Records
of the
Botanical Survey of India

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BY

W. W. SMITH

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SUPERINTENDENT GOVERNMENT PRINTING, INDIA
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Issued in January 1913 Price Re 1 or 1s 6d

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THE ALPINE AND SUB-ALPINE VEGETATION OF SOUTH-EAST SIKKIM.

By
W. W. Smith.

INTRODUCTION.

The writer was deputed in July—August 1910 by Major A. T. Gage, I.M.S., Director of the Botanical Survey of India, to explore botanically South-East Sikkim, more especially the ridges lying between the Cho-La and the Tanka-La. Both these passes were visited by botanist many years ago, by the late Sir Joseph Hooker and the late Mr. C. B. Clarke, and more recently (1892) by Mr. G. A. Gammie. However the intervening country, a tangle of hills with deep wooded valleys, was unknown and offered an inviting field for investigation. The area is one of the wettest in the Himalayas, exposed to almost the full force of the monsoon rains. During July and August it rained every day, often all day and generally the greater part of every day. The actual total of inches is probably less than what is received on the outer hills below and at Darjeeling, as owing to the elevation the rain is frequently more of a drizzle than a downpour, but the amount of sunshine during the short flowering season is very limited. The conditions approximate to those of the Singalela Range with less violent winds.

I left Darjeeling on June 29th with Lepcha collectors and coolies travelling *viâ* Namchi, Temi, Song and Gangtok. As the Chola Range is practically without settled inhabitants, there being only a few herdsmen during the summer months, arrangements were made at Gangtok, the capital of Sikkim, for food supplies. Gangtok was left on July 3rd by the Changu road which leads to the Nathui La, one of the chief passes into the Chumbi Valley. The greater part of this road was surveyed and completed for the Tibet expedition of 1903-04 as a means of relief to the Dzalep-La (Jelep La) route and is an excellent one throughout, presenting little difficulty beyond the climb of 10,000 feet in a journey of about 30 miles. The first march is to the Karponang bungalow, a gradual rise from 5,000 to 9,000 feet. The forest vegetation corresponds closely to that of the Darjeeling District at the same elevation. Signs of cultivation soon disappear and at Karponang there are only a few huts near the bungalow. It is not an area to attract the

cultivator, the valley being very wild and the slopes steep. The road has been cut with considerable difficulty, here and there overhanging deep precipices. *Didymocarpi* frequent these rocky cuttings. *Didymocarpus*, as has been pointed out by Ridley in connection with the Malayan Flora, is very restricted in its specific distribution. The Sikkim species are no exception to the rule and the Burmese species seem similarly restricted. The same is true of the closely allied genus *Chirita*. Near Karponang I picked a branch from a shrub which at the time I took to be *Leycesteria glaucophylla*, but subsequent comparison in the herbarium showed it to be a new species allied to the Chinese *Leycesteria sinensis*. I have named it *Leycesteria Belliana* in honour of Mr. C. A. Bell, the Political Officer of Sikkim, who has made botanical collections in the Chumbi Valley. I was in hopes that the native collectors would secure the plant later in seed but on returning in October they were unable to find the shrub again. No doubt it had shed its leaves and was difficult to distinguish. Only four other species of this genus are known and the plant would be an interesting addition to the gardens of Europe. The roadside yielded another new species in *Swertia ramosa*.

The next day was spent in the vicinity of Karponang exploring the ridges above the bungalow and also the steep slopes below which lead to the Roro Chu. On the 5th we proceeded to Changu, a further rise of 3,000 feet. For the first five miles to Laghep the road is fairly level running through the narrowing valley, but high above the stream. The vegetation up to 10,000 feet was somewhat backward but above that a fine blaze of colour greeted us. The plants of alpine Sikkim make the most of their short flowering season. Above Laghep the ground rapidly rises to the lake of Changu which is near 12,000 feet elevation. In fine flower were *Cathcartia villosa*, *Meconopsis*, *Trollius*, *Anemone*, *Primula sikkimensis*, *Primula reticulata*. *Primula geraniifolia*, a plant hitherto known only from the Chumbi Valley, is not uncommon by the rocky slopes and more occasional is its near ally, the rare *Primula vaginata*. Also noteworthy were the scarce *Cathcartia lyrata*, the peculiar *Parnassia tenella* near the ruined Laghep bungalow and *Roscoea alpina* the rarer of the two Sikkim species and usually a plant of the drier ranges. The forest is here comparatively open but that may be due in great part to the cutting of firewood for the camp during the transit of gangs of coolies in 1903-04.

Changu and Laghep.

Changu lake is a fairly large one for Sikkim, being quite half a mile long, but like all the Sikkim lakes is almost destitute of plant life.

With the exception of paludal species on the banks it has no phanerogamic flora. A dâk-bungalow is pleasantly situated on the slope at the north end and formed a most convenient centre for my subsequent operations. The route is now little used as the Dzalep La is a more direct road for the Chumbi Valley. The number of storehouses and huts is a reminder of the Tibet expedition when the place had a transient importance. Now it is one of the most desolate posts in Sikkim. The Chumbi boundary at the Nathui La lies about eight miles to the east.

Changu and its lake lie in a hollow girt by irregular ridges which rise to 14—15,000 feet. In the valley basin there is a fair extent of what may be termed coarse meadow, where *Ranunculaceæ* and *Primulaceæ* are much more prominent however than *Gramineæ*. The slopes above are in most places covered with Rhododendrons, but here and there are open spaces cleared by shepherds. These extend in places to the top of the ridges and afford a very varied pasturage of herbs and prostrate shrubs.

On the 6th we climbed the hills lying to the west which do not rise above 14,000 feet. The slopes soon become rocky and barren. The limit of vegetation and the absolute altitude reached by typical individual species seem to be lower here than in other parts of Sikkim. In the Zemu and Llonakh valleys similar plants range at least 1,000 feet higher, but these latter valleys are drier than those of south-east Sikkim and the surrounding sheltering mountains much loftier. Thus in Western and Northern Sikkim an altitude of 15,000 feet gives a conspicuous and varied flora, while a height of 15,000 feet in the Changu area is usually a crest of bare rocks exposed to the force of the rains, so that the altitude reached by prevalent alpines in this area is much lower in many cases than what is recorded in the flora of British India, as a glance at the appended list will show. The snow must lie long on these Chola hills, melting slowly in the prevailing mists, and thus various conditions combine to give the alpine flora an exceedingly short flowering season.

The most tenacious phanerogams on the upper rocks and sometimes the only ones I found were *Primula muscoides* and *Chrysosplenium carnosum*. Minute forms of *Cochlearia, Arenaria, Potentilla, Saxifraga* and *Polygonum* occur sparingly on the wind swept crests. From 12—13,000 feet the vegetation was in early July in full bloom. The tall *Gentiana stylophora* and *Swertia Hookeri* were very conspicuous. *Rheum nobile* was scarce, appearing at 13,500 feet, which is comparatively low for it. *Primula* was especially prevalent with a dozen fine species. The large species of *Senecio* of the section *Ligularia* were just coming into bud and formed a considerable element in the vegetation. As everywhere in

temperate and alpine Sikkim there were miles of Rhododendron, the more alpine species being still in flower. Trees occurred in the more sheltered corners. Two miles above Changu, and also just below the lake, were forests of *Abies Webbiana*. Unfortunately many of the trees were dead, as during the Tibetan expedition their lower bark was freely stripped off by the host of coolies employed for the carriage of supplies and used by them for shelter against the monsoon deluges. So now between Laghep and Changu are scores of naked giants tottering in decay. No other trees were here the rivals of the *Abies* in height or girth. *Acer*, *Prunus*, *Rosa*, *Pirus*, *Viburnum*, *Betula*, *Salix* were present in stunted forms.

The herbaceous flora was at its best and I secured many interesting species. A rare *Potentilla* (*P. sikkimensis* Prain) allied to *P. purpurea* was found on the cliffs about 13,000 feet, and by the lake another new *Swertia* (*S. Burkilliana*.); in shady rocks by the stream a new *Arenaria* (*A. Balfouriana*); *Loxostemon pulchellus* appeared here and there but never in quantity. Ripe fruit of this I have never been able to secure, the plant being difficult to find late in the year. The fruit would be of interest as the position of the genus is still somewhat doubtful. I noticed the occasional presence of bulbils in the axils of the leaves; these are ovoid, apiculate, 8—12 together, and are possibly homologous with the clustered mass of bulbils at the root.

After two days given to the flora round Changu, we ascended on the 9th of July to the Nathui La. The pass is a very easy one to surmount and can be reached within two or three hours from Changu. The elevation is 14,250 feet. The vegetation at the top of the ridge was but little different from what I found at 13,000 feet. The more conspicuous plants were *Caltha scaposa*, *Cochlearia scapiflora*, *Potentilla Sibbaldi*, *P. peduncularis*, *P. microphylla*, *Saussurea* sps., *Rhododendron campanulatum*, *R. anthopogon*, *R. lepidotum*, *Cassiope fastigiata*, *Primula obtusifolia*, *P. Stuartii*, *P. pusilla*, *P. sapphirina*.

Two days were given to the area south of Changu including Laghep. Among the more interesting plants was a *Cardamine* which is, I believe, *Cardamine Griffithii*. Griffith's original specimens from Bhutan have no flowers but the vegetative parts agree. It is a more delicate plant than *Cardamine macrophylla* and makes a better 'cress.' So few alpine species are edible that this one is worth noting in a land where vegetables are scarce. *Rheum acuminatum*, *Rheum nobile* and *Smilacina oleracea* are also worth attention from this point of view. Species of *Arisaema* were plentiful at Laghep but edible only by the greatly daring. *Senecio Kingianus*, a fine new species about three feet high, was also abundant to the south of Changu associated with *S. Mortoni*.

On the 12th we camped at Sherabthang under the Nathui La, and examined the fairly extensive marshes there. One day was given to the ridges which lie between the Dzalep and the Nathui La. The most interesting find was another new *Senecio* (*S. Lagotis*), a handsome plant with large entire leaves resembling those of a *Bupleurum*.

Survey of the Flora in early July.

The following is a brief survey of what seemed to me the chief characteristics of the flora at this season (first half of July). From 12,000 to 13,500 feet the vegetation seemed somewhat backward as compared with the more northerly parts of Sikkim but those species of *Meconopsis, Rhododendron, Primula,* which occur in both areas, appeared to be in about the same stage of development. The more alpine species, 13,000—14,500 feet, were decidedly later than the flora of the Lachen and Lachung valleys. They have to endure more constant rain and obtain much less sun. Pasturage was scanty and flocks few. I saw only one or two herds of cattle and scarcely any yaks. The valleys are open and the slopes of fairly easy ascent except for the Rhododendrons which, when wet, and that is the rule in July, present as uncomfortable a barrier as can be met with in an alpine tract. The bottoms of the valleys are marshy and showed a fine growth of *Caltha, Trollius* and *Primula*. The number of species was not great. Small glacial lakes appeared at intervals as the main passes were approached; the prevailing vegetation fringed their borders but not even *Callitriche* and its allies invaded the chilly waters. *Rhododendron campanulatum* was the chief constituent of the shrubby vegetation, with occasional tracts of *Pirus* and *Salix*. *Berberis macrosepala* was the most prominent of the smaller shrubs. The herbaceous vegetation was very luxuriant, above the general level of which towered the tall *Meconopsis paniculata, Gentiana stylophora, Swertia Hookeri* and *Senecio Kingianus*. The *Primulæ* were a special glory of the slopes and meadows. The most conspicuous was a white *P. Stuartii* with a somewhat oblique corolla, perhaps a distinct species. This was found in great profusion among the Rhododendrons, especially on the rising ground a mile above Changu and close to the road. Smaller and also presenting here a white or very pale yellow corolla was *P. reticulata*. Along with these two and ranging also somewhat lower with a preference for a moister habitat was *Primula sikkimensis* with yellow corolla and sweet scent. *Primula obtusifolia* occurs at the same elevation with a tendency to range higher than the other species. I found it abundant at 14,500 feet, which is high for plants on this range. These four species were in full flower and in the greatest profusion rivalling any display of Cowslips in an English

meadow. Of the smaller flowered species *P. sapphirina* was in thousands, every marsh and every slope being studded with it. *P. pusilla* was associated with it but was much less common. In the drier northern Sikkim it is the most prevalent of the smaller species. *P. soldanelloides* was plentiful in crevices in the wet black rocks about 13,500 feet. Much more occasional was *P. glabra,* almost past flower. Patches of *P. petiolaris* were common enough but this, the earliest of Sikkim *Primulæ,* was long out of flower. *Primula denticulata,* the commonest of the Himalayan primroses, I did not see in this area but its near ally, *P. capitata,* was just opening its flowers. Of the rarer species *P. Kingii* was in profusion in the wet meadows at Sherabthang, 13,000 feet, and all the way to Kapoop. *Primula Wattii*—a beautiful plant rarely met with—was found to the north-west of Changu, on the track which leads to Chamnago at an elevation of over 13,000 feet. *P. Elwesiana,* another rare and striking species, was collected two miles above Changu where a large stream crosses the road. Ranging lower towards Laghep, 9—10,000 feet, were *P. geraniifolia* and *P. vaginata,* the former frequent, the latter very sparingly. *P. muscoides* appeared on the bleak rocks at 14,000 feet, and more rarely *P. tenuiloba. P. involucrata* was frequent in the wet Sherabthang pastures. The genus *Androsace* I did not meet with till later, as it favours the drier regions to the north. I have given in some detail the habitat of these primroses as they are among the most desired of Sikkim plants for European gardens. There is no fear that their inclement home will fail to protect them from unfair depredations. Saxifrages were uncommon but it was early in the season for them. *Saxifraga micrantha* and *S. pallida* were frequent however. *Compositæ* were plentiful but not in full flower. *Senecio* was the predominant genus in the wet region. In northern Sikkim its place is taken by *Saussurea* which favours Tibetan conditions.

So far I had not seen one leguminous plant in the area between 11,000 and 14,000 feet. Of *Rosaceæ, Potentillæ* were prominent with *Geum elatum, Pirus,* and *Rosa sericea. Umbelliferæ, Rubiaceæ* and *Labiatæ* were poorly represented. *Scrophularineæ* were represented by a few species chiefly of *Pedicularis.*

In number of species the vegetation compares favourably with that of West Sikkim though nowhere is it as rich as in such favoured spots as Jongri. The blaze of colour is as fine as anything in the west or north of Sikkim.

The next few days were spent in the neighbourhood of the Nathui La. We made several attempts to penetrate along the boundary north of the pass but found it too arduous a course to the Chola for laden men. Almost continuous mist and rain rendered it difficult to take any

bearings. This boundary ridge is bleak and barren, and is avoided by the shepherds. The tracks of these men tend to keep to the long valley bottoms, working up from Gangtok and the Lachung valley, and crossing the intervening ridges as seldom as possible. It is comparatively easy to visit any of the passes if the valley routes are followed, but to cross from pass to pass along the boundary is very difficult and not advisable with laden men, though the heights are not great as compared with those in other parts of Sikkim. As elsewhere it is the Rhododendron scrub which deters one from attempting apparent short cuts from one valley to the next.

Dikchu Valley and Chamnago.

Returning on the 19th to Changu we arranged our collections and made preparations for the journey to the Dikchu valley. The slight track above the bungalow leads over the ridge which rises to above 13,000 feet, and there follows a dip into a valley with a fairly large stream, as far as I could find out, without name. Then comes a long ascent to 14,000 feet to a long ridge which is much favoured by the shepherds, as several of their 'gôts' were found there. One or two stone huts are on the ridge, a sign that it has been for long a regular summer station of these men. *Primula Wattii* was here fairly abundant. Beyond was dense Rhododendron forest sloping steeply to the Dikchu. This stream in the rains is a rapid torrent even at 12,000 feet and the temporary bridge erected by the shepherds is a rickety structure of poles without handrail and forms an unpleasant hazard in the day's march, especially when a heavy shower brings it level with the water. After crossing we ascended the right bank to Chamnago, where we camped about 12,500 feet. The ground is everywhere a temporary marsh at this season but the traveller will find a convenient triangle of ground for a camp just where the stream forks.

The valley is much narrower than the Nathui La valley with very precipitous sides. The road is merely a track which a moment's inadvertence is sufficient to lose. *Abies Webbiana* is the common tree. Except Juniper I saw no other conifers. The next day we ascended the Chola by the narrow steep path. There is little grazing ground. Above 13,000 feet, the path is very rocky. The pass is 14,700 feet high, slightly higher than the Nathui La and with similar vegetation.

On the following day we descended the Dikchu to Fieungong. *Lilium roseum* was found sparingly. The 24th was given to the ascent of the Yakla. Rain fell all day and the march was eminently disagreeable, about a score of swollen streams having to be forded. Botanically none of these passes are worth a special visit as the hills in the vicinity

of Changu provide in greater profusion all that is to be found at the passes. The number of shepherds' clearings in the Dikchu valley is very limited and makes no appreciable difference to the mass of Rhododendrons. If it were not for their narrow tracks and rough bridges, these areas would be impossible to traverse without a party of pioneers to clear the way. These clearings give an opportunity to many plants which otherwise would be overwhelmed by the Rhododendrons.

The next two days were spent at work in the valley. The most interesting plant obtained was a red flowered *Saxifraga* (*S. Gageana* sp. nov.). Here also was found a species of *Caragana* the first leguminous plant I had seen on these ranges. This absence of *Leguminosæ* is remarkable as at the same elevation in the drier north *Astragali* with allied genera abound while in the equally wet south-west *Piptanthus* at least is common.

The Chakung Chu Valley.

On the 29th we struck north to the Chakung Chu and marched amid a downpour to the morass which was our camping ground. It was fair for the first time in the month from two to six o'clock in the afternoon. This event transformed our camp and cheered us with the hope that another ridge between us and the rains might give us better weather.

Our finds in this region included *Meconopsis bella*, hitherto recorded only from one spot near Megu in Western Sikkim, and *Saxifraga odontophylla*, new to the East Himalayas. It is noteworthy that of the many species of *Saxifraga* known from the Himalayas, all with one or two exceptions appear in Sikkim.

The Chakung Chu takes a precipitous course to the Tista which it reaches ultimately near Tong. About one mile of its course is decked by luxuriant plants of *Meconopsis napaulensis* DC. One fine specimen had 224 flowers and flower buds and stood over 7 feet high. A new *Saxifraga* (*S. pluviarum*) was found on the higher ridges about 14,000 feet.

The next few days were spent in exploring the ridges and slopes of Gaoring and the Chakung valley. The flora is that of the Dikchu valley, but as the area is not quite so exposed to the rainstorms, there is an approximation to the drier Lachung flora. On August 4th we crossed the north affluent of the Chakung Chu and ascended the ridge known as Ningbil which rises to about 15,000 feet and affords an extensive view of the whole of the Sikkim Himalaya from the Singalela in the west to Donkia and Tanka La in the east. The slopes from Ningbil to the torrent known as the Ong Chu are very precipitous and covered with dense rhododendron wherever the slopes are less abrupt.

We had a long search for a gap in the rampart of rock and the only available gorge required a mile of cutting through the scrub to make it practicable. Near a deserted shepherd's camping ground below Ningbil we came across, at 13,000 feet, plants of *Circæaster agrestis*, a rare plant found in the Kumaon hills and also in Tibet and West China. Its small hooked fruits no doubt explain its occasional presence in the vicinity of the sheepfolds.

The area here is undoubtedly less wet receiving about half the rainfall of the outer Chola ridges. Instead of the rain arriving at 8 or 9 A.M. as is the average at Changu and Dikchu, we usually escaped until noon. The chief difference in the vegetation was the almost entire disappearance of the large species of *Senecio* which were so characteristic of the Chungu area.

We spent two or three days at Ningbil and the Ongchu ridges. We bridged the Ongchu and made several attempts to reach the Tanka La from this side but without success.

Gnatong and Dzalep La.

