the late Mr. Robert Pantling, the authority on Himalayan orchids.

324. Epipactis Br.

846. Epipactis latifolia Sw.
Lachen, 8-9,000 ft., Nos. 2648, 2650.

325. Orchis Linn.

847. Orchis Chusua Don.
Lachen, Zemu, 10-13,500 ft., Nos. 1067, 1241, etc. Frequent.

848. Orchis habenarioides King and Pantl.
Zemu, 11-12,000 ft., No. 1083.

326. Herminium Linn.

849. Herminium orbiculare Hook. f.
Zemu, 12,000 ft., No. 1594.

850. Herminium gracile King & Pantl.
Zemu Valley, 14,000 ft., No. 1463.

851. Herminium quinquelobum King & Pantl.
Lachen, 8,600 ft., No. 2412.

327. Habenaria Willd.

852. Habenaria pectinata Don.
Lachung, 8-9,000 ft., No. 2585.

853. Habenaria Orchidis Hook. f.
Zemu, Valley, 14,000 ft., No. 1464.

854. Habenaria Aitchisoni Reichb. f.
Lachen, 8,000 ft., Nos. 2663, 2669.
var. **Josephi** Hook. f.
Llonakh, 15,500 ft., No. 1882.

855. **Habenaria stenantha** Hook. f.
Lachen, 8,000 ft., No. 2655.

856. **Habenaria densa** Wall.
Lachen, 9,000 ft., Nos. 2299, 2664.

857. **Habenaria fallax** King & Pantl.
Lachen, 8,000 ft., Nos. 2652, 2659.

328. Satyrium Swartz.

858. **Satyrium nepalense** Don.
var. **ciliata** Lindl.
Cheungtong, 7,000 ft., No. 2604.

329. Cypripedium Linn.

859. **Cypripedium elegans** Reichb. f.
Zemu Valley, 13,500 ft., No. 1462.

860. **Cypripedium himalaicum** Rolfe.
Zemu Valley, 13-14,000 ft., No. 1240.

861. **Cypripedium tibeticum** King.
Zemu Valley, 13,000 ft., No. 1453.

LXXXV.—SCITAMINEÆ.

330. Roscoea Smith.

862. **Roscoea purpurea** Sm.
Lachen, 7-9,000 ft., Nos. 940, 947.

331. Cautleya Royle.

863. **Cautleya lutea** Royle.
Cheungtong, 6,000 ft., No. 906.

332. Hedychium Kœnig.

864. **Hedychium densiflorum** Wall.
Lachen, 8-9,000 ft., No. 2437.

865. **Hedychium ellipticum** Ham.
Tista Valley, 3-4,000 ft. No. 818.

866. **Hedychium gracile** Roxb.
Var. **glauca** Baker.
Lachung, 8,000 ft., No. 2580.

867. **Hedychium coccineum** Ham.
Cheungtong, 6,000 ft., No. 2612.

LXXXVI.—HÆMODORACEÆ.

333. Aletris Linn.

868. Aletris nepalensis Hook. f.
Zemu Valley, 10-12,000 ft., Nos. 1125, 1126. Frequent.

869. Aletris sikkimensis Hook. f.
Lachen, Zemu, Llonakh, 8-14,000 ft., Nos. 958, 965, 1084, 2004. Frequent.

334. Ophiopogon Ker.

870. Ophiopogon Wallichianus Hook. f.
Lachen, 9-11,000 ft.

871. Ophiopogon intermedius Don.
Zemu, 8-9,000 ft., Nos. 999, 2639.

LXXXVII.—IRIDACEÆ.

335. Iris Linn.

872. Iris sp. near **Clarkei** Baker.
Lachung, 10,000 ft., No. 2596. In fruit only.

LXXXVIII.—LILIACEÆ.

336.—Smilax Linn.