By the 10th we had returned to Changu and after obtaining later stages of the Changu and Laghep flora, marched by way of Kapoop to Gnatong. The opportunity was taken to visit the Dzalep La, the flora of which closely resembles that of the passes to the north. The immediate neighbourhood of Gnatong is of comparatively little botanical interest. The forest of *Abies Webbiana* which was once all round the village has been cleared, and the common weeds of the district occupy the space. By the streams are large plants of *Mandragora caulescens* from two to three feet high, much more robust than the specimens seen near Changu. The calyx in fruit is an inch and a half long, and the fruit over two inches in diameter.

We visited the source of the Gnatong Chu and of the Dikchu, and the boundary hill, Gipmochi, without finding any very good botanical ground. Some miles of the Gnatong Chu which we traversed on the 18th yielded a beautiful *Codonopsis* which frequents the precipitous banks. On the 19th we reached Phadonchen where we spent a day examining the forest flora between 5,000 and 9,000 feet. Hosts of leeches at this season render this area disagreeable to explore. The lower valleys by Ari and Rhenock are interesting but present no botanical features new to those who have visited the opposite slopes of Pedong and Kalimpong.

Weather.

The summer of the Chola Range is a short one and very wet, corresponding to that of the Singalela Range. I kept a rough record of

the last 28 days of July and the first 20 of August. July I spent on the outer and more exposed ridges, August chiefly on the inner. Reckoning from 6 A.M. to 6 P.M., I find that :—

For July—

On 7 days	rain all day.
11 „	fair for two hours on average.
6 „	„ „ five „ „ „
4 „	„ „ eight „ „ „

For August—

1 day	fair for two hours.
13 days	„ „ six „
5 „	„ „ eight „
1 day	„ „ ten „

In the record there is no day but showed some rain. Heavy downpours were the exception in the upper areas where there was usually a steady drizzle. August in the outer ranges was as wet as July and the contrast in the records of the two months brings out very well the gradual lessening of the daily rainfall as the inner ranges were reached. Most of the spurs run east and west and each in succession takes its quantum from the southern rainclouds. One's position in the area could almost be defined during these months by the time the morning rain arrived—the more northerly, the later the rain. Considering the limited amount of sunshine and the scarcity of the ordinary insect visitors, the number of brightly coloured flowers is high. As has been aptly noted by Gammie (Sikkim Gazetteer, 1894, page 109), these brightly coloured flowers are of the types most favoured by bees which are the most usual visitors at these altitudes, other kinds of insects being comparatively rare.

Homogeneity of the Flora.

The flora of the Chola Range between 10,000 to 15,000 feet is very homogeneous and only in the northern area is there a gradual transition to the flora of a drier region. The transition proceeds *pari passu* with the succession of ridges running more or less east and west. As already pointed out, the comparatively low general altitude of the range with the absence of lofty protecting ridges, tends to restrict any tendency to diversity.

In its general features there is a similarity to the flora of the Singalela Range, but the latter with its extensive alpine meadows protected by very lofty ridges is somewhat more prolific in individual species.

The short vegetative season is one of mist and rain. This in conjunction with the low temperature is conducive to the formation of an acid soil. The result is a vegetation which is in many aspects xerophytic.

Of this the Rhododendrons are the most striking example with their tough evergreen foliage in many instances covered with ferruginous wool or with glands and hairs, or with a glaucous waxy coating ; the fleshy corollas are another character. In the subalpine tract they form in great part a forest with a general vegetation level of 20—30 feet, altitude 8—10,000 feet ; from 10—12,000 feet, a bush with an average level of 6—10 feet, and in the upper altitudes to 15,000 feet, a heath of prostrate forms which do not usually rise above 2 feet. The regularity of the diminution of these Rhododendrons with the altitude is noteworthy. Mr. George Forrest who has collected much in Western China (Yunnan), where the specific concentration of the genus is morem arked than even in the East Himalaya, has shown me photographs illustrating the general habit of the Rhododendrons in that region and there the smaller species appear to intermingle much more freely with the bush and tree types and frequently occur below them. Neither in that area, which is much less moist, does the genus appear to be so antagonistic to other genera.

The preponderance of Rhododendrons induced by the climatic factors is no doubt a reason for the comparative absence of variety in herbaceous plants. This has been suggested by Gammie in the Sikkim Gazetteer, 1894, page 102. Shrubs of other genera such as *Berberis, Pirus, Salix* are much less prominent and rarely succeed in monopolising even a small area. Notwithstanding the prevalence of the Rhododendrons, they appear to be slow in reconquering any area from which they have been ejected and the shepherds seem to have little difficulty in keeping their pastures from being overgrown.

Further among the conditions favouring a flora of a restricted character is the homogeneous geological formation. The rocks in the alpine area are chiefly gneissose with little of the micaceous schist which is so conspicuous in the Darjeeling district. I saw no indication of limestone.

Other factors which help to explain the homogeneity are the covering of snow which prevails for the greater part of the year and shortens the vegetative season, the regularity of the moist south winds with frequent mists during that period, and everywhere the steep slopes which are quickly denuded and are usually but sparely covered with soil.

Dominant Orders, Genera and Species.

The dominant orders are *Ericaceæ, Primulaceæ, Compositæ, Crassulaceæ, Saxifragaceæ, Rosaceæ ;* and in a less degree, *Ranunculaceæ, Caryophylleæ, Juncaceæ, Cyperaceæ, Gramineæ, Scrophularineæ, Gentianaceæ, Salicineæ.*

The dominant genera are :—*Rhododendron, Primula, Senecio, Sedum, Saxifraga Potentilla, Gentiana, Pedicularis, Salix, Swertia, Meconopsis,*

Ranunculus, Anemone, and in a less degree, *Juncus, Corydalis, Rheum, Codonopsis, Parnassia, Arisæma.*

The dominant species are :—*Abies Webbiana, Clematis montana, Chrysanthemum Atkinsoni, Senecio Kingianus, Senecio Mortoni, Swertia Hookeri, Gentiana stylophora, Rhododendron campanulatum, Primula sikkimensis, P. reticulata, P. obtusifolia, P. Stuartii, Trollius pumilus, Meconopsis paniculata, Iris Clarkei, Cardamine macrophylla, Lloydia serotina.*

The following are absent, or at least not recorded from the S. E. area :—*Anemone vitifolia, Adonis, Callianthemum, Isopyrum, Hypecoum, Arabis, Tamarix, Coriaria, Oxytropis, Thermopsis, Piptanthus, Deutzia, Philadelphus, Scabiosa, Leptocodon, Pyrola, Ephedra, Picea, Tsuga, Larix; Draba,* the tufted *Arenariæ, Astragalus, Saussurea, Lactuca, Crepis,* are scantily represented.

Protected Flowers.

The character of the climate suggests the need of protection to the flower-organs. There was a profusion of bell-shaped and drooping flowers. In addition to the numerous species of *Rhododendron, Rosa sericea* showed inverted flowers ; while the flowers of *Swertia Hookeri, Gentiana stylophora, Primula* sps., *Meconopsis* sps., *Geranium* sps., *Codonopsis* sps., *Cyananthus, Fritillaria* sps., *Lloydia,* the nodding *Cremanthodia, Senecio* sps., *Cassiope, Enkianthus, Geum elatum, Pedicularis* sps., *Aconitum, Corydalis, Lagotis,* were all fairly secure by structure or position against the downpour.

Isolated Species.

The flora of Sikkim is remarkable for the isolation of many of the species. The physical features of the country, the deep valleys and the sterile mountain ridges are the chief causes of this. Hooker has pointed out in his Himalayan Journals the isolation of even distinct floras such as the temperate flora of the Lachen-Lachung area. The broad belt of Rhododendrons no doubt plays its part in keeping the areas distinct. In all probability many of these unique species will be found to occur in the adjoining parts of Bhutan, Tibet and Nepal, when these come to be known botanically. *Rodgersia pinnata* occurs in one spot only in the North Chakung Chu valley ; it has been found in the Chumbi Valley, and then there is a gap until we reach Western China. As examples of such isolations in the Chola area we may mention *Calathodes, Meconopsis bella, Cathcartia lyrata, Geranium refractum, Senecio Kingianus, Senecio Chola, Saussurea Laneana, Primula Elwesiana, Primula Wattii Swertia Burkilliana.*

Transition to Tibetan Flora.

It has already been noted that the change in the flora as one proceeds northward is a gradual one in the Chola Range. This is in striking contrast to the Singalela and the area lying to the north of it. The two ridges on either side of the Zemu are so uniformly high and unbroken by any southward-tending valley that the aspect of the flora to the north (Llonakh) is quite Tibetan. In the Chola the ranges are lower and are much divided by lateral valleys so that the change to the conditions of Lachung and the Donkia (though these are ultimately quite Tibetan) does not appear so abrupt.

New species from the area.

The following are the new species collected on the tour :—

Paroxygraphis sikkimënsis, Draba cholaensis, Arenaria Balfouriana, Potentilla microphylla Don, var. *pusilla, Saxifraga Gageana, Saxifraga pluviarum, Trachydium affine, Leycesteria Belliana, Senecio biligulatus, Senecio Kingianus, Senecio Lagotis, Senecio Chola, Saussurea nimborum, Saussurea Lanceana, Gentiana pluviarum, Swertia ramosa, Swertia Burkilliana, Pedicularis siphonantha* Don, var. *prostrata* Bonati, *Pedicularis sikkimensis* Bonati. Two species of *Juncus* may prove to be undescribed species but they require fuller investigation and comparison with ampler material of the genus.

General Survey of the Alpine Flora.

The sub-alpine area, 8—10,000 feet above the region of oaks, maples and laurels, presented a nearly uniform level of mixed forest from 20—40 feet high, broken only by the tall *Abies Webbiana*. Rhododendrons formed a large part of this, especially at the upper limit. The zone above 10—12,000 feet consisted chiefly of *Pirus, Salix, Viburnum* and again a majority of Rhododendrons, shrubs rarely exceeding 15 feet in height, though in sheltered areas the *Abies* reappeared. In this zone meadows became more prominent but were never extensive. The zone above 12,000 feet was partly a kind of 'heath' formed by the smaller species of *Rhododendron* and *Salix* and partly subglacial fell-field with a mixture of herbaceous species. In this region annuals were few and bulbous and tuberous species only sparingly represented by *Codonopsis, Mandragora, Cortia, Cochlearia scapiflora, Arisæma, Habenaria, Polygonatum, Allium, Fritillaria, Lloydia*. Towards the ridges the density of vegetation fell away very rapidly and the chaotic masses of bare rocks at the top sheltered only a few hardy forms such as *Chrysosplenium*

carnosum, Primula tenuiloba, P. muscoides and *Polygonum nummularifolium.* True chasmophytic vegetation was scarce; the most noteworthy species were *Corydalis lathyroides, Meconopsis bella, Potentilla eriocarpa, Primula Gambeliana, Primula soldanelloides.*

Ranunculaceæ were represented chiefly by *Anemone, Caltha, Trollius* and small *Ranunculi.* These occurred in large numbers wherever there was any approach to meadow conditions. Aconites were apparently much scarcer than in Western Sikkim. Of *Berberideæ, Decaisnea* frequented the moist woods just below 9,000 feet while *Berberis macrosepala* was a trial to travellers on the higher slopes. *Meconopsis* was plentiful and there were several prolific species of *Corydalis. Cruciferæ* were not well represented; *Cardamine* sps., *Cochlearia* sps., *Draba elata,* being the most conspicuous. The almost entire absence of cultivated land precludes many wide-ranging species usually associated with agriculture. Of *Caryophyllaceæ* the region yielded chiefly species of *Stellaria* and *Arenaria,* mostly straggling forms typical of moist alpine conditions and very different from the "rosette" plants of those genera in northern Sikkim. *Leguminosæ* were almost entirely absent. *Rosaceæ* were represented chiefly by species of *Potentilla* while *Rosa sericea* and *Geum elatum* were common. *Saxifraga* showed many species though not quite so many as in northern Sikkim. This is also true for *Crassulaceæ,* prolific in individuals but restricted in species. *Umbelliferæ* showed more species than in Northern Sikkim but fewer than in the Singalela Range. Both *Caprifoliaceæ* and *Rubiaceæ* were poorly represented; the dearth of species of *Lonicera* is noteworthy. Of the abundant *Compositæ* the most conspicuous were species of *Senecio* of which three are new. *Rhododendron* and *Primula* were the most prevalent genera in the area. *Gentiana* and *Swertia* were also well represented. *Boragineæ* were scarce with the exception of *Paracaryum glochidiatum* and *Onosma Emodi.* In *Solanaceæ, Mandragora caulescens* was the only common plant. As elsewhere in Sikkim, *Pedicularis* was well represented while *Veronica* was not uncommon. In the moist forest *Utricularia* was frequent—two species were found above the forest zone. *Labiatæ* were not common, the most conspicuous members being *Dracocephalum speciosum, Phlomis* sps., and *Calamintha umbrosa.* Species of *Polygonum* were common. *Euphorbiaceæ* and *Urticaceæ* were scarce. Prostrate *Salices* were abundant and in the valleys formed a few bushes of fair height. Among *Monocotyledons, Orchis* and *Habenaria* were frequent; extensive circular areas of *Iris Clarkei* were prominent in the moist valleys, and *Lloydia* was everywhere. *Arisæma* was prominent in both temperate and alpine areas. *Juncaceæ* and *Graminæ* were practically as numerous as in other alpine Sikkim areas.

In the alpine regions ferns were scarce. In the forests around Karponang and Phadonchen they were abundant but my record of species from the sub-temperate area is anything but complete.

Seed-collecting in October.

The native collectors returned to the area in October to collect seeds chiefly those of Rhododendrons for cultivation in Darjeeling and for exchange with botanic gardens in temperate regions. Towards the end of the month Mr. G. H. Cave, Curator of the Lloyd Botanic Garden in Darjeeling, paid a visit to Changu, to inspect the work of the men and to obtain seeds of such species as are apt to be overlooked by the Lepcha collector. He traversed the same route but on arriving at the Chakung Chu, it was found impossible to return by the same path, and an attempt which proved successful was made to reach Tong by descending the valley to where the stream joins the Tista. The following notes furnished by Mr. Cave on the country and the aspect of the vegetation at the beginning of November will be of interest as showing the difficulties of seed-collecting in November on the high Himalaya :—

"Arrived Lagyep October 26th, and after examining and packing the specimens collected by the men, left next morning for Chamnago. Hillmen on the Laghep road had reported that the passes, even the Kangralamo, were still unsnowed or with only light snow. At Chamnago a Chumbi yak-herd was making preparations for departure next morning. He was the last inhabitant, all the others having already gone to winter quarters in the lower valleys.

On the 28th, while the coolies marched towards the Chakung Chu, I paid a visit with two men to the Cho La for seeds of Primula and then followed the route taken by the coolies. Snow fell as we ascended the Doplandim Pass and on the other side it lay thick, making the descent difficult. We pitched on the same site as the August camp and experienced an exceedingly bitter night. Milk in a bottle and water in a glass both froze solid in the night inside the tent. We were snowed up at day break but the morning was fine and the snow melting rapidly we set off up the next pass, though going up and across the ridges was slow and difficult work. We reached the pass about noon and then the snow-clouds gathered thickly again and it became almost dark. Once over the pass it was worse. The snow lay waist deep and hid rocks and shrubs alike. In the steeper parts steps had to be dug for each foothold of the coolies and help given with their loads. In places we formed a line and passed the things from hand to hand. A descent was made to the beginning of the trees (Pines and Rhododendrons) and

in the shelter of a large 'ordar' (leaning rock) we spent the night, the men at once forgetting their sufferings in a hearty meal and copious tea.

It snowed all night and all the next day (30th October). We descended the north branch of the Chakung Chu as the Lepchas said they had heard of a path from there to Tong. To go back over the passes when it was still snowing was impossible. We did not find the path, which was possibly under the snow, but we found traversible ground till noon, when the banks began to grow precipitous, and the river a series of falls. The snow lay at 11,000 feet and below that level the drizzling sleet formed an icy coat on everything. Late in the afternoon we came to a large 'slip' and found the river hemmed in by sheer cliffs, that on the right being so precipitous and smooth that there was no hope of passing it, while the river ran deep along its base. Cutting trees we made a rough bridge and by means of a rope crossed the river and climbed up the cliffs on the other side, by holding on to the vegetation growing in the niches of the rocks; there was no soil. Here we were scarcely in better case and just at dark found a small ledge on which we could sleep and camped there in a fashion. With alternations of sleet and snow we passed a miserable night; in the morning the frozen tents stood erect after their poles were removed. We left the tents as they were and started to look for a way out. The men were decidedly against going back over the last pass. I was for trying to scale a 'chimney' which fissured the rock just where our camp was and see if we could cross the ridge and get to the S. Chakung Chu. On each side of the river the rocks rose in sugar-loaf form, all the upper parts being quite bare. But the men preferred to go along the cliff ahead and we went slowly on, hammering pegs into fissures, cutting down shrubs, and tying notched poles horizontally along the cliff side with roots and climbers to make a way. There was little soil except a treacherous coating of soaking leaf-mould on the steep slopes overhanging the river gorge. There was rain or sleet all day and a dense mist lay over everything. Late in the afternoon we reached a ridge from which we could hear fitfully the noise of a stream to the south-east which we hoped would be the upper Chakung Chu. We waited for some time to see if the mist would clear and give us a look ahead, but we had to retrace our steps without a view and in the absence of suitable camping ground, had to make the best of our previous night's uncomfortable niche.

The morning of the first November found us stiff and sore with the exertions of the previous day, more especially from the work of hacking branches and cutting down trees. Fortunately the snowstorm was

over for a time. Besides food, rugs and the specimens our only baggage was the small tent which I offered to abandon. But the men were in good heart and took everything, carrying the loads however without 'kokuns' (side shoulder lines) and not using the 'numlor' (head-strap). We went slowly over our pegs and notches of the previous day, the loads having to be passed piecemeal at the more awkward places. By noon we reached our ridge and still faced a dense mist and heard no sound of the northern Chakung Chu. Four of us climbed into a tall *Rhododendron Hodgsoni* and sat for nearly an hour waiting for a temporary clearing of the mist. Then for a few minutes we had a view which was both cheering and magnificent. Magnificent because in a terrific gorge was the junction of the two Chus and the united river going west, the whole shut in by three tremendous cliffs. Cheering because the belt of forest between us and the upper (north-east) Chakung Chu looked to be traversible as indeed it proved to be. The men ran down the steep forest slopes and camped quite happily a long way above the junction of the two streams. Before nightfall one of the men crossed on a fallen tree and found the remains of an old path on the other side.

In the morning we had to wait some time to get the tent sufficiently thawed to fold up but got across the stream by 9 A. M. The slender path took us up to 13,000 feet where we lost it in the snow but not before we reached a peak where we could see the Tista river and Cheungtong bungalow as well as the whole country from Chakung Chu to Sandakphu. Two other paths were tried, both evidently tracks of the kustorah (muskdeer) hunters, but these also ended in a blank. As we were surrounded by snow and precipices we followed a small watercourse till we got clear of the snow and some time after dark found a rock which gave no shelter but was dry at the base. Here we piled up dead bamboos (Maling) for fuel and in the morning continued our way down. Another tract ended abruptly but by now we were near enough the Tista to cut our way to Tong bungalow. The forest here is full of leeches but a good botanizing ground.

The men throughout behaved admirably and no permanent ill-effects resulted from their exertions."

Aspect of Alpine Flora in October.

"The chief impression received during a tour in late October and early November along the Cho-La range was the rapidity with which the alpine vegetation prepared for winter."

Frost had already "scorched" the grass and most of the herbage. Annual plants were mere dry sticks. Almost the only green leaf was

that of an Umbellifer (*Trachydium* sp.) of small size. *Saxifraga* sp., *Gentiana amoena*, and a stray *Erigeron multiradiatus* were the only plants in flower.

Notwithstanding the winter aspect of the vegetation, however, the seeds of scarcely any species were entirely shed, those of the great majority of plants were shed only to a partial or small extent, and again others were quite unripe. The following had shed all or almost all their seeds:—*Anemone vitifolia*; (some heads of seed were noticed still keeping their spherical form, although quite separated at the base from the old flowerhead and the sphere somewhat expanded); *Corydalis* sps., *Meconopsis bella*, *M. simplicifolia*, *M. paniculata*, *M. horridula*; (in all cases some seed remained in the lower part of the capsule of the Meconopsis;) *Cathcartia villosa*—the same; *Primula obtusifolia*, *Pedicularis* sps., *Swertia* sps.; *Oxyria digyna* and *Rheum acuminatum* had lost seeds, although the majority of the *Polygonaceæ* were still unripe; some of the *Compositæ*; the majority of the *Cruciferæ*, *Lloydia serotina*.

The seeds of practically all the rest of the plants were still unshed, although in many cases the stems were dry and the seed rattling in the capsules—this was noticeably the case with the Aconites.

Some perennial plants had made up the "bud" on the apex of the crown for the winter, as in the case of some of the Saxifrages and *Parnassia* (the large *Saxifraga purpurascens* in particular), many of the *Compositæ*, *Rheum acuminatum*, *R. nobile*, *Iris Clarkei*, etc. Others had developed 'rosettes' of young leaves, lying more or less curled over each other towards the centre, and quite distinct from the old withered leaves outside; examples of this were:—*Anemone obtusiloba* and *A. rupicola*; *Meconopsis paniculata* and *M. nepaulensis*; these were 6 to 8 inches across and the leaves densely villous; *Cortia Hookeri*; *Primula sikkimensis*, *P. obtusifolia*, the crown almost hard and leafless enough to call a bud; *P. Stuartii*, *P. petiolaris*; *Bryocarpum himalaicum*.

Others again had the small growths, with very small but fully developed leaves, clustering round the old stems as:—*Inula Hookeri*, *Erigeron multiradiatus*, *Polygonum campanulatum*, *Euphorbia sikkimensis*.

The tops of tuberous and bulbous plants were as a rule quite dead, in some cases dry, in others mucilaginous. No seedlings from seed of current season were seen, although in cases the seed of the same plants grown on the rockery at Darjeeling gives quite stocky little plants before the end of December.

Rhododendron seeds were collected from about 14 species and all except three of these were amongst the snow, the smaller plants being

almost buried in it. The capsules had not begun to split however, except in the case of *R. campanulatum, R. campylocarpum, R. cinnabarinum, R. Wightii, R. Hodgsoni* (at a lower level).

When the capsules of the other species were fractured they were found to be almost dry, woody and brittle, and the seeds themselves ripe. The capsules were therefore gathered, tied loosely in large bags of thin cloth and on arrival at Darjeeling these bags were daily laid in a sunny spot till the capsules opened naturally, as they did in about a month.

In this way were obtained seeds of *R. anthropogon, R. arboreum, R. camelliæflorum, R. glaucum, R. lepidotum, R. Maddeni, R. setosum, R. Thomsoni.*

I am of opinion that if the whole capsules are gathered early in November, and treated as noted above without any attempt to open them by artificial heat, that most of the seeds will be good. *Rhododendron ciliatum* was in bud and in some cases opening flowers on November 2nd at 13,000 feet. Plants brought to Darjeeling some years ago do not flower till February-March.

The mixed forest of 9—13,000 feet had a gorgeous appearance in consequence of the brilliant colouring of the fading leaves, the most noticeable being golden yellow—*Acer Campbelli, Acer sikkimensis,* and an Araliad; bronze—*Pirus sikkimensis;* silver gray—*Pirus vestita;* scarlet—*Pirus microphylla, Rosa sericea,* and *Acer Hookeri;* shades of brown—the Rhododendrons.

I have to acknowledge much kind assistance in the identification of my specimens. Some of the more critical species were examined in the Kew Herbarium, and I am indebted to Mr. W. G. Craib for his opinion on these. M. Bonati has dealt with the genus *Pedicularis;* Mr. I. H. Burkill with the *Gentianaceæ;* Oberpfarrer Kükenthal with the *Cyperaceæ,* and M. Hamet with the *Crassulaceæ.*

For help in the field, I owe much to the enthusiasm of Mr. Cave who has added several species to the records of the area, and to the untiring energy of Ribu and Rhomoo, the Lepcha collectors, whose record of work in the higher Himalaya is a very honourable one.

SYSTEMATIC LIST.

DICOTYLEDONS.

I.—RANUNCULACEÆ.

1.—CLEMATIS Linn.

1. **Clematis montana** Ham.
   Laghep, Changu, Chola Range, 9—13,000 ft., No. 3322.
   More sparingly in the north of this area.
   VAR. **tongluensis.**
   Dikchu Valley, 11,000 ft., No. 3829.
2. **Clematis smilacifolia** Wall.
   Ari, Rhenok, 3—5,000 ft.
3. **Clematis acuminata** DC.
   near Laghep, 7,000 ft.
4. **Clematis connata** DC.
   Ari, 6,000 ft.
5. **Clematis Buchananiana** DC.
   Phadonchen, 9,000 ft.

2. THALICTRUM Linn.

6. **Thalictrum elegans** Wall.
   Laghep, Chamnago, 11—13,000 ft., No. 3803.
7. **Thalictrum Chelidonii** DC.
   Chola Range, Gnatong, 11—12,000 ft., No. 3722.
8. **Thalictrum virgatum** Hook. f. & Thom.
   Laghep, 11,000 ft., No. 3055.
9. **Thalictrum alpinum** L.
   Fieunggong, Ningbil, 12—15,000 ft., Nos. 3876, 4086.
10. **Thalictrum javanicum** Bl.
    Phadonchen, 7—9,000 ft., No. 4405.

11. Thalictrum foliolosum DC.
Changu, W. of Tanka La, 12—13,000 ft.

3. Anemone Linn.

12. Anemone rupicola Camb.
Above Changu, 14,000 ft., No. 3535. Rare.

13. Anemone vitifolia Ham.
Lower Chakung Chu towards Keadom, 7,000 ft.
Only in the drier region.

14. Anemone Griffithii H. f. & T.
Changu, 12,000 ft., No. 3138.
Rare. This is a tall form differing much in habit from the 8—9,000 ft. plant

15. Anemone obtusiloba Don.
Changu, Chola, 11—14,000 ft., No. 3079. Sparingly.

16. Anemone rupestris Wall. nec F.B.I.
Changu, 12—14,000 ft., Nos. 3099, 3179, 3561.
A dwarf form very common in the area, scarcely one inch high. Root almost bulbous. Plant nearly glabrous with petals white above, bluish below ; stamens with very broad, almost elliptic filaments, and ovaries glabrous.

17. Anemone trullifolia H. f. & T.
W. of Changu, 12,000 ft., No. 3279.

18. Anemone rivularis Ham.
Near Lachung, 9,000 ft., No. 3341.

19. Anemone demissa H. f. & T.
Changu, Chola, Dzalep La, 12—15,000 ft., Nos. 3455, 3677.
VAR. **monantha** Brühl
Near Tanka La, 15,000 ft., No. 523 *Gammie* !

20. Anemone polyanthes Don.
Lachung, Changu, Chola, 12—14,000 ft., Nos. 3098, 3177, 3317, 3694.
Very common and very variable in colour throughout the area.

4. Ranunculus Linn.

21. Ranunculus Cymbalariæ Pursh.
Laghep, Changu, Tanka La, 12—14,000 ft., Nos. 3144, 3294, 3304, 3594.

22. Ranunculus pulchellus C. A. Mey.
Lingtu, Lachung, 10—13,000 ft.
The var. *sericea* I did not see in the moist region.

23. Ranunculus lobatus Jacq.
Chola range, 16,000 ft., No. 820 *Gammie*!

24. Ranunculus hyperboreus Rottb.
Nathuii La, Chola, 13—15,000 ft., Nos. 3399, 3454, 3914.

25. Ranunculus affinis Br.
Changu, Dzalep La, Gnatong, 12—14,000 ft., No. 3278.

26. Ranunculus hirtellus Royle
Changu, Karponang, 9—13,000 ft., Nos. 3070, 3176, 3177.

27. Ranunculus nivalis Linn.
Tanka La, 16,000 ft., fide *Hooker f.*

28. Ranunculus diffusus DC.
Karponang, Changu, 7—11,000 ft., No. 2971.

29. Ranunculus flaccidus H. f. & T.
Karponang, Changu, 9—12,000 ft., No. 3178.

5. Oxygraphis Bunge

30. Oxygraphis polypetala H. f. & T.
Changu, Lingtu, 12—13,000 ft., Nos. 3196, 3286.

I did not find *O. glacialis* Bunge in the area; it occurs to the north in the drier ranges.

6. Paroxygraphis W. W. Smith. Genus novum.

Habitus *Oxygraphidis perpusillæ* sed flores dioici. Structura floris cum *Oxygraphide* non quadrat. Ab *Hamadryade* habitu, sepalis persistentibus, quinque petalis inconspicuis satis distinctum. Species unica.

31. Paroxygraphis sikkimensis W. W. Smith, sp. nov.

Planta nana plus minusve 1 cm. alta, perennis, acaulis, glabra, scapo unifloro; plantæ multæ in glebam parvam congestæ. *Radicis* gracilis corona squamis ovato-acuminatis et foliorum reliquiis obtecta. *Folia* 2—10, omnia radicalia, ad 1 cm. petiolata; lamina minima, 1 mm. longa, fere 1 mm. lata, late ovata, cordata, coriacea, integra. *Scapus* solitarius, 5—7 mm. longus, erectus. *Sepala* quinque, oblonga vel obovata, apice rotundata, 3 mm. longa, subcoriacea, persistentia, 3-nervia. *Petala* quinque cum sepalis alternantia, subviridia, fere translucida, discreta, in laminam 1 mm. longam fere 1 mm. latam, (folio similem magnitudine et forma) ovatam, 3-nerviam, et in unguem 1 mm. longum oblongum extensa. *Stamina* 10, in medio toro sine carpellorum vestigiis inserta, 2 mm. longa. *Carpella* 10—15, in planum torum laxe inserta, nec in

convexum receptaculum compacta; ovarium 1 mm. longum, triangulari—ovoideum, glabrum, læve, nec striatum, stylo recto, apiculato, persistente, 1 mm. longo. *Ovulum* singulum a basi cavitatis adscendens. *Achenia* matura disjuncta ecalyce persistente facile delabuntur.

Sikkim :—In the wetter ranges at 12—14,000 ft., near Changu bungalow, in the Dikchu valley, in the Chola Range below the Tanka La, Nos. 3204, 3318, 3359, 3635, 3864, *Smith*; at Jongri, No. 139 *Gammie*! and in Kew Herbarium, *Watt*!

7. Caltha Linn.

32. Caltha palustris Linn.

Changu, 10—13,000 ft., No. 3263. Common.

33. Caltha scaposa H. f. & T.

Changu, Gnatong, 10—12,000 ft., Nos. 3071, 4545.

Very common.

8. Calathodes H. f. & T.

34. Calathodes palmata H. f. & T.

Dickchu Valley, 10,000 ft., *Gammie*!

I did not observe this rare plant.

9. Trollius Linn.

35. Trollius pumilus Don

Changu, 11—12,000 ft., Nos. 3056, 3297.

Very common.

10. Delphinium Linn.

36. Delphinium viscosum H. f. & T.

No. 885 *Gammie*!

In the Flora of British India, Vol. I, p. 27, the sepals of this plant are said to be light blue. I found the sepals in my Sikkim specimens to be yellowish with the semi-transparent look of the bracts in *Saussurea obvallata*; peta's purplish with glistening bronzy hairs. This is the only *Delphinium* I saw in the area *D. glaciale* however is found at 16,000 ft. on the Donkia La, a little to the north.

11. Aconitum Linn

37. Aconitum luridum H. f. & T.

Changu, Chola, Chakung Chu, 12—14,000 ft., Nos. 4058, 4205, Frequent.

38. Aconitum palmatum D Don

Yakla, 14,000. Sparingly.

39. **Aconitum spicatum** Stapf
W. of Tanka La, 12,000 ft. Sparingly.
40. **Aconitum laciniatum** Stapf
Gnatong, Chola, Ningbil, 11—13,000 ft., Nos. 3746, 4135. Common throughout.
41. **Aconitum heterophylloides** Stapf
Lingtu, 10,000 ft.

II.—MAGNOLIACEÆ.

12. Talauma Juss.

42. **Talauma Hodgsoni** H. f. & T.
Phadonchen, 5—6,000 ft.

13. Magnolia Linn.

43. **Magnolia Campbellii** H. f. & T.
Phadonchen, 7—8,000 ft. No. 4485.
44. **Magnolia globosa** H. f. & T.
Tanka, 9,000 ft., *Gammie* !

14. Michelia Linn.

45. **Michelia excelsa** Bl.
Phadonchen, Ari, 5—8,000 ft.
46. **Michelia lanuginosa** Wall.
Phadonchen, 6,000 ft.

15. Schizandra Michx.

47. **Schizandra elongata** H. f. & T.
Phadonchen, 7—8,000 ft.

16. Kadsura Kæmpf.

48. **Kadsura Roxburghiana** Arn.
Cheungtong, 5,000 ft., No. 3350.

III.—BERBERIDEÆ.

17. Decaisnea H. f. & T.

49. **Decaisnea insignis** H. f. & T.
Karponang, Phadonchen, 7—9,000 ft., Nos. 2997, 3358.

18. Holbœllia Wall.

50. **Holbœllia latifolia** Wall.
Karponang, Phadonchen, 7—9,000 ft.
VAR. **angustifolia.**
Phadonchen, 8—9,000 ft.

19. Mahonia Nutt.

51. **Mahonia nepalensis** DC.
Karponang, 7—8,000 ft.

20. Berberis Linn.

52. **Berberis umbellata** Wall.
Common in the Chola Valley, 11—12,000 ft., No. 3736.
53. **Berberis Wallichiana** DC.
Karponang, 9,000 ft.
54. **Berberis angulosa** Wall.
Gnatong, 11—12,000 ft., No. 4376.
55. **Berberis macrosepala** Hook. f.
Changu, Chola, 13—13,500 ft., No. 3140.
An abundant and troublesome shrub, usually two to three feet high.
56. **Berberis concinna** Hook. f.
Chola Valley, Laghep, 11—12,000 ft., No. 3761.
Occasional.

IV.—PAPAVERACEÆ.

21. Meconopsis Vig.

57. **Meconopsis horridula** H. f. & T.
Chola, Gaoring, 14—16,000 ft., No. 3990.
Frequent in rocky places near the summit of the ridges.
VAR. **racemosa.**
Ningbil, 14—15,000 ft., No. 4077.
58. **Meconopsis sinuata** Prain
Changu, 12—13,000 ft., No. 3147.
59. **Meconopsis paniculata** Prain
Changu, Chola, 10—11,000 ft. Frequent

60. Meconopsis napaulensis DC. nec F.B.I.

Chakung Chu, 11—12,000 ft., Nos. 3962, 4465 *Ribu* !

In this valley grows to 5—7 ft. high, with flowers 3 in. across and occasionally over 300 on one plant.

61. Meconopsis simplicifolia Walp.

Changu, Chola, 12—14,000 ft. Common.

62. Meconopsis bella Prain

Tosa, Chakung Chu, 14—15,000 ft., Nos. 3926, 4084, 4463 *Ribu* !

A rare plant, found usually in the moist crevices of cliffs facing north.

22. Cathcartia Hook. f.

63. Cathcartia villosa Hook. f.

Laghep, Chola 9—12,000 ft., No. 3298.

Abundant at the former place.

64. Cathcartia lyrata Cummins & Prain

Karponang, Sherabthang, Dikchu Valley, 9,500—13,000 ft., Nos. 3168, 3758, 4308.

Distributed over the area but very sparingly. I have not seen more than half a dozen plants in one spot.

V. FUMARIACEÆ.

23. Dicentra Borkhaus

65. Dicentra scandens Walp. nec F.B.I.

Karponang, Phadonchen, 7—9,000 ft. Very common.

24. Corydalis DC.

66. Corydalis cashmeriana Royle

VAR. **ecristata.**

Changu, Nathui La, Tosa, Mugbil, 13—14,500 ft., Nos. 3237, 3310, 3770, 3954, 4089. Common.

67. Corydalis trifoliolata Franch.

Gnatong, 12,000 ft., *King's collector* !

68. Corydalis lathyroides Prain

Ningbil, Tosa, 13—14,000 ft., Nos. 3941, 4114.

Has a stout rootstock nearly 5 cm. long and 6 mm. thick. Old leaf-bases practically gone. Flowers 1·6 cm. long, yellow ; upper petal shortly crested, winged, with two reddish spots near apex ; spur equal in length to lamina, yellow, straight or curved downwards slightly. Lower petal exceeding upper, carinate, winged, grooved above, with two red spots below. Laterals yellow, united above.

69. Corydalis graminea Prain

Dikchu, Tosa, Pemberingo, 11—14,000 ft., Nos. 3715, 4072.

Roots numerous, tuberous.

70. Corydalis juncea Wall.

Changu, Dzalep, Ningbil, 12—13,000 ft., Nos. 4120, 4329.

71. Corydalis flaccida H. f. & T.

Laghep, Changu, 10—12,000 ft., No. 3384. Common.

72. Corydalis Laelia Prain

Changu, Chola, Dikchu, 12—13,000 ft., Nos. 4198, 4224, 4275.

Leaf segments obtuse, acute, or acuminate. Flowers one inch long, with large dorsal crest, projecting forward. Lower petal with a large projecting keel. The upper crest and lower keel project 6 mm. beyond the beak. Flowers yellow.

73. Corydalis Casimiriana Duthie & Prain

Kapoop, Chola, Tanka La, Nos. 4217, 4230.

74. Corydalis longipes DC.

Dzalep, Sherabthang, Ningbil, 12—14,000 ft., Nos. 4124, 4303, 4339.

VAR. **chumbica** Prain MSS.

Species distincta ? floribus albis (semper ?) stigmate diverso, carcare multum curvato, distinguenda.

Lieutenant-Colonel Prain, when discussing (Journ. As. Soc. Beng. LXV. p. 28) the relationships between *Corydalis Casimiriana* and *C. longipes* points out that neither of these is in the least degree variable, at all events in the direction of passing into each other. " An apparent exception to this is a solitary gathering from Chumbi which with flowers exceedingly like those of *C. Casimiriana* has unripe capsules like those of *C. longipes*. But the evidence that we have in this plant an intermediate between *C. Casimiriana* and *C. longipes* is far from complete. It flowers instead of being intermediate in form between those of the other two have a spur with an exaggerated curvature. The stigma too differs from that in either *C. Casimiriana* or *C. longipes* and resembles that of *C. tongolensis* Franchet from Szechuen, another nearly related but nevertheless quite distinct species." The plant is referred in the Calcutta Herbarium to *C. longipes* DC. var. *chumbica* but in a note on the cover Colonel Prain states that it is probably a distinct species. Without a careful study of this and its close allies I hesitate to do more than append the following field notes :—

Root weak, fibrous. *Stem* glabrous, much branched from the base. *Leaves* long petioled, almost triternate ; apices and sinuses of segments marked with a black dot *Racemes* simple elongate. *Bracts*, lower similar to the leaves, gradually becoming simpler until only trifid leaves. *Flowers* distant. *Sepals* two, fimbriate whitish scale 1 mm. broad. *Corolla* whitewitha tinge of blue, spur white with a bluish central

thread ; in the original Chumbi specimens the colour is given yellow as reported by the native collector ; the anterior part of the corolla is a deep blue with a little green and still less yellow ; upper petals crested very distinctly, 1—1·2 cm. long, including spur which is strongly uptilted, obtuse ; lower petal boat-shaped with a constriction in the middle, keeled distinctly ; laterals coherent. *Stamens* with broad elliptic white translucent filaments. *Style* 1 mm., filiform ; fruit immature 8 mm. long, 2·5 mm. broad, linear-oblong.