873. Smilax rigida Wall.
Lachen, 8-9,000 ft., No. 2430.

874. Smilax elegans Wall.
Lachen, 8-9,000 ft., No. 3046 Ribu.

337. Polygonatum Tourn.

875. Polygonatum Hookeri Baker.
Thé La, Llonakh, No. 2698 Ribu.

876. Polygonatum verticillatum All.
Zemu Valley, 9-13,000 ft., Nos. 1038, 1202, 1454. Very common.

877. Polygonatum cirrifolium Royle.
Lachen, Zemu, 8-14,000 ft., Nos. 974, 1346. Frequent.

338. Streptopus Mich.

878. Streptopus simplex Don.
Lachen, Zemu, 8-14,000 ft., Nos. 978, 1051, 1448, 1597. Frequent.

339. Smilacina Desf.

879. **Smilacina pallida** Royle.
Zemu, 12-13,000 ft., No. 1144.

880. **Smilacina fusca** Wall.
Zemu, 10-11,000 ft., No. 2637.

881. **Smilacina oleracea** H. f. & T.
Lachen, Zemu, 8-11,000 ft., Nos. 973, 2638. Very common.

340. Theropogon Maxim.

882. **Theropogon pallidus** Maxim.
Lachen, Zemu, 7-9,000 ft., Nos. 935, 957, 959.

341. Chlorophytum Ker.

883. **Chlorophytum undulatum** Wall.
Cheungtong, 6,000 ft., No. 897.

342. Allium Linn.

884. **Allium Wallichii** Kunth.
Lachung, 10,000 ft., No. 2595.

885. **Allium sikkimense** Baker.
Llonakh, 14,500-15,000 ft., No. 2105.

886. **Allium victorialis** Linn.
Zemu, Llonakh, Thango, Giagong, 10-14,500 ft., Nos. 1082, 1242, 1688, 2480, 2547. Frequent.
var. **angustifolia**, Hook. f.
Thango, 13,000 ft. With the type.

887. **Allium Gageanum** W. W. Smith sp. nov.
Species *Allio Govaniano* Wall. affinis ; sed caule rotundo, foliis acutis, stylo longo præter alia signa distincta.
Glabrum. *Caulis* ad 30 cm. altus, erectus, vix compressus, basi foliatus. *Bulbi* anguste fusiformes, plures, cæspitosi, brevi rhizomati insidentes ; ad bulborum apices fibræ multæ erectæ, ad 3 cm. longæ, liberæ basi excepto, non-reticulatæ, caulis basin laxe induentes. *Folia* subdisticha, ad 25 cm. longa, 2-3 mm. lata, linearia, plana, longe acuta, caulem fere æquantia. *Umbella* pluriflora, sphærica ; spatha scariosa, plerumque in duos lobos partita. *Pedicelli* flore longiores, erecti vel exteriores deflexi. *Sepala* albida 5-6 mm. longa, linearioblonga, acuta, interdum apiculata, demum reflexa. *Filamenta* subulata, basi nec dilatata, sepalis paulo breviora, demum sepalis reflexis exserta. *Stylus* longitudine staminum. *Ovarium* subgloboso-trigastrum, 4 mm. diametiens, dimidio superiore pubescente, loculis 1—2-seminiferis. *Semina* 2·5 mm. longa, plano-convexa.

Upper valleys of Llonakh, Sikkim, 15-16,000 feet, Nos. 2130 Smith & Cave, 2771 Ribu. Found in loose alluvium by the side of streams.

888. Allium macranthum Baker.

Thango, 14,000 ft., Nos. 2378, 2560.

889. Allium sp.

Llonakh, 12,000 ft., No. 1750. Not matched but in bud only.

343. Lilium Linn.

890. Lilium giganteum Wall.

Lachen, Zemu, 8-11,000 ft., No. 2636. Occasional.

891. Lilium roseum Wall.

Cheungtong, Lachen, 7-9,000 ft., No. 3080 Ribu.

344. Fritillaria Linn.

892. Fritillaria Stracheyi Hook. f.

Yumchho La, Zemu, Llonakh, 14-16,000 ft., Nos. 1358, 1376, 1602. A dwarf form found close to the snow.

893. Fritillaria cirrhosa Don.

Zemu, 13-14,000 ft., No. 2635.

345. Lloydia Salisb.

894. Lloydia serotina Reichb.

Throughout the Zemu and Llonakh valleys from 13-17,000 feet, Nos. 1243, 1255, 1295, 1712, 1789.