Chamnago, 12,000 ft., No. 3658. Chumbi, at Ta-Ohey Kung, No. 525 *King's collector* !

75. Corydalis chaerophylla DC.

Karponang, Fieunggong, Ningbil, 9—13,000 ft., Nos. 2977, 3881, 4162. Common.

76. Corydalis geraniifolia H. f. & T.

Lachung valley, 9,000 ft. *Gammie* !

77. Corydalis meifolia Wall.

Sherabthang, Yak La, 14—15,000 ft., Nos. 3573, 3776.

Flowers in a dense flat corymb with very stout pedicles one inch or less. Corolla yellow with a purple base and spur, a green band on either side of the crest and on either side of the keel. Posterior petal broad with two yellow wings and a high yellow crest ending in a very short obtuse down-turned spur, only ¼ length of lamina. Anterior petal stout with a very broad keel and purplish base. Lateral petals with linear claws, apices stout adherent ridged and crested, inner surface grooved and purple at tip.

VAR. **sikkimensis** Prain

Ningbil, 14,000 ft., No. 4214.

78. Corydalis latiflora H. f. & T.

Nathui La, Chola, Gaoring, 14—15,000 ft., Nos. 3486, 3682, 3988.

Petals a light blue with many minute darker blue spots. The upper and lower petals are each marked 1 mm. from the apex, by a pair of eye-like spots black behind greenish-yellow before. Posterior petal 1·5 cm., or less, ·5 cm. broad stout, firm, shortly crested, winged more, apex triangular firm ; spur 1 mm. obtuse, curved downwards. Anterior petal boat-shaped, 1·2 cm. long, with firm triangular apex. Laterals 1 cm., upper half purplish, lower bluish white, grooved sagittate in front, keeled and ridged behind, coherent at the apex by a whitish twin horse-shoe.

79. Corydalis Stracheyi Duthie

Sherabthang, Gnatong, Tosa, 13—14,000 ft., Nos. 3552, 3567, 3930, 4067. Common.

VI.—CRUCIFERÆ.

25. Barbarea Br.

80. Barbarea vulgaris Br.
var. **sicula.**
Changu, Chola Valley, 11—13,000 ft., Nos 3074, 3123, 3296, 3696.

26. Cardamine Linn.

81. Cardamine circaeoides H. f. & T.
Lower Chakung Chu, 6—7,000 ft.

82. Cardamine trifoliolata H. f. & T.
Karponang, Laghep, 8—11,000 ft., Nos. 3031, 3046, 3257.

83. Cardamine hirsuta Linn. VAR. **sylvatica** Link (sp.)
Karponang, 7—9,000 ft. Common.

84. Cardamine impatiens Linn.
Lachung Valley, 9—10,000 ft.

85. Cardamine Griffithii H. f. & T.
Between Laghep and Changu, 11,000 ft., Nos. 3376, 3515, 4234.

Griffith's specimens from Bhutan have no flowers (F.B.I. i, p. 139). Leaflets entire or rather indistinctly trilobate. Sepals broadly elliptic to almost orbicular, 2mm. long with a fine translucent margin, somewhat erose at the apex. Petals 5 mm. long, obovate, slightly emarginate, lilac. Edible and a more delicate 'cress' than the next species.

86. Cardamine macrophylla Willd.
VAR. **sikkimensis.**
Changu, Chamnago, 10—12,000 ft. Very common.

27. Loxostemon H. f. & T.

87. Loxostemon pulchellus H. f. & T.
Changu, Chamnago, 11—13,000 ft., No. 3173.

28. Draba Linn.

88. Draba alpina Linn.
Sherabthang, W. of Tanka La, 14—15,000 ft., Nos. 3546, 4184.
Not common on this range.

89. Draba elata H. f. & T.

Changu, Nathui La, Dzalep, 11—13,000 ft., Nos. 3069, 3262, 4338. Common.

90. Draba gracillima H. f. & T.

Sherabthang, Changu, Tosa, 12—14,500 ft., Nos. 3094, 3441. Common.

91. Draba cholaensis W. W. Smith sp. nov.

Sectionis *Drabellæ* species; *Drabæ gracillimae* H. f. & T., affinis; majoribus floribus, fructu capillis albis sparse induto satis distincta.

Planta annua radice debili. Omnino habitus *Drabae gracillimae*. *Caules* 5—10 cm. alti, multi, filiformes, debiles, flexuosi, ascendentes, sparse albo-villosi. *Folia radicalia* delapsa (plantae graminibus intermixtae); *caulina* 1 cm. longa, 4mm. lata, remota, elliptica, sessilia, integra, sparse albovillosa, nervis obscuris. *Flores* 1—3, fugacei, remoti, racemosi, ebracteati, superiore dimidio scapi 5—10 cm. longi aphyllo, pedicellis 1—3 cm. longis, filiformibus, flexilibus. *Sepala* 3 mm. longa, ovata, obtusa, glabra, rarius subglabra. *Petala* 7—8 mm. longa, oblonga, apice rotundata, flava. *Gynæceum* 8 mm. longum, stylo 1·5 mm. longo; fructus 2 cm. longus, 1·5 mm. latus, linearis, compressus, sparse albo-villosus, seminibus +20, biseriatis.

West of Tanka La, Sikkim, very sparingly at an elevation of 13,000 ft., No. 4175.

29. Cochlearia Linn.

92. Cochlearia serpens W. W. Smith (Rec. Bot. Surv. Ind. iv, 175).

Changu, Sherabthang, Gnatong, 11—14,500 ft., Nos. 3487, 3577, 4311, 4551. Petals dark lilac. Very common at Changu.

93. Cochlearia scapiflora H. f. & T.

Changu, Chola, Tosa, Chakung Chu, 13—15,000 ft., Nos. 3169, 3229, 3685, 4069, 4552.

VAR. foliis grosse obtuse dentatis, floribus albis; Tosa, 15,000 ft., No. 3981.

The *Cochleariæ* of the Alpine East Himalaya are very puzzling. In addition to the two above, there are *C. Hobsoni* Pearson from Yatung in Tibet, near the Sikkim border (Hook. Ic. 2643) and *C. himalaica* H. f. & T. collected in Alpine Sikkim by Hooker. In their typical forms all four appear distinct enough but at the higher altitudes the dwarf specimens become scarcely distinguishable. I have been long in

doubt regarding the validity of *C. serpens*. Specimens were sent to Kew for comparison with the Hookerian type of *C. himalaica*, represented there by only one sheet. In the Calcutta Herbarium there is only a meagre fragment. *C. serpens* certainly does not match these type sheets. At Changu the ample material of this species aided me to note the following differences from the description of *C. himalaica*. The leaves are usually tripartite, and when not so, are ovate; the racemes are very elongate, not short; sepals are not persistent, are glabrous with membranous margins; the fruits tend to be one-seeded. I did not find in alpine Sikkim a *Cochlearia* to match the Hookerian specimens of *Cochlearia himalaica* H. f. & T. *C. scapiflora* in its normal development is very distinct but shows considerable variety in the form of its leaves and in the colour of the flower; its minute forms approximate to the dwarfs of the other two species.

30. Sisymbrium Linn.

94. Sisymbrium himalaicum H. f. & T.

Changu, Ningbil, 11—13,000 ft., Nos. 3121, 4150.

95. Sisymbrium deltoideum H. f. & T.

Sherabthang, Chamnago, 12—14,000 ft., Nos. 3392, 3450, 3775. Petals lilac.

31. Eutrema Br.

96. Eutrema primulæfolium H. f. & T.

W. of Tanka La, Lachung, 10—13,000 ft., Nos. 3331, 4716 *Ribu*!

32. Erysimum Linn.

97. Erysimum longisiliquum H. f. & T.

Ningbil, 13,000 ft., No. 4170.

33. Thlaspi Linn.

98. Thlaspi cochlearioides H. f. & T.

Gaoring, W. of Tanka La, 14—15,000 ft., Nos. 4004, 4220.

VII.—CAPPARIDEÆ.

34. Capparis Linn.

99. Capparis multiflora H. f. & T.

Below Phadonchen, 4,000 ft.

VIII.—VIOLACEÆ.

35. Viola Linn.

100. Viola biflora Linn.

Laghep, Changu, Tosa, 8—14,500 ft., Nos. 3181, 3291. Very common.

101. Viola Hookeri Thoms.

Karponang, 8—9,000 ft., No. 3028.

IX.—PITTOSPOREÆ.

36. Pittosporum Banks.

102. Pittosporum floribundum W. & A.

Phadonchen, 8,000 ft., No. 4647 *Ribu*!

X.—POLYGALEÆ.

37. Polygala Linn.

103. Polygala arillata Ham.

Ari, Karponang, Phadonchen, 5—7,000 ft.

104. Polygala sibirica Linn.

W. of Tanka La, 9,000 ft., No. 3339.

XI.—CARYOPHYLLEÆ.

38. Gypsophila Linn.

105. Gypsophila cerastioides Don

Changu, Tosa, 11—14,000 ft., Nos. 3067, 3162, 4065. Common.

39. Cucubalus Linn.

106. Cucubalus bacciferus Linn.

W. of Tanka La, 12,000 ft., *Ribu*!

40. Lychnis Linn.

107. Lychnis apetala Linn.

Chakung Chu, Ningbil, 11—13,000 ft., Nos. 3974, 4139.

108. Lychnis nigrescens Edgew.

Gaoring, Ningbil, Gipmochu, 13—15,000 ft., Nos. 3994, 4177, 4352.

109. Lychnis himalayensis Edgew.
Changu, 13,000 ft., No. 4271.

110. Lychnis multicaulis Wall.
W. of Tanka La, 4743 *Ribu* !

111. Lychnis nutans Benth.
Changu, Chamnago 11—12,000 ft., Nos. 3659, 4252. Frequent.

41. Cerastium Linn.

112. Cerastium vulgatum Linn.
Changu, Chola Valley, 11—12,000 ft., No. 3739.

42. Stellaria Linn.

113. Stellaria sikkimensis Hook. f.
Phadonchen, Karponang, 8—9,000 ft., No. 4490.

114. Stellaria lanata Hook. f.
Laghep, Lachung, 9—10,000 ft., Nos. 3065, 3329.

115. Stellaria longissima Wall.
Lower Chakung Chu, 8—9,000 ft., No. 3349.

116. Stellaria saxatilis Ham.
Gangtok, Karponang, 6—7,000 ft., No. 2960.

117. Stellaria uliginosa Linn.
Changu, 12—13,000 ft., No. 3492.

118. Stellaria subumbellata Edgew.
W. of Tanka La, 12,000 ft.

119. Stellaria depauperata Edgew.
Changu, 11—12,000 ft., No. 4210.

120. Stellaria decumbens Edgew.
Laghep, Changu, Chola, Gnatong, 11—13,000 ft., Nos. 3523, 4360.
Frequent but not nearly so variable as in drier Sikkim.

121. Stellaria sp.
Karponang, 11,000 ft., Nos. 3038, 3084. Perhaps only a variety of the polymorphic *S. decumbens*.

43. Arenaria Linn.

122. Arenaria polytrichoides Edgew.
Nathui La, Kapoop, Chola, Ningbil, 14—15,000 ft., Nos. 3419, 3456, 3700. Sparingly.

123. Arenaria densissima Wall.

Ningbil, 15,000 ft., No. 4094. Rare.

124. Arenaria orbiculata Royle

Ningbil, 11,000 ft., No. 4212. Occasional.

125. Arenaria ciliolata Edgew.

Gaoring, Tosa, Ningbil, 14—15,000 ft., Nos. 3999, 4037, 4079.

Frequently tetramerous, with two styles. Style and filaments bluish. Sparingly.

126. Arenaria glanduligera Edgew.

Dzalep, Chamnago, 12—15,000 ft., Nos. 3807, 4327. Sparingly.

127. Arenaria Balfouriana W. W. Smith. sp. nov.

Locus mihi dubius; ob glandulas quinque quadratas staminiferas in grege *Pentadenaria* species ponenda sed habitu potius ad *Odontostemma* spectat. Sed styli tres et petala integra.

Planta perennis procumbens, laxe cæspitosa, radice longa gracili, apice incrassata. *Caules* e radicis coronâ 2—6 orti, ad 10 cm. longi, debiles, prostrati, filiformes, vix nisi apud inflorescentiam ramosi, suprà glandulosis albidis capillis pubescentes, in medio nonnunquam capillis crispatis 2-lineati, basi glabrescentes, rubescentes, teretes. *Folia* linearia, 5—6 mm. longa, 1 mm. lata, apiculata, subflaccida, uninervia. *Flores* in cymas 2—6 floriferas trichotomas plus minusve *re* diffusas dispositi. *Pedicelli* proplanta longi, (1—3 cm.) debiles; bracteæ foliis similes vix minores. *Sepala* 5, lineari-lanceolata, 2 mm. longa, acuta, vix basi indurata, uninervia, scarioso-marginata. *Petala* 3—4 mm. longa, alba, anguste elliptica, apice rotundata, integra. *Discus* lobatus, in 5 glandulas staminiferas quadratas purpureas expansus. *Stamina* 10, biseriata, subcœrulea. *Styli* 3, subcœrulei. *Capsula* ovoideo-globosa, ut videtur 6 dentibus dehiscens; semina immatura pauca, compressa, subauriformia.

Sikkim :—In the region of heavy rains, 12—14,000 ft., near Changu and to the west of Tanka La, by the rocky banks of streams, Nos. 4222, 4246. The specific name is in honour of Prof. I. B. Balfour of Edinburgh University.

128. Arenaria melandryoides Edgew.

Ningbil, Gaoring, W. of Tanka La, 14—15,000 ft., Nos. 4103, 4176. Sparingly.

129. Arenaria Benthami Edgew. *A. glandulosa* Williams.

Changu, Dikchu, Tosa, 11—14,000 ft., Nos. 3110, 3718, 3924. Common.

130. Arenaria debilis Hook. f.
Chola, 14—15,000 ft., No. 3678. Sparingly.

XII.—TAMARISCINEÆ.

44. Myricaria Desv.

131. Myricaria germanica Desv.
Lower Chakung Chu, Lachung, 9—12,000 ft. Not seen in the south of the area.

XIII.—HYPERICINEÆ.

45. Ascyrum Linn.

132. Ascyrum filicaule Dyer
Yakla, 14,000 ft., No. 3780.

46. Hypericum Linn.

133. Hypericum Hookerianum W. & A.
Phadonchen, Karponang, Chola, 7—11,000 ft., No. 3838
VAR. **Leschenaultii.**
Fieunggong, 10,000 ft.

134. Hypericum patulum Thunb.
Phadonchen, 8—9,000 ft., No. 4388.

135. Hypericum reptans H. f. & T.
Lachung, Chakung Chu, 8—9,000 ft.

136. Hypericum petiolulatum H. f. & T.
Phadonchen, Laghep, Changu, 9—12,000 ft.
Common in the valleys.

137. Hypericum japonicum Thunb.
Rhenock, Ari, 3—5,000 ft.

XIV.—TERNSTRŒMIACEÆ.

47. Eurya Thunb.

138. Eurya symplocina Bl.
Phadonchen, 6—7,000 ft.

139. Eurya acuminata DC.
Ari, Rhenock, 5—6,000 ft.

48. Actinidia Lindl.

140. Actinidia strigosa H.f. & T.
Phadonchen, 7—8,000 ft., No. 4488.

49. Saurauja Willd.

141. Saurauja napaulensis DC.
Ari, 5,000 ft.

142. Saurauja punduana Wall.
Temi, 5,000 ft., No. 2917.

50. Schima Reinw.

143. Schima Wallichii Choisy
Ari, 5,000 ft.

XV.—MALVACEÆ.

51. Bombax Linn.

144. Bombax malabaricum DC.
Ari, 3,000 ft.

XVI.—TILIACEÆ.

52. Echinocarpus Bl.

145. Echinocarpus dasycarpus Benth.
Phadonchen, 6–7,000 ft.

53. Elæocarpus Linn.

146. Elæocarpus lanceæfolius Roxb.
Phadonchen, 7,000 ft.

XVII.—LINEÆ.

54. Reinwardtia Planch.

147. Reinwardtia trigyna Planch.
Rhenock, 4,000 ft.

148. Reinwardtia tetragyna Planch.
Ari, 4—5,000 ft.

55. Anisadenia Wall.

149. Anisadenia saxatilis Wall.
Ari, 5,000 ft., No. 4503.

XVIII.—GERANIACEÆ.

56. Geranium Linn.

150. Geranium refractum Edgew. & Hook. f.
Changu, 12—13,000 ft., Nos. 3533, 4284, 4293. Rare.

151. Geranium Donianum Wall.
Kapoop, Chola, 11—13,000 ft.

152. Geranium Grevilleanum Wall.
Chola, 11—12,000 ft. Sparingly.

153. Geranium nepalense Sweet
Phadonchen, 8—9,000 ft.

154. Geranium polyanthes Edgew. & Hook. f.
Laghep, Changu, Fieunggong, 9—12,000 ft.

57. Oxalis Linn.

155. Oxalis acetosella Linn.
Changu, 11—12,000 ft., No. 4249.

58. Impatiens Linn.

A few specimens of *Impatiens* were collected and forwarded to the late Sir Joseph Hooker. They were however in too early a stage to warrant description.

XIX.—RUTACEÆ.

59. Bœnninghausenia Reichb.

156. Bœnninghausenia albiflora Reichb.
Ari, 5,000 ft.

60. Evodia Forst.

157. Evodia fraxinifolia Hk. f.
Phadonchen 7—8,000 ft.

158. Evodia rutæcarpa H.f. & T.
Lachung, 9,000 ft., No. 4730 *Ribu!*

61. Zanthoxylum Linn.

159. Zanthoxylum acanthopodium DC.
Phadonchen, 7,000 ft.

160. Zanthoxylum oxyphyllum Edgew.
Karponang, Phadonchen, 6—8,000 ft.

62. Toddalia Juss.

161. Toddalia aculeata Pers.
Phadonchen, 5—6,500 ft.

63. Skimmia Thunb.

162. Skimmia Laureola Hook. f.
Karponang, Phadonchen, 8—10,000 ft.

XX.—BURSERACEÆ.

64. Garuga Roxb.

163. Garuga pinnata Roxb.
Ari, 3,000 ft.

65. Canarium Linn.

164. Canarium sikkimense King
Ari, 3,000 ft.

XXI.—MELIACEÆ.

66. Lansium Rumph.

165. Lansium decandrum King
Temi, 6,500 ft., No. 2914.

67. Cedrela Linn.

166. Cedrela microcarpa C. DC.
Phadonchen, 6,000 ft.

XXII.—ILICINEÆ.

68. Ilex Linn.

167. Ilex intricata Hook. f.
Lachung, Phadonchen, 9—10,000 ft., Nos. 3321, 4387, 4752.

168. Ilex fragilis Hook. f.
Karponang, 9,000 ft., No. 3252.

169. Ilex Hookeri King
Phadonchen, 9—10,000 ft., No. 4433.

XXIII.—CELASTRINEÆ.

69. Euonymus Linn.

170. Euonymus frigidus Wall.
Fieunggong, Phadonchen, 8—9,000 ft., Nos. 3901, 4427.

171. **Euonymus vagans** Wall.
Gangtok, Karponang, 4—8,000 ft.

XXIV.—AMPELIDEÆ.

70. Vitis Linn.

172. **Vitis capreolata** Don
Karponang, Phadonchen, 7—8,000 ft., No. 4458.

XXV.—ACERACEÆ.

71. Acer Tournef.

173. **Acer oblongum** Wall.
Cheungtong, 6,000 ft.

174. **Acer lævigatum** Wall.
Cheungtong, Karponang, 6—8,000 ft.

175. **Acer pectinatum** Wall.
Laghep, 11,000 ft.

176. **Acer caudatum** Wall.
Changu, 12,000 ft., No. 3208.

177. **Acer Campbellii** H. f. & T.
Karponang, Phadonchen, 9—11,000 ft. Common.

XXVI.—SAPINDACEÆ.

72. Dobinea Ham.

178. **Dobinea vulgaris** Ham.
Cheungtong, Phadonchen, 6—7,000 ft.

73. Turpinia Vent.

179. **Turpinia pomifera** DC.
Cheungtong, Ari, 6—7,000 ft.

XXVII.—SABIACEÆ.

74. Meliosma Bl.

180. **Meliosma Wallichii** Planch.
Phadonchen, 8,000 ft., No. 4478.

XXVIII.—ANACARDIACEÆ.

75 Rhus Linn.

181. Rhus insignis Hook. f.
Karponang, Phadonchen, 6—7,000 ft.

182. Rhus succedanea Linn.
Phadonchen, 7—8,000 ft.

XXIX.—LEGUMINOSÆ.

76. Piptanthus D. Don

183. Piptanthus nepalensis D. Don
W. of Tanka La, Lachung, 8—10,000 ft. Not seen in the wetter southern area.

77. Priotropis W. & A.

184. Priotropis cytisoides W. & A.
Gangtok, Karponang, 6—7,000 ft.

78. Parochetus Ham.

185. Parochetus communis Ham.
Phadonchen, 8,000 ft. Very occasional in the area.

79. Indigofera Linn.

186. Indigofera Dosua Ham. VAR. **tomentosa.**
Ari, 5,000 ft.

80. Caragana Lamk.

187. Caragana crassicaulis Benth.
North of Chamnago, 13,000 ft., No. 3846. Flowers purple. The plants seen in N. W. Sikkim in 1909 had yellow flowers. Sparingly.

81. Astragalus Linn.

188. Astragalus sikkimensis Benth.
Ningbil, 14,000 ft., No. 4169. Sparingly.

189. Astragalus xiphocarpus Benth.
W. of Tanka La, 11,000 ft.

190. Astragalus stipulatus D. Don
W. of Tanka La, towards Keadom, 7—8,000 ft.

82. Desmodium Desv.

191. Desmodium tiliaefolium G. Don
W. of Tanka La 7—9,000 ft.

192. Desmodium kulhaitense C. B. Clarke
Ari, 3,000 ft., No. 4501. A rare species.

83. Erythrina Linn.

193. Erythrina arborescens Roxb.
Ari, 5-6,000 ft.

84. Pueraria DC.

194. Pueraria peduncularis Grah.
Lachung, Karponang, Cheungtong, 6—9,000 ft.

85. Entada Adans.

195. Entada scandens Benth.
Phadonchen, ascending to 7,000 ft.

XXX.—ROSACEÆ.

86. Prunus Linn.

196. Prunus rufa Wall.
Changu, Chola, 11—12,000 ft., No. 3207.

197. Prunus anadenia Koehne
Karponang, 9—10,000 ft.

This is the *Prunus Padus* L. of the Flora of British India. See Fedde's Repertorium, x, 34.

198. Prunus glaucifolia (Wall.) Koehne
Laghep, Fieunggong, 10—12,000 ft., No. 3880.

199. Prunus nepalensis Ser.
Phadonchen, 7—8,000 ft.

200. Prunus acuminata Wall.
Cheungtong, Lower Chakung Chu, 6—7,000 ft., No. 4769 *Ribu*!

87. Prinsepia Royle

201. Prinsepia utilis Royle
Lower Chakung Chu, towards Keadom. Only in the drier region.

88. Spiræa Linn.

202. Spiræa Aruncus Linn.

Karponang, Chakung Chu, Gnatong, 9—12,000 feet, No. 4377.

203. Spiræa bella Sims

Changu, Dikchu, 8—12,000 feet. Common.

204. Spiræa micrantha Hook. f.

Dikchu, 7—8,000 feet, No. 3825.

89. Neillia Don

205. Neillia thyrsiflora Don

Temi, Karponang, 5—7,000 ft.

206. Nellia rubiflora Don

Karponang, Chola, Phadonchen, 8—10,000 ft., No. 3001.

90. Rubus Linn.

207. Rubus calycinus Wall.

Phadonchen, Karponang, 7—9,000 ft.

208. Rubus paniculatus Smith

Phadonchen, 8,000 ft. Very common.

209. Rubus moluccanus Linn. *lato sensu.*

Karponang, Phadonchen, 7—9,000 ft. Common.

210. Rubus fragarioides Bertol.

Changu, Chola, 10—12,000 ft., No. 3049.

211. Rubus lineatus Reinw.

Karponang, Phadonchen, 8—9,000 ft. Common.

212. Rubus Andersoni Hook. f.

Phadonchen, 9,000 ft., No. 4424.

213. Rubus niveus Wall.

Karponang, Changu, Chola, 8—12,000 ft. Common.

1. Geum Linn.

214. Geum elatum Wall.

Changu, 12—13,000 ft., Nos. 3089, 3451. Common. Flowers, nodding.

VAR. **humile**, with the type, No. 3174.

92. Fragaria Linn.

215 **Fragaria vesca** Linn. VAR. **collina.**

Karponang, Chola, 8—12,000 ft., No. 2713.

93. Potentilla Linn.

216. **Potentilla Sibbaldi** Haller f.

Common throughout the area, 10—15,000 ft., Nos. 3058, 3165, 3871.

VAR. **micrantha**

Nathui La, Cho La, 14—15,000 ft., Nos. 3226, 3672.

217. **Potentilla perpusilloides** W. W. Smith

Tosa, Kapoop, Chakung Chu, 14—15,000 ft., Nos. 3417, 3575, 3666, 3944, 4020.

Fairly frequent on the Chola Range just at the limit of vegetation.

218. **Potentilla purpurea** Royle

Tosa, 14—15,000 ft., No. 3952.

219. **Potentilla sikkimensis** Prain

Changu, 13,000 ft., No. 3164.

220. **Potentilla albifolia** Wall.

Changu, 10—12,000 ft., No. 3062.

221. **Potentilla fruticosa** Linn.

Changu, Chola, Gnatong, 11—13,000 ft.

Not so conspicuous on this range as elsewhere in Sikkim.

222. **Potentilla ambigua** Camb.

Gnatong, 12,000 ft., No. 4378.

223. **Potentilla eriocarpa** Wall.

Nathui La, Ningbil, Tosa, 13—15,000 ft., Nos. 3462, 4035, 4085.

224. **Potentilla Mooniana** Wight

Karponang, Changu, 9—12,000 ft., No. 2976. Common.

225. **Potentilla fulgens** Wall.

Changu, Chola, 9—12,000 ft., No. 3368.

226. **Potentilla Griffithii** Hook. f.

Lachung, 9—12,000 ft.

I did not see this species in the south-east moist region.

227. **Potentilla peduncularis** Don

Common in the Chola range, 12—14,000 ft.

VAR. **Clarkei**

Yakla, Lingtu, 12—13,000 ft.

228. Potentilla leuconota Don

Changu, 11—13,000 ft., Nos. 3404, 3692.

229. Potentilla microphylla Don

Common throughout the range, 12—15,000 ft., No. 3553.

VAR. **achilleaefolia**

Nathui La, 13,000 ft., No. 3203.

VAR. **commutata**

Changu, Tosa, Gaoring 10—15,000 ft., Nos. 3054, 3993, 4049. Stamens frequently only ten.

VAR. **pusilla** var. nov.

Nana, glabra; interdum folii costa perpaucis capillis albis adpressis instructa; folia 1—2 cm. longa; flores 1—2, fere sessiles, pedunculi 1—2 mm., sepala bracteaeque lanceolata; petala 3 mm. longa, obovata; stamina 10; achenia 20—30, receptaculo villoso.

Sherabthang, Chola 14—15,000 ft., Nos. 3481, 3909.

230. Potentilla coriandrifolia Don

Throughout the range from 13—14,000 ft., Nos. 3415, 3946, 4047.

In the "Flora of British India," ii, 353, the petals are described as yellow, The herbarium specimens confirm this in several instances. But the majority including all those I have collected show white petals with the lower fourth of a reddish purple.

94. Poterium Linn.

231. Poterium filiforme Hook. f.

Sherabthang, Dikchu, 12—14,000 ft. Nos. 3238, 3714.

232. Poterium diandrum Wall.

Changu, Chola, 11—13,000 ft. Common.

95. Rosa Linn.

233. Rosa macrophylla Lindl.

Laohung Valley, 9,000 ft. No. 3343.

Not seen in the south-east area.

234. Rosa sericea Lindl.

Throughout the area, 8—13,000 ft.

96. Pirus Linn.

235. Pirus sikkimensis Hook. f.

Lower Chakung Chu, 8—9,000 ft.

236. Pirus vestita Wall.

Phadonchen, 9—10,000 ft. Common.

237. Pirus foliosa Wall.

Chamnago, Chola, 11—13,000 ft., No. 3141. Common.

238. Pirus microphylla Wall.

Throughout the area, 11—14,000 ft.

239. Pirus Griffithii Dene.

Phadonchen, 8—10,000 ft.

240. Pirus rhamnoides Dene.

Karponang, 9,000 ft., No. 3253.

97. Photinia Lindl.

241. Photinia integrifolia Lindl.

Phadonchen, Karponang, 7—8,000 ft.

98. Cotoneaster Linn.

242. Cotoneaster frigida Wall.

Lachung Valley, W. of Tanka La, 9,000 ft., No. 3337.

243. Cotoneaster acuminata Lindl.

Gnatong, Chola, 10—12,000 ft., Nos. 3762, 4375.

244. Cotoneaster microphylla Wall. VAR. **glacialis.**

Sherabthang, 14,000 ft., No. 3459.

245. Cotoneaster thymifolia Hort.

Tanka La, *Gammie*!

XXXI—SAXIFRAGACEÆ.

99. Rodgersia Gray

246. Rodgersia pinnata Franch.

North Chakung Chu, 12,000 ft., No. 4681 *Ribu*!

A very interesting discovery as it is the first record of the occurrence of the genus within the Indian area. No. 21 *Scaright* from 9—10,000 ft. in the Chumbi Valley, a fragment in fruit collected in December 1904, is no doubt the same. Distribution:—China.

100. Saxifraga Linn.

247. Saxifraga odontophylla H. f. & T.

Ningbil, Tosa, 13—14,500 ft., Nos. 3940, 4066, 4075, 4467 *Ribu*!

A West Himalayan plant not previously recorded from Sikkim. Locally abundant.

248. Saxifraga palpebrata H. f. & T.

VAR. **elliptica.**

Tosa, 15,000 ft., No. 3986.

249. Saxifraga cordigera H. f. & T.

The commonest saxifrage on the Chola Range, 12—15,000 ft.

250. Saxifraga aristulata H. f. & T.

Ningbil, 14—15,000 ft., No. 4088.

***251. Saxifraga Kingiana** Engler Mss. in Herb. Calc.

Ningbil, W. of Tanka La, 13—14,000 ft., Nos. 4116, 4174.

252. Saxifraga saginoides H. f. & T.

Sherabthang, Tanka La, 14—15,000 feet, Nos. 3547, 4221.

A variety with petals scarcely exceeding the sepals, and three nerved, is also common, Tosa, Gaoring, 14—15,000 ft., Nos. 3982, 3996, 4050.

253. Saxifraga diversifolia Wall.

Changu, Chakung Chu, Tosa, 13—14,000 ft., Nos. 4015, 4060, 4269.

VAR. **parnassifolia.**

Chola, *King's collector* !

VAR. **elliptica.**

Changu, Gnatong, 12—13,000 ft., Nos. 4241, 4282.

254. Saxifraga corymbosa H. f. & T.

Ningbil, Tosa, Dzalep, 13—14,500 ft., Nos. 3939, 4083, 4219, 4326.

Not typical; usually only one flowered and yet not dwarf. Possibly a distinct species.

255. Saxifraga pallida Wall.

Sherabthang, Cho La, 12—14,000 feet, No. 3912.

256. Saxifraga micrantha Edgew.

Kapoop, Gnatong, Changu, Chola, 12—14,000 ft., Nos. 3114, 4011. Common.

257. Saxifraga Gageana W. W. Smith. (Rec. Bot. Surv., iv, 265),

Ningbil, Tosa, W. of Tanka La, 14—14,500 ft., Nos. 4091, 4180 4461 *Ribu* !

258. Saxifraga pluviarum, W. W. Smith, sp. nov.

Species valde affinis *Saxifragae pallidae* Wall., floribus minutis, bulbillis crebris distincta.

* These sheets do not agree with *Saxifraga Kingiana* as recently published by Engler and Irusher, pages 574 and 610 of Bot. Jahrbuch, vol. 48, Heft. III & IV, 1912. q.v. [Editor.]

Saxifragae dallidae habitus. Caulis 5—7 cm., longus, flexilis, supra pubescens, infra fere glaber. *Folia radicalia* 2—3, lamina 10—15 mm. longa, 5—8 mm. lata, ovata vel elliptica, fere integra vel remote dentata, ad 1·5 cm. late petiolata; *folia caulina* nulla. *Inflorescentiae* subcorymbosae, ramuli bracteis ad 12 mm. longis linearibus rarius ovato-lanceolatis instructi; flores 1-nati, ad 4 mm. pedicellati ramulos terminantes, subnutantes, minores quame is *Saxifragae micranthae* Edgew; bulbilli 4—8, sub flore terminali in spica nascentes, ad 4 mm. bracteati, virides vel purpurei, ovoidei, 1 mm. longi, interdum 1—2 minutis foliis rotundatis instructi. *Sepala* 5, linearia oblonga, 2 mm. longa, glabra. *Petala* 5, vix calycem excedentia, anguste ovata vel obovata, alba. *Gynæceum* fere globosum, 1 mm. altum, stylis nullis.

Tosa, Chola Range, East Sikkim at an elevation of 14—15,000 ft., No. 3985.

This species is closely allied to *Saxifraga pallida* and *Saxifraga micrantha*. These two are prevalent throughout alpine Sikkim but neither in the field nor in the herbarium have I seen any bulbilliferous forms. Both are found in the same area as *Saxifraga pluviarum*, *S. pallida* ranging even higher, but the dwarf forms of each appear fairly distinct. In the Flora of British India, ii, 394 C. B. Clarke suggests that perhaps when more material accumulates *S. micrantha* will be merged in *S. pallida*. I have collected both many times in different areas and have never found a satisfactory series of intermediates. It seems better meanwhile to accord all three specific rank.

259. Saxifraga imbricata Royle

Tosa, 15,000 ft., No. 3983.

260. Saxifraga coaretata W. W. Smith (Rec. Bot. Surv., Ind. iv, 194). VAR. **elliptica.**

W. of Tanka La, 14,000 ft., No. 4186. Planta laxior; *petala* elliptica, angustiora, nec orbicularia, alba.

261. Saxifraga inconspicua W. W. Smith (Rec. Bot. Surv. Ind., iv, 194). Chola, Nathui, Ningbil, 14,500—15,000 ft., Nos. 3456, 3485, 3674, 3675, 3859, 4090.

262. Saxifraga Jacquemontiana Decne.

Sherabthang, Chola, 14—15,000 ft., Nos. 3549, 4045.

Sometimes with the petals not exceeding the sepals.

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

Chakung Chu, Gaoring, 13—15,000 ft., Nos. 3852, 3992.

264. Saxifraga brachypoda Don

Changu, Ningbil, Gnatong, 12—13,000 ft., Nos. 4227, 4319.

265. Saxifraga fimbriata Wall.

Ningbil, 12—13,000 feet, No. 4140.

266. Saxifraga hispidula Don

Common throughout the Chola range, 12—15,000 ft., Nos. 494, 4215, 4355.

267. Saxifraga Brunoniana Wall.

Ningbil, 13,000 ft., No. 4154.

268. Saxifraga purpurascens H. f. & T.

Changu, Tosa, 10—15,000 ft., Nos. 3122, 3928. Very common.

101. Tiarella Linn.

269. Tiarella polyphylla Don

Karponang, 9,000 ft. No. 3002.

102. Chrysosplenium Linn.

270. Chrysosplenium nepalense Don

Changu, Chola, 11—14,000 ft. Common.

271. Chrysosplenium alternifolium Linn.

Nathui La, Tosa, 13—14,000 ft.

272. Chrysosplenium carnosum H. f. & T.

Common at 13—15,000 feet, throughout the Chola range, Nos. 3171, 3686.

103. Parnassia Linn.

273. Parnassia mysorensis Heyne

Chola, 13,000 ft., No. 3913.

274. Parnassia nubicola Wall.

Changu, Chola, 11—12,000 feet.

275. Parnassia ovata Ledeb.

Common throughout the Chola range, 11—14,000 ft., Nos. 3843, 4550.

276. Parnassia pusilla Wall.

Changu, Chola, 12—15,000 ft. Common.

277. Parnassia tenella H. f. & T.

Laghep, Ningbil, 10—11,000 ft., Nos. 3380, 3416, 4210.

104. Hydrangea Linn.

278. Hydrangea altissima Wall.

Common from 8—10,000 ft., in the area.

105. Dichroa Lour.

279. Dichroa febrifuga Lour.
Phadonchen, 7—8,000 ft..

106. Philadelphus Linn.

280. Philadelphus coronarius Linn.
W. of Tanka La, Chakung Chu, 8—9,000 ft. Not seen in the moist S. E. area.

107. Ribes Linn.

281. Ribes glaciale Wall.
Laghep, Chola, Chakung Chu, 10—12,000 ft. Common.

282. Ribes desmocarpum Wall.
W. of Tanka La, 8—10,000 ft.

283. Ribes luridum H. f. & T.
Chakung Chu, 11—12,000 ft.

284. Ribes Griffithii H. f. & T.
Chamnago, 11—12,000 ft. No. 4424 *Ribu* !

XXXII.—CRASSULACEÆ.

108. Sedum Linn.

285. Sedum Oreades (Clarke) Hamet
Ningbil, W. of Tanka La, 12—14,000 ft., Nos. 4157, 4251.

286. Sedum quadrifidum Pall.
Very common throughout the Chola range, 12—14,000 ft. Nos. 3191, 3446, 3471, 3783, 3958, 4189.

287. Sedum himalense Don
Changu, Chamnago, Chola 11—13,000 ft. Nos. 3189, 3537, 3788. Common in the Chola range.

288. Sedum Quevai Hamet
Changu, 12—14,000 ft., Nos. 3190, 3489.

289. Sedum bupleuroides Wall.
Changu, Chamnago, Tosa, 13—14,000 ft., Nos. 3538, 3791, 4483, *Ribu* ! Common.

290. Sedum elongatum Wall.
Common throughout the range, 12—13,000 ft., Nos. 3188, 3543, 3701, 3887.

291. Sedum crassipes Wall.

Common throughout the range, 11—14,000 ft., Nos. 3578, 3790, 4016, 4506, 4582 *Ribu* !

292. Sedum roseum Stev.

Frequent in the Chola range, 12—14,000 ft., Nos. 3096, 3192, 3303, 3447, 3469, 3493, 4030, 4031.

293. Sedum trifidum Wall.

Karponang, 8—10,000 ft., common.

294. Sedum multicaule Wall.

Cheungtong, Lower Chakung Chu, 6—7,000 ft., No. 4774 *Ribu* !

295. Sedum verticillatum (H. f. & T.) Hamet

Ningbil, 11,000 ft., No. 4141.

XXXIII.—HAMAMELIDEÆ.

109. Bucklandia Br.

296. Bucklandia populnea Br.

Phadonchen, 7—8,000 ft.

XXXIV.—HALORAGEÆ.

110. Callitriche Linn.

297. Callitriche stagnalis Scop.

Karponang, 6—9,000 ft.

298. Callitriche verna Linn.

Chola, 11,000 ft., No. 3733.