346. Tofieldia Huds.

895. Tofieldia himalaica Baker.

Yumchho La, Zemu, 11-13,000 ft., Nos. 1447, 1590, 2801.

347. Clintonia Rafin.

896. Clintonia alpina Kunth.

Zemu Valley, 8-15,000 ft., Nos. 998, 1433. Frequent.

348. Trillium Linn.

897. Trillium Govanianum Wall.

Zemu Valley, 11,000 ft., No. 1113.

349. Paris Linn.

898. Paris polyphylla Smith.

Cheungtong to Lachen, 6-9,000 ft., Nos. 926, 930.

LXXXIX.—COMMELINACEÆ.

350. Commelina Linn.

899. **Commelina sikkimensis** Clarke.
Cheungtong, 5,000 ft., No. 2803.

XC.—JUNCACEÆ.

351. Juncus Linn.

900. **Juncus bufonius** Linn.
Above Thango, No. 2876 Ribu.

901. **Juncus effusus** Linn.
Zemu Valley, 8-9,000 ft., No. 2809.

902. **Juncus chrysocarpus** Buch.
Zemu, Thango, 10-13,000 ft., Nos. 1065, 1162, 1403.

903. **Juncus prismatocarpus** Br.
Cheungtong, 6-7,000 ft. Frequent.

904. **Juncus triglumis** Linn.
Zemu, 14-15,000 ft., No. 1366.

905. **Juncus** sp. near. **triglumis** Linn.
Thangchung La, Zemu, 15,000 ft., No. 1470.

906. **Juncus leucomelas** Royle.
Llonakh, 14,500 ft., No. 1911.

907. **Juncus bracteatus** Buch.
Zemu, 10-14,000 ft., Nos. 1239, 2808.

908. **Juncus sphacelatus** Decne.
Llonakh, 14,000 ft., No. 2071.

909. **Juncus himalensis** Klotzsch & Garcke.
Zemu, 12-13,000 ft., Nos. 1148, 1397.

910. **Juncus sikkimensis** Hook. f.
Yumchho La, Zemu, 15-16,000 ft., Nos. 1428, 1442.

911. **Juncus concinnus** Don.
Zemu, 13,000 ft., No. 2807.

912. **Juncus minimus** Buch.
Zemu, 12-15,000 ft., Nos. 1396, 1441.

913. **Juncus Clarkei** Buch.
Cheungtong, 6,000 ft., No. 895.

352. Luzula D.C.

914. Luzula effusa Buch.

Lachen, Zemu, 10-11,000 ft., Nos. 1081, 2810.

Young states of this, as seen in some of our specimens, correspond with the doubtful species of Fl. Brit. Ind., Vol. VI, p. 402. This latter, collected by Hooker and by Pantling was referred doubtfully by Buchenau to *L. parviflora* var. *subcongesta*.

915. Luzula campestris D.C.

Zemu, 11-13,000 ft., Nos. 1120, 1150, 1169.

XCI.—ARACEÆ.

353. Arisæma Mart.

916. Arisæma tortuosum Schott.

Tong, 4-5,000 ft., No. 877.

917. Arisæma nepenthoides Mart.

Lachung, 9,000 ft., No. 2594.

918. Arisæma consanguineum Schott.

Tong, 4-5,000 ft., No. 878.

919. Arisæma concinnum Schott.

Llonakh, No. 2700 Ribu.

920. Arisæma Jacquemontii Bl.

Zemu, Thango, 8-12,000 ft., Nos. 1011, 1049, 2293.

354. Typhonium Schott.

921. Typhonium diversifolium Wall.

Lachen, 8,000 ft., No. 2848.

XCII.—NAIADACEÆ.

355. Triglochin Linn.

922. Triglochin maritimum Linn.

Llonakh, 14,500 ft., No. 1854.

356. Potamogeton Linn.

923. Potamogeton javanicus Hassk. ?

Thango, 14,000 ft., No. 2515.

XCIII.—ERIOCAULACEÆ.

357. Eriocaulon Linn.

924. **Eriocaulon alpestre** Hook. f. & T.
Lachen, 8,000 ft., No. 3064 Ribu.

925. **Eriocaulon** sp.
Thango, 14,000 ft., No. 2850.