XXXV.—MELASTOMACEÆ.

111. Oxyspora DC.

299. Oxyspora paniculata DC.

Ari, Phadonchen, 3—7,000 ft.

112. Sonerilla Roxb.

300. Sonerilla Kurzii C. B. Clarke

Ari, 5,000 ft., No. 4520.

113. Sarcopyramis Wall.

301. Sarcopyramis nepalensis Wall.

Common at 8—9,000 ft.

XXXVI.—ONAGRACEÆ.

114. Epilobium Linn.

302. Epilobium reticulatum C. B. Clarke
Ningbil, 12—13,000 ft., No. 4173.

303. Epilobium origanifolium Lamk.
VAR. **Balansae.**
Karponang, Changu, Chamnago, 9—12,000 ft., Nos. 2992, 3540, 3870.

304. Epilobium alpinum Boiss. (nec Linn. of F. B. I.)
Changu, 13,000 ft., No. 3520.

305. Epilobium tetragonum Linn.
Chakung Chu, 11—12,000 ft., No. 3978.

306. Epilobium amplectens Hassk ?
Changu, Chamnago, 11—12,000 ft., Nos. 3117, 3869.

115. Circæa Linn.

307. Circæa lutetiana Linn.
Phadonchen, 8—10,000 ft.

308. Circæa alpina Linn.
Changu, Chakung Chu, 11—12,000 ft., No 3579.

XXXVII.—CUCURBITACEÆ

116. Trichosanthes Linn.

309. Trichosanthes Wallichiana Wight
Phadonchen, 7,000 ft., No. 4461.

117. Herpetospermum Wall.

310. Herpetospermum caudigerum Wall.
Common at 7—8,000 ft., No. 4777 *Ribu* !

118. Warea Clarke.

311. Warea tonglensis C. B. Clarke
Phadonchen, 7—10,000 ft., No. 4432. Frequent.

119. Edgaria Clarke.

312. Edgaria darjeelingensis C. B. Clarke
Phadonchen, 7—8,000 ft., No. 4418. Common.

XXXVIII.—BEGONIACEÆ.

120. Begonia Linn.

313. Begonia Josephi A. DC.
Phadonchen, 6—8,000 ft.

314. Begonia laciniata Roxb.
Song, Samatek, lower Dikchu Valley, 6—7,000 ft., No. 3355.
VAR **flava.**
Namchi, 5,000 ft., No. 2907.

315. Begonia megaptera A. DC.
Gangtok, Karponang, 7—8,000 ft.

XXXIX.—UMBELLIFERÆ.

121. Hydrocotyle Linn.

316. Hydrocotyle javanica Thunb.
Phadonchen, Ari, 3—8,000 ft.

122. Sanicula Linn.

317. Sanicula europæa Linn.
Common, 7—11,000 ft.

123. Vicatia DC.

318. Vicatia millefolia C. B. Clarke
Changu, Ningbil, 11—14,000 ft., Nos. 4106, 4144, 4286.

124. Trachydium Lindl.

319. Trachydium novemjugum C. B. Clarke
Kapoop, 12,000 ft., No. 3412.

320. Trachydium affine W. W. Smith. sp. nov.

Species *Trachydio novemjugo* Clarke proxima sed diverso habitu gracilior, evolutior, foliorum segmentis angustioribus nec orbicularibus.

Herba perennis radice longa fusiforme. *Caulis* ad 25 cm. longus, gracilis, striatus, glaber. *Folia* subradicalia, 2—3, ad 10 cm. longa pinnata ; vagina magna, alba, membranacea ; petiolus 2—2-plo laminam excedens ; pinnae 5—7, ellipticae vel cuneato-obovatae, 1 cm. longae, 5 mm. latae, apice serratae, vel 5—6-fidae. *Umbellae* 2—3, inferiores in singulis bracteis foliaceis axillantes, superior terminalis 2—3 bracties,

ad 2—3 cm. longis, in segmenta linearia 3—7-fidis, instructa, radis 4—6, gracilibus, 2—3 cm. longis ; umbellulorum radii 8—10, bracteolis 2—3 quam bracteis minoribus sed subsimilibus. *Petala* orbicularia, lurido-viridia. *Discus* conspicuus, 6—8-lobus. *Fructus* immaturus, ovoideus, subquadratus, sub calycis margine constrictus, carpellis 9-jugatis. Sikkim Himalaya :—Ningbil, Chola range, at an elevation of 13,500—14,000 ft., Nos. 4109, 4115.

A species closely allied to *Trachydium novemjugum* with similar fruits at the early stage, and with the same lurid green petals. *Trachydium novemjugum* comes from the drier, more exposed hills of north Sikkim ; the moister conditions of the Chola range may be sufficient to account for the marked difference in habit, which brings the species near in appearance to *Trachydium obtusiusculum*.

321. **Trachydium obtusiusculum** C. B. Clarke

Changu, Chola, Ningbil 11—14,500 ft., Nos. 4048, 4288.

VAR. **stricta.**

Chola, Dzalep, 13,500 ft. No. 4333.

125. **Bupleurum** Linn.

322. **Bupleurum Candollii** Wall.

Common, 10—13,000 ft., throughout the area.

323. **Bupleurum longicaule** Wall.

VAR. Changu, Laghep, 10—12,000 ft., Nos. 3309, 3365. Very common.

324. **Bupleurum falcatum** Linn.

VAR. **gracillimum** (Klotzsch) Wolff.

Laghep, Fieunggong, 10—11,000 ft., No. 3073.

126. **Pimpinella** Linn.

325. **Pimpinella Hookeri** C. B. Clarke

Chola, 11—12,000 ft., No. 3708.

326. **Pimpinella tenera** Benth.

Common, 10—14,000 ft., Nos. 3172, 3361.

VAR. ? Nos. 4287, 4487, 4553.

327. **Pimpinella acronemaefolia** C. B. Clarke

Nathui La, Changu, 13,000 ft., Nos. 4270, 4524.

328. **Pimpinella diversifolia** DC.

Common, 8—10,000 ft., No. 4416.

329. **Pimpinella trifoliata** Wall.

Chola, 12,000 ft., No. 3613.

127. Oenan Linn.

330. Oenanthe Thomsoni C. B. Clarke
Phadonchen, Karponang, 6—8,000 ft.

128. Selinum Linn.

331. Selinum tenuifolium Wall.
Changu, Chola, Gnatong, 10—13,000 ft. Common.

332. Selinum Condollii DC.
Chakung Chu, Chamnago, 12—13,000 ft., No. 3815.

129. Cortia DC.

333. Cortia Lindleii DC.
Common throughout the Chola Range, 12—15,000 ft.

334. Cortia Hookeri C. B. Clarke
Changu, Tosa, 13—16,000 ft., more sparingly than in northern Sikkim.

130. Pleurospermum Hoffm.

335. Pleurospermum sikkimense C. B. Clarke
Changu, Tosa, Ningbil, Gnatong, 12—14,000 ft.

336. Pleurospermum Benthami C. B. Clarke ?
Changu, Chola, 11—13,000 ft., Nos. 3586, 3728, 4024. Closely allied if not equivalent to the Nepal plant of Wallich.

337. Pleurospermum dentatum Benth.
Dikohu, Ningbil, 11—13,500 ft., Nos. 3765, 4129.
VAR. **erosa**
Dzalep, 12—13,000 ft., No. 4330. Doubtfully distinct.

338. Pleurospermum apiolens C. B. Clarke
Nathui La, Chamnago, 12—14,000 ft., Nos. 4415, 4572, *Ribu* !

339. Pleurospermum Hookeri C. B. Clarke
Gnatong, 11—12,000 ft.

131. Archangelica Hoffm.

340. Archangelica officinalis Hoff.
Laghep, Chola, 10—12,000 ft.

132. Heracleum Linn.

341. Heracleum Wallichii DC.
Lachung Valley, W. of Tanka La, 9,000 ft., No. 4741 *Ribu* !

342. Heracleum nubigenum C. B. Clarke
Chola, Yakla, 10—14,000 ft.

343. Heracleum sublineare C. B. Clarke
Common throughout the Chola range, 11—13,500 ft, No. 4358.

344. Heracleum nepalense Don
Common, 10—13,000 ft., No. 3816.

XL.—ARALIACEÆ.

133. Aralia Linn.

345. Aralia Pseudo-ginseng Benth.
Common, 7—11,000 ft.

346. Aralia bipinnatifida C. B. Clarke
Laghep, 10,000 ft., No. 3375.

347. Aralia cissifolia Griff.
Common, 10—12,000 ft.

348. Aralia cachemirica Dene.
Phadonchen, Ningbil, 7—11,000 ft. Common.

349. Aralia armata Seem.
Karponang, 7—8,000 ft., 4655 *Ribu*!

134. Pentapanax Seem.

350. Pentapanax Leschenaultii Seem.
Common, 9—10,000 ft.

135. Helwingia Willd.

351. Helwingia himalaica Hook, f. & T.
Phadonchen, 8—9,000 ft.

136. Heptapleurum Gaertn.

352. Heptapleurum impressum C. B. Clarke
Phadonchen, 8—10,000 ft., No. 4487.

353. Heptapleurum ventilosum Seem.
Ari, Rhenock, 3—5,000 ft.

137. Trevesia Vis.

354. Trevesia palmata Vis.
Ari, 3—5,000 ft.

138. Brassaiopsis Dene. & Planch.

355. Brassaiopsis alpina C. B. Clarke

Karponang, Phadonchen, 8—10,000 ft., Nos. 3005, 4410.

139. Macropanax Miq.

356. Macropanax oreophilum Miq.

Phadonchen 5—7,000 ft.

140. Hedera Linn.

357. Hedera Helix Linn.

W. of Tanka La, 9—10,000 ft.

141. Gamblea C. B. Clarke.

358. Gamblea ciliata C. B. Clarke

Fieunggong, 10,000 ft. *Gammie*!

XLI.—CORNACEÆ.

142. Alangium Lamk.

359. Alangium begoniifolium (Roxb.) Baill.

Rhenock, Ari, 3—5,000 ft., No. 4493.

? VAR. **alpina.**

Phadonchen, 5—9,000 ft., No. 4494.

It has long been known that there are two "Marleas" in the Sikkim Himalaya. Among the specimens collected by Sir Joseph Hooker there is one marked "2 Marlea alt. 6—9,000 ft." This is the one referred to by C. B. Clarke in the "Flora of British India," Vol. II, p. 744, as VAR. *alpina*. It is distinguished from the type by the leaves not angular, hairy all over beneath and no tufts in the nerve-axils. Later Sir George King separated similar plants in fruit as *Marlea sikkimensis* King Mss. In Kew Herbarium meanwhile to judge from Brandis, "Indian Trees" p. 355, the same plant appears as *Marlea alpina* Gamble Mss. and as such is accorded in that volume a brief diagnosis.

The tree is recognised by the Lepcha aborigines of Sikkim as distinct and receives in their language a different name. The low level form 1—6,000 ft. is Palit-kung while the high level from 5—9,000 ft. is Palit-nyok.

Wangerin in '*Das Pflanzenreich*,' iv, 230 b., p. 20, makes no reference to this species or variety, and to judge from the measurements given of the fruit of the widespread *A. begoniifolium* did not see an authentic specimen of the high Sikkim plant. The fruit of this plant measures 18—20 mm. long, and 8—9 mm. broad, measurements which exceed the limits given to *A. begoniifolium*. Further observations in the field are wanted.

XLII.—CAPRIFOLIACEÆ.

143. Sambucus Linn.

360. Sambucus javanica Bl.
Gangtok, Karponang, Phadonchen, 5—8,000 ft.

361. Sambucus adnata Wall.
Chakung Chu, W. of Tanka La, 9—10,000 ft.

144. Viburnum Linn.

362. Viburnum stellulatum Wall.
Phadonchen 9,000 ft.

363. Viburnum cordifolium Wall.
Very common, Laghep, Changu, 10—12,000 ft.

364. Viburnum erubescens Wall.
Very common, 7—10,000 ft.

145. Triosteum Linn.

365. Triosteum hirsutum Wall.
Changu, 10—11,000 ft.

146. Lonicera Linn.

366. Lonicera macrantha DC.
Song, Karponang, 4—8,000 ft., No. 2934.

367. Lonicera hispida Pall.
Changu, Chamnago, 10—12,000 ft., No. 3209.

368. Lonicera angustifolia Wall.
Dikchu Valley, 11—12,000 ft., No. 3744.

147. Leycesteria Wall.

369. Leycesteria glaucophylla Hook. f.
Karponang, 8,000 ft., No. 4676 *Ribu*!

370. Leycesteria Belliana W. W. Smith (Trans. Bot. Soc. Edin. xxiv, 173).
Karponang, 9—10,000 ft., No. 2996.
A new species closely allied to *Leycesteria sinensis* Hems

XLIII.—RUBIACEÆ.

148. Hymenopogon Wall.

871. Hymenopogon parasiticus Wall.
Phadonchen, 7—8,000 ft.

149. Hedyotis Linn.

872. Hedyotis stipulata Br.
Karponang, Phadonchen, 7—8,000 ft., No. 4398.

150. Ophiorrhiza Linn.

873. Ophiorrhiza Harrisiana Heyne VAR. **rugosa**
Karponang, 7—8,000 ft., Nos. 3040, 3248.

874. Ophiorrhiza Treutleri Hook. f.
Gangtok, Karponang, 6—7,000 ft., No. 2951.

875. Ophiorrhiza fasciculata Don
Temi, Lower Dikchu Valley, 6—7,000 ft., No. 2922

151. Rubia Linn.

876. Rubia cordifolia Linn.
Karponang, Laghep, 8—9,000 ft.

152. Galium Linn.

877. Galium rotundifolium Linn.
Common, at Karponang, 8—9,000 ft.

878. Galium triflorum Michx.
Changu, Dikchu, 9—12,000 ft. Common.

879. Galium asperifolium Wall.
Common, 9—12,000 ft.

880. Galium acutum Edgew.
Common throughout the Chola range, 9—13,000 ft.

XLIV.—VALERIANEÆ

153. Nardostachys DC.

881. Nardostachys Jatamansi DC.
Changu, Chola, 12—16,000 ft. Common.

154. Valeriana Linn.

382. Valeriana Hardwickii Wall.
Very common at Changu, 11—14,000 ft.

XLV.—DIPSACEÆ.

155. Triplostegia Wall.

383. Triplostegia glandulifera Wall.
Laghep, Changu, Gnatong, 9—12,000 ft. Frequent.

156. Morina Linn.

384. Morina polyphylla Wall.
Ningbil, 13—14,000 ft., Nos. 4107, 4168.
385. Morina betonicoides Benth.
Changu, Chola, 12—13,000 ft. Common.

157. Dipsacus Linn.

386. Dipsacus inermis Wall.
Changu, 11—12,000 ft. Common.

XLVI.—COMPOSITÆ.

158. Myriactis Less.

387. Myriactis Wallichii Less.
Gnatong, 11—12,000 ft., No. 4370.

159. Aster Linn.

388. Aster himalaicus C. B. Clarke
Tosa, 13—14,000 ft., No. 4064.
389. Aster tricephalus C. B. Clarke
Kapoop, Lachung, 10—13,000 ft., No. 3334.
390. Aster Stracheyi Hook. f.
Ningbil, 12—13,000 ft., Nos. 4158, 4159.
391. Aster Heterochæta Benth.
Dikchu, 12,000 ft., No. 3766.

160. Brachyactis Led.

392. Brachyactis menthodora Benth.
Gipmochu, Sherabthang, 13—14,000 ft., Nos. 4348, 4534.

161. Erigeron Linn.

393. Erigeron multiradiatus Benth.

Changu, Chola, Gnatong, 11—13,000 ft., No. 4267. Not common.

162. Microglossa DC.

394. Microglossa albescens C. B. Clarke

West of Tanka La, 12—13,000 ft.

163. Leontopodium Br.

395. Leontopodium alpinum Cass.

Gnatong, Gipmochu, Gaoring, 13—15,000 ft., No. 4346.

164. Anaphalis DC.

396. Anaphalis nubigena DC.

Changu, Tosa, 13—15,000 ft. common.

397. Anaphalis cuneifolia Hook. f.

Chakung Chu, Chola, 11—13,000 ft., Nos. 3963, 4137.

398. Anaphalis Royleana D. C. VAR. **cana.**

West of Tanka La, 13,000 ft., No. 4714 *Ribu* !

399. Anaphalis triplinervis C. B. Clarke

Laghep, 10,000 ft.

400. Anaphalis subumbellata C. B. Clarke

Chamnago, Gnatong, 12—13,000 ft., Nos. 3638, 4340, 4357.

401. Anaphalis araneosa DC.

Namchi, W. of Tanka La, 6—9,000 ft., No. 2904.

402. Anaphalis contorta Hook. f.

Changu, W. of Tanka La, 11—13,000 ft., No. 4717 *Ribu* !

165. Inula Linn.

403. Inula Hookeri C. B. Clarke

W. of Tanka La, 9—10,000 ft.

166. Carpesium Linn.

404. Carpesium cernuum Linn.

Fieunggong, Laghep, 8—10,000 ft.

VAR. **pedunculosa**

Phadonchen 8,000 ft., No. 4389.

167. Adenocaulon Hook.

405. Adenocaulon bicolor Hook.
Laghep, 9—10,000 ft.

168. Chrysanthemum Linn.

406. Chrysanthemum Atkinsoni C. B. Clarke
Changu, Gnatong, 11—14,000 ft., No. 3604. Very common.

169. Artemisia Linn.

407. Artemisia parviflora Roxb.
Lower Chakung Chu, 9—10,000 ft.
408. Artemisia vulgaris Linn.
Karponang, Phadonchen, 6—7,000 ft.
409. Artemisia Campbellii H. f. & T.
Changu, Chola, 13,000 ft., No. 3571.

170. Cremanthodium Benth.

410. Cremanthodium reniforme Benth.
Gnatong, 12—13,500 ft., Nos. 4321, 4364. Rare in this area.
411. Cremanthodium Decaisnei C. B. Clarke
Tosa, 14—15,000 ft. Uncommon.
412. Cremanthodium Thomsoni C. B. Clarke
Very common, 12—14,000 ft., over the Chola range.
413. Cremanthodium pinnatifidum Benth.
Gnatong, W. of Tanka La, 13—14,000 ft., No. 4614 *Ribu* ! Sparingly.

171. Doronicum Linn.

414. Doronicum sp. aff. **Roylei** DC.
Chola, Gaoring, 12—13,500 ft., Nos. 3607, 4013, 4502 *Ribu*

Not quite the West Himalayan plant. A tall plant, 3—4 ft. high ; capitula less glandular than those of *D. Roylei*, achenes sparsely ciliate, pappus white. Occurs also in the Chumbi Valley and has been referred to both *D. Roylei* and *D. altaicum* Pall. It does not agree quite with either.

415. Doronicum Hookeri C. B. Clarke
Tanka La, 12,000 ft. *King's collector* !

172. Gynura Cass.

416, Gynura nepalensis DC.

Phadonchen, 7,000 ft.

173. Senecio Linn.

417. Senecio graciliflorus DC.

Frequent from 9—12,000 ft.

418. Senecio biligulatus W. W. Smith. (Journ. Asiat. Soc. Beng., new series, vii, 69.)

Changu, Kapoop, Gnatong, 12—13,000 ft., Nos. 4223, 4245, 4277, 4325. Also collected by Scully in Nepal.

A new species allied to *Senecio graciliflorus*.

419. Senecio chrysanthemoides DC.

Common near Changu, 10—12,000 ft.

420. Senecio Yakla C. B. Clarke

Sherabthang, Kapoop, Gaoring, Yakla, Chola, 13—15,000 ft., Nos. 3393, 3439, 3697, 4000, 4370.

The Senecios of the section *Ligularia* are very difficult of discrimination in the herbarium and are troublesome enough in the field. Both racemose and corymbose types are common on the Chola range and I had the opportunity of comparing the species in a fresh condition. Of the corymbose types the Flora of British India gives two species for the East Himalaya—*S. Yakla* reduced to *S. amplexicaulis* and *S. pachycarpus*. I have had to add a new and very distinct species *S. Kingianus*. True *S. amplexicaulis* I have not seen in the East Himalayas and in my opinion *S. Yakla* should be restored. None of the other allied species have its numerous short broad ligules. Clarke named his species after the pass known as Yak La. This pass I visited and Clarke's plant is there at an elevation of 13—15,000 ft. It affects marshy ground, even tussocks in the streams and is usually one to two feet high. There is no *Senecio* of three feet high at 16,000 ft. in the Chola range, the altitude given in the "Flora of British India" though Clarke himself gives 12—15,000 ft. in "Compositæ Indicæ." The plant is nearly glabrous, with 1—2 radical leaves, orbicular or reniform, 8—9 inches in diameter; petiole not winged. Capitula comparatively few, 8—14, short and broad, drooping, many-flowered; involucral bracts 16—18 acute or obtuse, half an inch long, connate below, slightly pubescent; ligules 15—18, scarcely exceeding the involucral bracts, broad, obovate or elliptic, not linear oblong, more or less involute, pappus white, longer than the achene. However in its less developed form this species approaches *S. retusus* from which it is distinguished by its corymbose inflorescence and short blunt ligules. I find Wallich's original specimen of *S. retusus* has long narrow ligules and the plant is thus described by Clarke, though in the "Flora of British India" Hooker says "short, broad." In small specimens the corymbose inflorescence, not a very good chararacter at any time, is a negligible distinction and one is left with the character of the ligules and a difference in habit difficult to appreciate except in the field and possibly due to very wet habitat. If we refer all the short liguled forms

to *S. Yakla* even when depauperated with racemose inflorescence, we bring *S. retusus* and *S. calthæfolius* very near together, distinguishable chiefly by the very slender habit of the latter and the narrow capitula with reddish pappus. Specimens of *S. Yakla* named by Clarke himself are in the Calcutta Herbarium and these agree with his description except as regards size; we have nothing approaching a plant 3 feet high. However in the field all these Senecios in their typical forms are appreciably distinct and I do not propose at present the reduction of any of them. *Senecio pachycarpus* Clarke occurs in the same area, affects the drier slopes, is later in flowering, and is distinguished by the many-flowered capitula with 10—12 involucral bracts, and 7—8 very long ligules. It comes nearest to the western *S. amplexicaulis*, and may ultimately be esteemed only a variety.

S. Kingianus is I believe a very local plant. I did not see it at Laghe nor in the Dikhchu Valley, and it was by that route that the Chola and Yakla were visited by Hooker and Clarke. It is a fine tall plant about 3 ft. high and just above and below Changu occurs in great abundance along with *Senecio Mortoni*. As this particular corner was not opened up until the road in connection with the Tibet expedition of 1903 was made through it is practically certain that the plant was not obtained by Clarke. Its inflorescence recalls that of *S. Mortoni*, but the leaves are quite different. Its narrow few-flowered capitula with three ligules distinguish it easily from the other species.

421. Senecio pachycarpus C. B. Clarke

Changu, Kapoop, Gnatong, 12—14,000 ft., Nos. 3220, 3438 4201, 4365. Common.

422. Senecio Kingianus W. W. Smith. (Journ. As. Soc. Beng., new series, vii, 71.)

Changu, Gnatong, 11—13,000 ft., Nos. 3131, 3401, 4292, 4556, *Ribu* !

423. Senecio Mortoni C. B. Clarke

Common at Changu, 11—13,000 ft.

424. Senecio Ligularia Hook f. *S. cacaliæfolius* Schultz-Bip.

Changu, Chola, 11-12,000 ft., No. 4261.

VAR. **Ansonikt ?**

Changu, Yakla, Kapoop, 11—12,000 ft., Nos. 3205, 3431.

This slender plant is common near Yakla, but has long narrow ligules, and is therefore not identical with Clarke's plant which has very short ligules. Perhaps both are only slender forms of the variable *S. Ligularia*. The racemose types of the section are even more confused than the corymbose and I am unable to distinguish them clearly even after observation in the field. Clarke records *S. Atkinsoni* from Yakla.

425. Senecio retusus Wall.

Changu, Chola, 12—13,000 ft., Nos. 3621, 4250, 4260.

426. Senecio calthæfolius Hook. f. non Maxim. *S. nimborum* Franch.

Changu, Chola, Ningbil, 12—13,000 ft., Nos. 3750, 4204.

I found it difficult to distinguish in the field from slender forms of *S. retusus*.

427. Senecio Lagotis W. W. Smith. (Journ. As. Soc. Beng. new series, vii, 70.)

Changu, Kapoop, Dickchu, 12—13,000 ft., Nos. 3414, 3516, 3748.

A new and very distinct species with leaves recalling those of *Bupleurum Candollii*.

428. Senecio Wallichii DC.

Sherabthang, 12,000 ft., No. 4604 *Ribu* !

429. Senecio alatus Wall.

Very common, 7—13,000 ft.

430. Senecio Candolleanus Wall.

Changu, Ningbil, 12—13,000 ft., Nos. 4132, 4258.

431. Senecio quinquelobus H. f. & T.

Chola, Yakla, Gnatong, 12—13,000 ft., No. 4359. Common.

432. Senecio Chola W. W. Smith. (Journ. As. Soc. Beng., new series, vii, 72).

Chakung Chu, 12—13,000 ft., Nos. 4134, 4501 *Ribu* ! 4680 *Ribu* !

A new species allied to *S. quinquelobus*.

433. Senecio acuminatus Wall.

W. of Tanka La, 10—11,000 ft.

174. Cnicus Linn.

434. Cnicus involucratus DC.

Changu, Chola, 11—12,000 ft.

435. Cnicus eriophoroides Hook. f.

Dikchu, 11—12,000 ft., No. 3764.

175. Saussurea DC.

436. Saussurea obvallata Wall.

Changu, Chola, 11—15,000 ft. Not common.

437. Saussurea uniflora Wall.

Changu, Chamnago, Gipmochu, 11—14,000 ft.

438. Saussurea Sughoo C. B. Clarke

Changu, Chamnago, 11—13,000 ft., No. 3797, 4279.

439. Saussurea Yakla C. B. Clarke

Recorded from Chola and Yakla. I saw nothing I could discriminate from *S. Sughoo*.

440. Saussurea taraxicifolia Wall.
Dzalep, 13—14,000 ft., No. 4336.
VAR. **depressa**
Chola, Chakung Chu, 12—14,000 ft., Nos. 3649, 3848, 4029, 4155.

441. Saussurea Kunthiana C. B. Clarke
Changu, Gnatong, 11—12,000 ft., Nos. 4242, 4613.
VAR. **filicifolia**
Changu, Yakla, 12—13,000 ft., No. 4254.

442. Saussurea nimborum W. W. Smith (Journ. As. Soc. Beng., new series, vii, 73). Dzalep, 14—15,000 ft., *King's collector* !

443. Saussurea hypoleuca Spreng.
Changu, Gnatong, 12—13,000 ft., No. 4371.

444. Sausserea deltoidea C. B. Clarke.
Karponang, Laghep, 9—10,000 ft.

445. Saussurea denticulata Wall.
Dikchu, 10—11,000 ft.

446. Sausserea Laueana W. W. Smith (Journ. As. Soc. Beng., new series, vii, 74).
Changu, Chola, Ningbil, Kapoop, 11—14,000 ft., Nos. 3920, 4130, 4263, 4549 *Ribu* !
A new species allied to *S. Lappa*.

447. Saussurea gossypiphora Don
Sparingly at 13—14,000 ft. throughout the Chola range.

176. Ainsliæa DC.

448. Ainsliæa pteropoda DC.
Karponang, 7—9,000 ft. Common.

449. Ainsliæa aptera DC.
Karponang, 8—10,000 ft.

177. Crepis Linn.

450. Crepis depressa H. f. & T.
Changu, Gnatong, 12—13,000 ft.

451. Crepis glomerata Dene.
Sparingly over the range at 14—15,000 ft.

178. Taraxacum Hall.

452. Taraxacum officinale Wigg.
Changu, Chamnago, 11—12,000 ft.
VAR. **eriopoda**
Chamnago, 12—13,000 ft., Nos. 3702, 4301.

179. Lactuca Linn.

453. Lactuca hastata DC.
Chakung Chu, W. of Tanka La, 8—10,000 ft.

454. Lactuca macrantha C. B. Clarke
Very common, 11—13,000 ft.

455. Lactuca Dubyæa C. B. Clarke
Common, 11—13,000 ft.

XLVII.—CAMPANULACEÆ.

180. Lobelia Linn.

456. Lobelia erecta H. f. & T.
Very common, 8—12,000 ft., over the Chola range.

457. Lobelia pyramidalis Wall.
Phadonchen, 7—8,000 ft.

181. Codonopsis Wall.

458. Codonopsis Benthami H. f. & T.
Dzalep, Yakla, 9—11,000 ft.

459. Codonopsis subsimplex H. f. & T.
Very common, 11—13,000 ft., Nos. 4250, 4298.

460. Codonopsis fœtens H. f. & T.
Changu, Chola, Gnatong, 12—15,000 ft., No. 3811. Common. The corolla is globose campanulate, not constricted, sky-blue without upper half within sky-blue, lower half lurid purple.

461. Codonopsis dicentrifolia (Clarke) W. W. Smith, Comb. nov.
Species *Codonopsidis thalictrifoliæ* et *C. ovatæ* affinis sed inter alia foliis omnino glabris distinguenda.

Planta sub-erecta elegans. *Radix* lignosa, robusta, 5—15 mm. diametiens. *Caulis* erectus, teres, glaber, flexilis, gracilis, 30—40 cm. altus, ramulis multis fere recto angulo patentibus. *Folia* radicalia nulla; caulina parva, 1—3·5 cm. longa, ·5—1·8 cm. lata, petiolo 5 mm. longo gracile, alterna vel opposita in eodem specimine, ovata, obtusa, rarius sub-obtusa, basi rotundata vel sub-cuneata, glabra, nervis obscuris 2—3-paribus. *Flores* solitarii terminales, 2—5 cm. pedunculati, nutantes. *Calyx* 5-partitus; lobi 1 cm. longi, 1 mm. lati, distantes, lineares, sub-obtusi, virides, in fructu persistentes. *Corolla* supra campanulata, ad 3 cm. longa, ad 3 cm. lata, ad tertiam partem fissa, cœrulea, sublurida,

lobis ovatis vel late-triangularibus. *Stamina* brevia, curva, filamentis lato cardine linearibus, glabra. *Ovarium* 1·5 cm. longum, 1 cm. latum, inferum, oboonicum, 10-costatum, in fructu ad 5 mm. rostratum, loculicide 3-loculare. *Semina* 1·5 mm. longa, ellipsoidea, nitentia.

Wahlenbergia ? *dicentrifolia* C. B. Clarke in Flora Brit. Ind., iii, 430; *Codonopsis Margaritæ* W. W. Smith in letteris et in duplicatis et seminibus distributis.

Phallut, 11,000 ft.; *Clarke* ! Gnatong Chu, South East Sikkim at an elevation of 11,000 ft., No. 4381 *Smith* ! Sandakphu, No. 371 *Ribu* !

A very graceful plant growing on the face of wet precipices in a deep valley. It recalls *Codonopsis fœtens* and *C. thalictrifolia*, but is free from the objectionable odour of those species. The slender branches bear the small ovate leaves so regularly as to give the impression of a long pinnate leaf. As in its nearest allies, there are no radical leaves and usually 3—6 inches of whitish stem appear underground before we come to the thick rootstock. The plants bears from one to twelve flowers. The corolla is bluish, with a dappling of light and dark blues. The ovary is surmounted by a black shining disc and at the edge of this disc the stamens are inserted. The stigma is at first clubshaped, later shortly trilobed. The plant is protandrous, the stamens withering before the stigmata diverge.

The Calcutta Herbarium possesses no type of Clarke's plant and so the above description was written as for a new *Codonopsis*. Clarke's original diagnosis was based on fruiting specimens only. In my opinion clearly a *Codonopsis*.

182. Cyananthus Wall.

462. Cyananthus lobatus Wall.

Changu, Dzalep, Gipmochi, 12—13,000 ft., No. 4248. Common.

463. Cyananthus pedunculatus C. B. Clarke

Nathui La, Chamnago, 12—14,000 ft. Frequent.

464. Cyananthus incanus H. f. & T.

Gnatong, 11—12,000 ft.

183. Campanumœa Bl.

465. Campanumœa inflata C. B. Clarke

Phadonchen, 7—8,000 ft., No. 4453. Common.

184. Peracarpa H. f. & T.

466. Peracarpa carnosa H. f. & T.

Karponang, 7—9,000 ft., No. 2974. Common.

185. Campanula Linn.

467. Campanula colorata Wall.
Karponang, Phadonchen, 6—8,000 ft.

468. Campanula argyrotricha Wall.
Nathui La, Tanka La, 13—14,000 ft., No. 4583 *Ribu*!

XLVIII.—VACCINIACEÆ.

186. Pentapterygium Klotsch

469. Pentapterygium serpens Klotsch
Phadonchen, Karponang, 7—8,000 ft.

187. Vaccinium Linn.

470. Vaccinium nummularia H. f. & T.
Karponang, Chakung Chu, 8—11,000 ft.

471. Vaccinium retusum Hook. f.
Phadonchen, 8—9,500 ft. No. 4411.

472. Vaccinium serratum Wight
Phadonchen, 6—8,000 ft.

473. Vaccinium Dunalianum Wight
Phadonchen, 7—8,000 ft., No. 4449.

XLIX.—ERICACEÆ.

188. Gaultheria Linn.

474. Gaultheria nummularioides Don
Common, 8—9,000 ft.

475. Gaultheria trichophylla Royle

The typical form is common from 10—14,000 ft., throughout the Chola range. What I take to be a variety with nearly glabrous leaves and a fruit nearly half an inch in diameter is found at Karponang, 8—9,000 ft., No. 2983.

476. Gaultheria pyrolæfolia Hook. f.
Ningbil, 13—14,000 ft., No. 4119. Sparingly.

477. Gaultheria fragrantissima Wall.
Karponang, 8—9,000 ft. Common.

478. Gaultheria Griffithiana Wight.
Phadonchen, 9—10,000 ft., No. 4417.

189. Cassiope D. Don

479. Cassiope fastigiata D. Don
Very common, 11—13,000 ft., Nos. 3261, 3430.

480. Cassiope selaginoides H. f. & T.
Also common, 12—14,000 ft., Nos. 3301, 3490.

190. Pieris D. Don

481. Pieris ovalifolia D. Don
Common, 4—11,000 ft.

482. Pieris villosa Hook. f.
Laghep, Dikchu, 9—11,000 ft.

483. Pieris formosa D. Don
Ningbil, 10,000 ft.

191. Enkianthus Lour.

484. Enkianthus himalaicus H. f. & T.
Phadonchen, Changu, 9—11,000 ft., No. 3320.

192. Diplarche H. f. & T.

485. Diplarche pauciflora H. f. & T.
Tanka La, 15,000 ft., *Gammie*!

193. Rhododendron Linn.

I do not propose to give a detailed list. The species of the Chola were collected in November 1849 in the vicinity of Laghep by Sir Joseph Hooker who enumerates 24 of them in Him. Journ., ii, 197. Further north near Ficunggong Mr. G. A. Gammie found all the Sikkim species with the exception of *Rhododendron nivale*. It is as the latter points out—Gazetteer of Sikkim, 1894, p. 107—a remarkable specific concentration of the genus. As I was too late for the flowers of the majority and much too early for seed, I did not devote any time to the genus though most of th species were collected incidentally.

L.—MONOTROPEÆ.

194. Monotropa Linn.

486. Monotropa uniflora Linn.
Dikchu Valley, 7—8,000 ft., No. 3820.

LI.—DIAPENSIACEÆ.

195. Diapensia Linn.

487. Diapensia himalaica H. f. & T.

Nathui La, Chola, Fieunggong, 11—14,000 ft., Nos. 3442, 3570, 3892.

LII.—PRIMULACEÆ.

196. Primula Linn.

488. Primula Gambeliana Watt

Tosa, 13,000 ft., No. 3924. In the crevices of wet rocks. Rare.

489. Primula pulchra Watt

Chamnago, 11—12,000 ft. *King's collector* !

490. Primula reticulata Wall.

Common in the Chola range, 11—13,000 ft., Nos. 3041, 3591, 3582, 3583.

491. Primula vaginata Watt

Laghep, 10,000 ft., Nos. 3292, 4537 *Ribu* ! Apparently a very local plant.

492. Primula geraniifolia Hook. f.

Karponang, Chola Valley, 9—12,000 ft., Nos. 3042, 3721, 4547, 4358 *Ribu* !

493. Primula capitata Hook.

Common on the Chola range, 12—14,000 ft., Nos. 3429, 3621, 4010, 4171.

494. Primula erosa Wall.

Ningbil, 13,000 ft., No. 4209.

495. Primula glabra Klatt

Kapoop, Ningbil, 13—14,500 ft., Nos. 3405, 4076.

496. Primula involucrata Wall.

Changu, Kapoop, Chamnago, 12—13,000 ft., Nos. 3395, 3406, 3773.

497. Primula obtusifolia Royle

Common at Changu, Kapoop, and Chola, 12—14,000 ft., Nos. 3086, 3285, 3509, 3590.

498. Primula elongata Watt

Changu, Sherabthong, 12—14,000 ft., Nos. 3092, 3259, 3444, 3600.

This species is closely allied to *Primula Stuartii*. Its capsule distinguishes it from *P. obtusifolia* as well as its colour.

499. Primula Stuartii Wall. forma, forsan sp. distincta.

Very common on the Chola range, 11—14,000 ft., Nos. 3269, 3580, 3699, 3929, 4003.

500. Primula nivalis Pall. VAR. **macrocarpa**

Tosa, Ningbil, 14—15,000 ft., Nos. 3953, 4036. The flowers were white with a tinge of purple.

501. Primula sikkimensis Hook. f.

Very common, 11—12,000 ft.

502. Primula Kingii Watt

Changu, Sherabthang, 13,000 ft., Nos. 3394, 4294.

503. Primula Elwesiana King

Above Changu, 12—13,000 ft., No. 3127. Plentiful locally.

504. Primula pusilla Wall.

Changu, Chola, 13—15,000 ft., Nos. 3090, 3235, 3911.

505. Primula sapphirina Hook. f. & T.

Changu, Chola, 12—14,000 ft., Nos. 3088, 3234.

506. Primula uniflora Klatt

Tosa, Gaoring, Chakung Chu, 13—14,000 ft., Nos. 3847, 3942, 4007.

507. Primula Wattii King

W. of Changu, W. of Yakla, Chola, 12—13,000 ft., Nos. 3312, 3606, 4405 *Ribu*!

508. Primula soldanelloides Watt

Kapoop, Changu, Chola, 13—15,000 ft., Nos. 3091, 3420, 3690. Frequent.

509. Primula petiolaris Wall

Laghep, Changu, 9—12,000 ft. Common.

510. Primula Tanneri King

Laghep, 12,000 ft., No. 3290.

511. Primula minutissima Jacq. VAR. **spathulata**

Tosa, 14—15,000 ft., No. 4071.

512. Primula muscoides Hook. f.

Common at 14—15,000, over the Chola range, Nos. 3170, 3484, 3668, 3863, 3943.

513. Primula tenuiloba (Hook. f.) Pax

Chola, Tosa, Sherabthang, 14—15,000 ft., Nos. 3483, 3862, 3955.