XCIV.—CYPERACEÆ.

358. Eleocharis R. Br.

926. **Eleocharis palustris** R. Br.
Llonakh, 14,500 ft., No. 1912.

359. Bulbostylis Kunth.

927. **Bulbostylis capillaris** Kunth.
Lachen, Zemu, 9,000 ft., Nos. 2816, 2996 Ribu.

360. Scirpus Linn.

928. **Scirpus setaceus** Linn.
Zemu, 12,000 ft., No. 2817.

929. **Scirpus Caricis** Retz.
Llonakh, 14-15,000 ft., Nos. 1815, 2055, 2067.

361. Kobresia Willd.

930. **Kobresia pygmæa** Clarke.
Llonakh, 14,500 ft., No. 1817.

931. **Kobresia** sp.
Zemu, 17,000 ft., No. 1583.

362. Carex Linn.

932. **Carex nubigena** D. Don.
Lachen, 7,000 ft., No. 919.

933. **Carex longipes** Don.
Lachen, 9,000 ft.

934. **Carex linearis** Boott.
Thangchung La, Zemu, 16,000 ft., No. 1480

935. **Carex pulchra** Boott.
Zemu, 9,000 ft., No. 2815.

936. Carex munda Boott.
Zemu, 10-13,000 ft., Nos. 1080, 1685.

937. Carex alpina Sw.
Yumchho La, 15,000 ft., No. 1443.

938. Carex Lehmanni Drejer.
Zemu, 11,000 ft., No. 1085.

939. Carex obscura Nees.
Zemu, 12-13,000 ft., No. 1189.

940. Carex Moorcroftii Falc. var.
Jongsong La Valley, Llonakh, 16,500 ft., No. 2318. Not previously recorded from Sikkim.

941. Carex ustulata Wahl.
Zemu, Llonakh, 11-15,000 ft., Nos. 1086, 1879, 2108, 2155. Frequent.

942. Carex cruenta Nees.
Zemu, 14-15,000 ft., No. 1372.

943. Carex finitima Boott.
Zemu, 10,000 ft., No. 1073.

944. Carex inanis Kunth.
Lachen, Zemu, 8-10,000 ft., Nos. 2814, 2825.

945. Carex sp.
Llonakh, 16,500 ft., No. 2321.

946. Carex sp.
Llonakh, 16,000 ft., No. 1986.

XCV.—GRAMINEÆ.

363. Miscanthus Anders.

947. Miscanthus nudipes Hack.
Zemu, 9-10,000 ft., No. 1036.

Hierochloa Gmel.

948. Hierochloa Hookeri Clarke.
Zemu, 9-10,000 ft., No. 1036.

364. Stipa Linn.

949. Stipa purpurea Griseb.
Naku La, Llonakh, 16,000 ft., No. 2769 Ribu.
Not previously recorded from Sikkim.

950. Stipa mongolica Turcz.
Llonakh, 14,700 ft., No. 2106.

365. Oryzopsis Michx.

951. **Oryzopsis** sp.
Giagong, No. 2862 Ribu.

366. Phleum Linn.

952. **Phleum alpinum** Linn.
Zemu, Thango, 11-13,000 ft., Nos. 1099, 1186.

367. Agrostis Linn.

953. **Agrostis myriantha** Hook. f.
Lachen, 8,000 ft., No. 3012 Ribu.
954. **Agrostis inæquiglumis** Griseb.
Above Lachen, 12,000 ft.

368. Calamagrostis Adans.

955. **Calamagrostis emodensis** Griseb.
Zemu, 11,000 ft., No. 2824.

369. Deyeuxia Clar.

956. **Deyeuxia scabrescens** Munro.
Zemu, 10-11,000 ft., No. 1079.
957. **Deyeuxia pulchella** Hook. f.
Naku La, Llonakh, 15,000 ft., No. 2737 Ribu.

370. Deschampsia Beauv.

958. **Deschampsia cæspitosa** Beauv.
Zemu, Llonakh, 11-16,000 ft., Nos. 1647, 1868, 2070. Frequent.

371. Avena Linn.

959. **Avena aspera** Munro.
Zemu, Tallum Samdong, 9-11,000 ft., Nos. 2410, 2823.
960. **Avena subspicata** Clairv.
Zemu, Llonakh, 13-17,000 ft., Nos. 1385, 2107, 2236. Frequent.
961. **Avena flavescens** Linn.
Zemu, 10-12,000 ft., No. 2818.

372. Danthonia D.C.

962. **Danthonia cachemyriana** Jaub. & Spach.
Thango, 14,000 ft., No. 2465.
var. **minor** Hook. f.
Thango, 14,000 ft., No. 2554.

373. **Tripogon** Roth.

963. **Tripogon filiformis** Nees.
Lachen, 8-10,000 ft.

374. **Catabrosa** Beauv.

964. **Catabrosa sikkimensis** Stapf.
Llonakh, 14,500 ft., No. 1909.

375. **Eragrostis** Beauv.

965. **Eragrostis nigra** Nees.
Lachen, 8-9,000 ft., No. 3003 Ribu.

376. **Poa** Linn.

966. **Poa pseudo-pratensis** Hook. f.
Zemu, Llonakh, 12-16,000 ft., No. 1413.

967. **Poa attenuata** Trin.
Kangralamo, 16,000 ft., No. 2452.

968. **Poa flexuosa** Wahlb.
Zemu, Llonakh, Giagong, 11-15,000 ft., Nos. 1412, 1960, 2169.

377. **Festuca** Linn.

969. **Festuca valesiaca** Schleich.
var. **tibetica** Stapf.
Naku La, Llonakh, 17,000 ft., No. 1947.

970. **Festuca Cumminsii** Stapf ?
Llonakh, 14,500 ft., No. 1818.

971. **Festuca polycolea** Stapf.
Zemu, 11-13,000 ft., Nos. 1108, 1229.

378. **Agropyron** Gærtn.

972. **Agropyron longe-aristatum** Boiss.
Llonakh, 16,000 ft., No. 2235.

GYMNOSPERMÆ.

XCVI.—GNETACEÆ.

379. **Ephedra** Linn.

973. **Ephedra Gerardiana** (Wall.) Stapf.
var. **sikkimensis** Stapf.
Llonakh, Thango, 14-15,000 ft., Nos. 2001, 2075, 2158, 2381.
Frequent.

XCVII.—CONIFERÆ.

380. Cupressus Linn.

974. **Cupressus funebris** Endl.
Lachung, 8,000 ft.

381. Juniperus Linn.

975. **Juniperus pseudo-sabina** Fisch. & Mey.
Zemu, Llonakh, 11-16,000 ft., Nos. 1091, 1563, 1676. Frequent.

976. **Juniperus recurva** Ham.
Zemu, Llonakh, 10-15,000 ft. Frequent.
var. **squamata** Parlat.
Llonakh, 14-16,000 ft. Frequent.

382. Podocarpus L'Hérit.

977. **Podocarpus neriifolia** Don.
Tista Valley, 3,000 ft., No. 826.

383. Pinus Linn.

978. **Pinus longifolia** Roxb.
Tista Valley, Namchi, 3-5,000 ft. Occasional.

384. Picea Link.

979. **Picea morindoides** Rehder.
Zemu, 8-9,000 ft., Nos. 1021, 2731.

385. Tsuga Carr.

980. **Tsuga Brunoniana** Carr.
Zemu, 8-10,000 ft., No. 2742.

386. Abies Juss.

981. **Abies Webbiana** Lindl.
Zemu, 9-12,000 ft., No. 1391.

387. Larix Mill.

982. **Larix Griffithii** H. f. & T.
Lachen, Zemu, Lachung, 8-10,000 ft., Nos. 2600, 2771.

PTERIDOPHYTA.

XCVIII.—POLYPODIACEÆ.

388. Davallia Sm.

983. Davallia sp. near **Clarkei** Baker.
Tumrachen, Zemu Valley, 12,000 ft., No. 1673.

389. Adiantum Linn.

984. Adiantum pedatum L.
Lachen, Zemu, 8-9,000 ft., Nos. 2833, 3094 Ribu.

390. Cheilanthes Schwartz.

985. Cheilanthes farinosa Kaulf.
Zemu, 9,000 ft., No. 2842.

391. Cryptogramme R. Br.

986. Cryptogramme crispa R. Br.
Zemu, Llonakh, 12-13,000 ft., Nos. 1341, 1638. Frequent.

392. Woodwardia Sm.

987. Woodwardia radicans Sm.
Tong, 5,000 ft., No. 890.

393. Athyrium Roth.

988. Athyrium thelypteroides Michx.
Zemu, 11-12,000 ft., Nos. 1639, 1643.

989. Athyrium fimbriatum Wall.
var. **sphæropteroides** Clarke.
Zemu Valley, 12,000 ft., No. 2844.

394. Aspidium Sw.

990. Aspidium lachenense Hook.
Llonakh, 14,500 ft., No. 1806.

991. Aspidium ilicifolium Don.
Zemu, 10,000 ft., No. 2841.

395. **Polystichum** Roth.

992. **Polystichum Prescottianum** (Wall).
Zemu, 12,000 ft., Nos. 1637, 1642.
var. **Bakeriana.**
Zemu, Thango, 13-16,000 ft., Nos. 1553, 2290. Not uncommon.

396. **Lastrea** Presl.

993. **Lastrea Filix-mas** (L.)
var. **cochleata** (Don.)
Lachen, 8-9,000 ft., No. 2845.
994. **Lastrea Brunoniana** Wall.
Llonakh, 14-14,500 ft., No. 1799.
995. **Lastrea barbigera** Hook.
Thango, 14,000 ft.

397. **Goniophlebium** Bl.

996. **Goniophlebium Hendersoni** Atkin.
Zemu, 12,000 ft., No. 1672.
997. **Goniophlebium amœnum** (Wall.)
Zemu, 9,000 ft., No. 2843.
998. **Goniophlebium subamœnum** Clarke.
Zemu, 10,000 ft., No. 2838.

Polypodium Linn.

998A. **Polypodium rostratum** Hook.
Zemu, 12,000 ft., No. 1636.
999. **Polypodium lineare** Thunb.
Zemu, 9,000 ft., No. 2837.
1000. **Polypodium malacodon** Hook.
Zemu, 12,000 ft., Nos. 1586, 1644. Frequent.
var. **major.**
Zemu, 10,000 ft., No. 2839.
1001. **Polypodium ebenipes** Hook.
Zemu, 11,000 ft., No. 2834.

398. Nothochlæna R. Br.

1002. Nothochlæna Marantæ R. Br.
Zemu, 15,000 ft., No. 2835.

399. Acrostichum Linn.

1003. Acrostichum tricuspe Hook.
Namchi, 4,000 ft., No. 842.

XCIX.—OSMUNDACEÆ.

400. Osmunda Linn.

1004. Osmunda Claytoniana Linn.
Zemu, 9-10,000 ft., No. 2840.

C.—OPHIOGLOSSACEÆ.

401. Botrychium Sw.

1005. Botrychium Lunaria Sw.
Zemu, 11,000 ft., Nos. 1116, 1585.

1006. Botrychium virginianum Sw.
var. **lanuginosa**.
Lachen, 8,000 ft., No. 3995 Ribu.

CI.—LYCOPODIACEÆ.

402. Lycopodium Linn.

1007. Lycopodium Selago H. f. & T.
Yumchho La, Naku La, Llonakh, 15-16,000 ft., Nos. 1275, 1962.

1008. Lycopodium serratum Thunb.
Zemu, 9,000 ft., No. 2832.

1009. Lycopodium alpinum Linn.
Zemu, 12-13,000 ft., No. 1337.

CII.—SELAGINELLACEÆ.

403. Selaginella Spreng.

1010. Selaginella caulescens Spreng.
Cheungtong to Lachen, 5-9,000 ft. Frequent.

By kind permission of Mr. Hoffmann, Calcutta.

Photo -Engraved & printed at the offices of the Survey of India, Calcutta, 1911.

Zemu Valley :—At an elevation of 11,000 ft. ; *Abies Webbiana* on the left; on the slopes and by the stream a dense growth of shrubs chiefly species of *Rhododendron*, *Pyrus*, *Lonicera*, *Salix*, *Viburnum*, *Ribes*, *Berberis*.

By kind permission of Mr. Hoffmann, Calcutta.

Photo.-Engraved & printed at the offices of the Survey of India, Calcutta, 1911.

Llonakh :—At an elevation of 14,500 ft.; in the foreground an old glacier-basin with moraines; the slopes dappled with patches of prostrate Juniper. Kangchenjunga, 28,150 ft., in the distance.

ADDENDUM I.

Since the first pages were printed off, I have received from M. Hamet a report on the *Crassulaceæ* submitted to him. Several new species are distinguished as well as two additions (of previously known species) to the flora of India. A paper by M. Hamet on these *Crassulaceæ* will appear later with descriptions of the new species. Meanwhile the following list is available.

Sedum quadrifidum Pall.

Zemu, Llonakh, Thango, 14-17,000 ft., Nos. 1266, 1804, 1930, 2026, 2054, etc. Very common.

Sedum himalense Don.

Zemu, Llonakh, Giagong, 12-15,000 ft., Nos. 1203, 1749, 2476, 2761 Ribu. Common.

Sedum bupleuroides Wall.

Zemu, Llonakh, Thango, 11-15,000 ft., Nos. 1105, 1494, 1756, 1923, 2151, 2727, 2794 Ribu. Common.

Sedum elongatum Wall.

Zemu, Llonakh, 12,000 ft., Nos. 1015, 1649, 1741.

Sedum roseum Stev.

Rongsa, Thé La, Goraphu Chu, 15-16,000 ft., Nos. 2024, 2205, 2714 Ribu.

Sedum asiaticum D.C.

Zemu, Llonakh, 12-14,500 ft., Nos. 1621, 2726.

Sedum trullipetalum H. f. & T.

Thango, 13-14,000 ft., Nos. 2468, 2552.

Sedum multicaule Wall.

Cheungtong to Lachen, 5-8,500 ft., Nos. 888, 2427, 2602.

Sedum Levii R. Hamet.

Naku Chu, Llonakh, 16,000 ft., No. 1989.

Sedum Smithi R. Hamet, sp. nov.

Llonakh, 15,000 ft., No. 2126.

Sedum Gagei R. Hamet.

Giagong, 16,000 ft., No. 2414.

Sedum Fischeri R. Hamet.

Naku La, Chhortenima La, 16-17,000 ft., Nos. 1940, 2350.

Sedum Cavei R. Hamet, sp. nov.

Yumchho La, Zemu, Llonakh, 12-14,500 ft., Nos. 1206, 1299, 2051.

Sedum Oreades R. Hamet.

Llonakh, 11,000 ft., No. 1747.

Sedum Przewalskii Maxim.

Thango, 15-16,000 ft., No. 2393. New to the flora of India.

Sedum verticillatum (H. f. & T.) R. Hamet.

Zemu, Llonakh, 9-11,000 ft., No. 1055. Common.

Sedum filipes Hemsl.

Cheungtong, 6,000 ft., No. 900. New to the flora of India.

Sedum Quevai R. Hamet, sp. nov.

Zemu, Llonakh, 12-14,500 ft., Nos. 1228, 1296, 1306, 1764, 1776.

ADDENDUM II.

I am much indebted to Mr. Hoffmann of Messrs. Johnston and Hoffmann, Calcutta, who has given me permission to reproduce two of his photographs taken when accompanying Mr. White in 1891. One shows very well the general aspect of the Zemu valley before the tall trees disappear; the other illustrates the piebald effect of the dwarf Juniper on the rounded hillocks in Llonakh.

CORRIGENDA.

Page 142, line 16 from base, supply the word *Sir* at the beginning of the line.

Page 16, line 6, for 4-900 read 4-9,000.

Page 180. **Arenaria Littledalei** Hemsl. has been made the type of a new genus **Gooringia** Williams. It is figured in Hook. Icones, Tab. 2944 (1911). *Arenaria thangoensis* is not included in this new genus.

Page 199. **Casearia sp.** I have incorrectly referred this fruiting specimen to *Casearia*. It ought to be *Stachyurus himalaicus* H. f. & T.