197. Androsace Linn.

514. Androsace geraniifolia Watt
Lachung, W. of Tanka La, 9,000 ft., No. 3325.

515. Androsace Hookeriana Klatt
Tosa, Ningbil, 13—14,000 ft., No. 3960.

516. Androsace Chamæjasme Host. VAR. uniflora.
Changu, Ningbil, 13—15,000 ft., Nos. 3536, 4078, 4156.

517. Androsace Poissonii Knuth
Nathui La, 14—15,000 ft., No. 4570 *Ribu* !

198. Bryocarpum Hook. f. & T.

518. Bryocarpum himalaicum Hook. f. & T.
Laghep, Chakung, Chu, 9—12,000 ft., Nos. 3288, 3379, 3966.

199. Lysimachia Linn.

519. Lysimachia ramosa Wall.
Namchi, Karponang, 5—7,000 ft., No. 2903.

LIII.—MYRSINEÆ.

200. Mæsa Forsk.

520. Mæsa rugosa C. B. Clarke
Phadonchen, Karponang, 7,000 ft., No. 4444.

521. Mæsa Chisia Don
Phadonchen, 3—6,600 ft. Common.

522. Mæsa indica Wall.
Gantok, Phadonchen, 3—6,000 ft. Common.

LIV.—STYRACEÆ

201. Symplocos Linn.

523. Symplocos ramosissima Wall.
Phadonchen, 7—9,000 ft.

524. Symplocos floribunda Wall.
Phadonchen, 7,000 ft., No. 4468.

525. Symplocos pyrifolia Wall.
Temi, Phadonchen, 5—7,000 ft.

LV.—OLEACEÆ.

202. Jasminum Linn.

526. Jasminum humile Linn.
Lachung, W. of Tanka La, 9,000 ft., No. 3338.

LVI.—ASCLEPIADACÆ

203. Cynanchum Linn.

527. Cynanchum Vincetoxicum Pers.
Lachung, Chakung Chu, 8—9,000 ft., No. 3342.

204. Hoya Br.

528. Hoya lanceolata
Song, Gantok, 4—5,000 ft., No. 2933.
529. Hoya longifolia Wall.
Cheungtong, 5,000 ft., No. 3346.

LVII.—LOGANIACEÆ.

205. Buddleia Linn

530. Buddleia Colvillei Hook. f.
Karponang, Fieunggong, 9—12,000 ft., Nos. 2975, 3840. Occasional.
531. Buddleia macrostachya Benth.
Gantok, Karponang, 6—7,000 ft.
532. Buddleia asiatica Lour.
Rhenock, Ari, 3—6,000 ft. Common.

LVIII.—GENTIANACEÆ.

206. Gentiana Linn.

533. Gentiana recurvata C. B. Clarke
Fieunggong, 12,000 ft., No. 3874.
534. Gentiana infelix C. B. Clarke
Tosa, W. of Tanka La, 14—14,500 ft., Nos. 4057, 4183.
535. Gentiana pedicellata Wall.
Below Gnatong, 10,000 ft.

536. Gentiana Prainii Burkill

Changu, 12—13,000 ft., Nos. 3508, 3518, 4190, 4332, Common.

Corolla outside dark blue, inside white, marked below the middle with a varying number of blue and of yellow spots, usually about ten of each; corolla lobes curiously bifid, usually very irregularly so into two portions, the smaller segment usually very acute, larger subacute, filaments blue broadened downwards.

537. Gentiana pluviarum W. W. Smith (Journ. Asiat. Soc., Beng., new series, vii, 77, with fig.)

Changu, Chamnago, Fieunggong, 12—13,000 ft., Nos. 3527, 3662, 3907.

538. Gentiana bryoides Burkill

Changu, Chamnago, Gnatong 11—13,000 ft., Nos. 3082, 3115, 3818, 4318. Common.

539. Gentiana sikkimensis C. B. Clarke

Above Phadonchen, 12,000 ft., No. 4423.

540. Gentiana Elwesii C. B. Clarke

Common, 12—14,000 ft., Nos. 4266, 4295, 4316.

541. Gentiana amœna Wall.

Ningbil, 13,000 ft.

542. Gentiana phyllocalyx C. B. Clarke

Very common, 13—14,500 ft., Nos. 3569, 3948.

543. Gentiana tubiflora Wall.

Chola, 14,000 ft., No. 4451 *Ribu!*

544. Gentiana ornata Wall.

Laghep, Gnatong, 11—13,000 ft., Nos. 4403 *Ribu!* 4353.

VAR. **meiantha**

Fieunggong, 12,000 ft., No. 3906.

545. Gentiana stylophora C. B. Clarke

Changu, Chola, 11—14,000 ft., Nos. 3132, 3592, Common.

I add the following notes from my field book as the book description was based on imperfect material. Flowering stem 80—180 cm. high, glossy green, glabrous. Upper leaves strongly 7—9, nerved, sessile sometimes connate for 5 cm. at the base, large specimens 18 cm. by 9 cm. Calyx tube 1·2 cm., green shining, glabrous; lobes nearly 2·5 cm., triangular. Corolla up to 7·5 cm. long, and 7·5 cm. broad, widely funnel-shaped, 5-cleft to nearly the base; lobes 6 cm. by 4 cm., ovate-elliptic, apex rounded, greenish yellow outside, inside similar with many irregular pustular outgrowths, not fimbriate in the throat, indistinctly 7-9 veined moderately fleshy. Stamens up to 2·5 cm. long, attached a little below junction of tube and lobes; bases very stout, 4 mm. broad, giving firmness to corolla tube; filaments whitish tapering from 4 to 2 mm. broad, apex of filament broadened and pendent anther applied throughout to it; anther 1—1·1 cm. long, oblong, tapering from 4 to 2·5 mm.; ovary 2 cm., stigma 4 mm. long, deeply cleft, lobes nearly orbicular, 4 mm. broad, flattened out at

maturity. The flower is protandrous. In the early stage the stigma is a rounded knob 2 mm. in diameter; the five anthers when ripe form a semicoherent mass round the style. Later the strong filaments begin to bend from the base and gradually the empty anthers are adpressed against the sides of the corolla lobes— a displacement of 2—3 cm.

207. Pleurogyne Eschsch.

546. Pleurogyne sikkimensis Burkill
Changu, 12,000 ft., No. 4631 *Ribu !*

208. Swertia Linn.

547. Swertia dilatata C. B. Clarke
Phadonchen, Changu, 7—11,000 ft., Nos. 4413, 4422.

548. Swertia racemosa Wall.
Gnatong, 11,000 ft., No. 4382.

549. Swertia ramosa W. W. Smith. (Journ. Asiat. Soc. Beng., new series, vii, 77 with fig.)
Karponang, 9,000 ft., Nos. 3032, 4539, *Ribu !* Rare.

550. Swertia Hookeri C. B. Clarke
Changu, Chola, Ningbil, 12—13,000 ft., No. 3186. Common.

551. Swertia Kingii Hook. f.
Chongu, Ningbil, Gipmochi, 13—13,500 ft. Nos. 4136, 4233.

Petals greenish-white with bluish base. This species is later in flowering than its allies in this area, as its flower-buds open about the middle of August.

552. Swertia Burkilliana W. W. Smith (Journ. Asiat. Soc., Beng., new series, vii, 78 with fig.)
Changu, Fieunggong, 12,000 ft., Nos. 3556, 3872, 4244, 4376 *Ribu* !

553. Swertia cuneata Wall.
Gnatong, 12—13,000 ft., No. 4343.

Sepals patent in bud, petals greenish without, bluish-white within, glands with long blue fimbriæ.

554. Swertia multicaulis Don
Common in the Chola range, 13—15,000 ft.

209. Halenia Borckh.

555. Halenia elliptica D. Don
Changu, Gnatong, 8—13,000 ft., Nos. 4281, 4345.

LIX. BORAGINEÆ.

210. Ehretia Linn.

556. Ehretia Wallichiana H. f. & T.
Song, Gangtok, 4—7,000 ft.

211. Cynoglossum Linn.

557. Cynoglossum furcatum Wall.
Karponang, Phadonchen, 7—9,000 ft.

558. Cynoglossum micranthum Desf.
Ari, Phadonchen, 5—7,000 ft., No. 4505.

559. Cynoglossum denticulatum A. DC.
Karponang, Laghep, 9—11,500 ft., Nos. 2993, 3795.

212. Paracaryum Boiss.

560. Paracaryum glochidiatum Benth.
Common, 10—13,000 ft.

213. Eritrichium Schrader.

561. Eritrichium Munroi C. B. Clarke
Nathui La, Chola, W. of Tanka La, 13—14,000 ft., No. 4185. Sparingly.

562. Eritrichium tibeticum C. B. Clarke
Changu, Chakung Chu, 11—12,000 ft., Nos. 3072, 3367, 3968.

214. Trigonotis Stev.

563. Trigonotis microcarpa Benth.
Lower Chakung Chu, 7—9,000 ft., No. 3348.

564. Trigonotis rotundifolia Benth.
Chamnago, Ningbil, 12—14,503 ft., Nos. 3774, 4073.

215. Onosma Linn.

565. Onosma Emodi Wall.
Changu, Gipmochi, 10—12,000 ft., very common.

LX.—CONVOLVULACEÆ.

216. Cuscuta Linn.

566. Cuscuta reflexa Roxb.
Karponang, 8,000 ft., No. 4678 *Ribu*!

LXI.—SOLANACEÆ.

217. Solanum Linn.

567. Solanum nigrum Linn.
Phadonchen, 9,000 ft.

218. Mandragora Juss.

568. Mandragora caulescens Juss.
Changu, Chola, Gnatong, 11—12,000 ft., No. 3509. Frequent.

On the west side of the Changu Lake, on the slopes above the road, this plant is fairly plentiful but easily over-looked, as flowers and fruits are very close to the ground. In fact the fruits tend to bury themselves. By the middle of July all the plants are in fruit with rare exceptions. The stems average from 30 to 36 cm., but in the moist basin of the Gnatong Chu I found specimens 60 cm. high with fruit 5 cm. in diameter, and calyx enlarged to nearly 4 cm. long. The stem, leaves, pedicles and calyx are pubescent. Leaves obovate, sometimes narrowly, usually 12 cm. by 5 cm. The measurements given in the "Flora of British India" 11 by 2 in., are surely exceptional or an error. Calyx lobes pubescent and ciliate, green, purplish below, reticulate. Corolla greenish purple, lurid brown inside, with a faint sweet odour, divided and lobed much as the calyx, up to 2 cm. long, rapidly withering when calyx begins to enlarge. Style short thick, just under 1 mm. in length, with bifid dilated stigma. The roots stout, attaining 60—90 cm. in length.

219. Scopolia Jacq.

569. Scopolia lurida Dunal
Laghep, Nathui La, Chamnago, 10—13,000 ft., Nos. 3242, 3794.

LXII.—SCROPHULARINEÆ.

220. Scrophularia Linn.

570. Scrophularia pauciflora Benth.
Changu, 10—13,000 ft. Common.

571. Scrophularia urticæfolia Benth.
Karponang, 8—9,000 ft. Very common.

221. Wightia Wall.

572. Wightia gigantea Wall.
Phadonchen, 6—7,000 ft.

222. Mimulus Linn.

573. Mimulus nepalensis Benth.
Common, 7—10,000 ft.

223. Mazus Lour.

574. **Mazus dentatus** Lour.
Laghep, 8—9,000 ft.

224. Hemiphragma Wall.

575. **Hemiphragma heterophyllum** Wall.
Common, 7—13,000 ft.

225. Picrorhiza Royle

576. **Picrorhiza Kurrooa** Benth.
Common, 12—15,000 ft.

226. Veronica Linn.

577. **Veronica himalensis** Don
Changu, Ningbil, 12—13,000 ft., Nos. 3869, 4123. Not uncommon on the Chola range.

578. **Veronica cana** Wall.
Karponang, Changu, 8—12,200 ft. Very common.

579. **Veronica capitata** Benth.
Changu, Chola, 11—14,000 ft., Nos. 3203, 4070. Common.

227. Euphrasia Linn.

580. **Euphrasia officinalis** Linn.
Common from 11—13,000 ft.

228. Pedicularis Linn.

581. **Pedicularis longiflora** Rudolph
Throughout the Chola range but not common, 12—14,000 ft., Nos. 3660, 4328.

582. **Pedicularis siphonantha** Don
Throughout the Chola range but not common as in north Sikkim, 11—13,000 ft., Nos. 3804, 4247.

VAR. **prostrata** Bonati. var. nov.
Dikchu, 11,000 ft., No. 3827.

" Elle se distingue du type par ses feuilles et lobes calicinaux *plus* découpés, par son port spécial et par sa capsule dépassante a peine le calice, semi-orbiculaire, a pointe déjetée latéralement comme dans le *Pedicularis Soulici.*"

583. **Pedicularis megalantha** Don
Changu, 12,000 ft., No. 4274.

584. **Pedicularis bella** Hook. f.
Lingtu, 12—13,000 ft.

585. **Pedicularis Daltoni** Prain
Dzalep La, Kapoop, 12—13,000 ft., No. 3687 in part.

586. **Pedicularis Garckeana** Prain
Chola, Nathui, Tosa, 13—14,500 ft., Nos. 3687 in part, 4038.

587. **Pedicularis nepalensis** Prain
Changu, 12,000 ft., *King's collector* !

588. **Pedicularis gracilis** Wall.
Lower Chakung, Keadom, 8—9,000 ft., No. 4756 *Ribu* !

589. **Pedicularis porrecta** Wall.
Tanka La, 14—15,000 ft., *King's collector* !

590. **Pedicularis confertiflora** Prain
Kapoop, 13,000 ft., *King's collector* !

591. **Pedicularis flexuosa** Hook. f.
Common on the Chola range, 11—13,500 ft., Nos. 3106, 3135, 3627, 4101, 4121.

592. **Pedicularis sikkimensis** Bonati. sp. nova.

Perennis, pluricaulis. *Rhizoma* repens, elongatum, in internodis additum squamis reliquis a precedentibus annis. *Caules* 10—20 cm. alti simplices, erecti vel flexuosi, paullo foliati, basi glabri, summo pilis fuscis tecti; *folia inferiora* verticillata, longissime petiolata, petiolis 6—9 cm. basi dilatatis, limbo pingue, 4—5 cm. longo, lineari vel oblongo, pinnatisecto, segmentorum 7—9-jugis; segmentis pinnatifidis, inferioribus valde distantibus, breve petiolulatis, superioribus sessilibus ac contiguis, obulis integris vel acutidentatis; *folia caulinaria* ac superiora opposita vel rarissime alterna, breve petiolata, triangulari forma; petiolis segmentorum inferiorum longioribus; segmentis aliis generaliter contiguis ac sessilibus. *Bracteæ* foliis superioribus similes petiolatæ, calyce duplo vel triplo longiores. *Flores* axillares, oppositi, pedunculis 2—6 mm. longis. *Calyx* cylindricus, glaber, antice non fissus, 6—7 mm. longus, usque ad tertium fissus in 5 lobis lineato-acutis, subæqualibus, lobo medio integro, lineato-acuto, lateralibus linearibus, basi subfiliformibus, summo dilatatis et acutidentatis. Tubus *corollæ* 20—25 mm. longus, 1 mm. latus, erectus, pubescens; galea rectangulatim curvata, in parte verticali 4—6 mm. longa, dorso falciformis, 6 mm. longa, 2 mm. lata, attenuata in apicem 2—3 mm. longum, raro horizontalem sæpe parte inferiori galeæ parallelon vel vix divergentem, summo fimbriatum, sicut

in *P. schizorhyncha* Prain; labio inferiore plano, 9 mm. longo, 10 mm. lato, margine glabro ac crenato. *Stamina* tertio superiori tubi inserta, filamentis duobus villosis. *Capsula* 1 cm. longa. *Semina*?

Sikkim, Changu, Chakung-Chu; 13,000 ft., *Smith*, No. 3563, 3849.

" Par ses deux filets velus, sa lèvre glabre et sés sepales incisés, cette plante est trés voisine du *P. flexuosa* Hook. f. Elle se distingue aisément de cette espèce par son rhizôme, la forme de ses feuilles rappelant celles des *P. albiflora* et *P. Gammieana*, par la tube de la corolle relativement *plus* long et *plus* grêle, par son bec *plus* court, lacinié à l'extrèmité et d'une autre direction."

593. Pedicularis chumbica Prain

Sherabthang, Chola, 14—14,500 ft., Nos. 3474 *Smith!* 444 *Ribu!*

594. Pedicularis furfuracea Wall.

Common on the Chola range, 9—12,000 ft., No. 2995, 3085, 3366, 3725.

595. Pedicularis Pantlingii Prain

Karponang, Changu, 9—11,000 ft., Nos. 3133, 3254.

596. Pedicularis carnosa Wall.

Lachung Valley, 8—9,000 ft., No. 4737 *Ribu!*

597. Pedicularis odontophora Prain

Gnatong, 12,000 ft., *King's collector!*

598. Pedicularis Wallichii Bunge

Changu, Kapoop, Tanka La, 13—14,000 ft., Nos. 2137, 3418, 3602.

599. Pedicularis excelsa Hook. f.

Ningbil 12—13,000 ft., No. 4160.

600. Pedicularis lachnoglossa Hook. f.

Chola, 13—14,000 ft., *King's collector!*

601. Pedicularis trichoglossa Hook. f.

Dzalep La, 13—14,000 ft., *Pantling!*

602. Pedicularis Clarkei Hook. f.

Changu, 12,000 ft., Nos. 4257, 4371 *Ribu!*

603. Pedicularis schizorhyncha Prain?

Chola, Tanka La, 14,000 ft., 4442 *Ribu!* Fruiting and doubtful.

604. Pedicularis Regeliana Prain

Changu, Kapoop, Chola, Tanka La, 12—13,000 ft., Nos. 3863, 3402.

605. Pedicularis Roylei Maxim.

Throughout the Chola range, 12—14,000 ft., Nos. 3477, 3751, 4160.

606. Pedicularis polygaloides Hook. f.

Tanka La, Kapoop, 13—14,000 ft., No. 4181.

607. Pedicularis denudata Hook. f.

Dzalep La, Ningbil, Tosa, 13—13,500 ft., Nos. 4059, 4101, 4153.

229. Oreosolen Hook. f.

608. Oreosolen Wattii Hook. f.

Changu, 14,000 ft., No. 4213.

LXIII.—OROBANCHACEÆ.

230. Boschniackia C. A. Mey.

609. Boschniackia himalaica Hook. f. & T.

Changu, Yakla, 11—12,000 ft., No. 3782.

LXIV.—LENTIBULARIEÆ.

231. Utricularia Linn.

610. Utricularia minor Linn. ?

Sherabthang, 13,000 ft., No. 3,400. Without flowers, as were Hooker's specimens.

611. Utricularia brachiata Oliver

Karponang, Chola, Ningbil, 8—12,000 ft., Nos. 3029, 4149, 4264.

612. Utricularia orbiculata Wall.

Phadonchen, 7,000 ft., No. 4454.

613. Utricularia multicaulis Oliver

Changu, Chola, 11—13,000 ft., No. 3363.

614. Utricularia furcellata Oliver

Phadonchen, 8,000 ft., No. 4400.

232. Pinguicula Linn.

615. Pinguicula alpina Linn.

Ningbil, 13—14,000 ft., No. 4113.

LXV.—GESNERACEÆ.

233. Aeschynanthus Jack

616. Aeschynanthus bracteata Wall.
Dikchu, 8,000 ft., No. 3837.

234. Lysionotus D. Don

617. Lysionotus serrata D. Don
Gangtok, Karponang, 4—7,000 ft.

235. Didymocarpus Wall.

618. Didymocarpus Andersoni C. B. Clarke
Song, Gangtok, 4—6,000 ft., No. 2936.
619. Didymocarpus oblonga Wall.
Above Gangtok, 6—8,000 ft., No. 2954.
620. Didymocarpus podocarpa C. B. Clarke
Gangtok, Karponang, 6—8,000 ft., Nos. 2955, 3036.
621. Didymocarpus leucocalyx C. B. Clarke
Karponang, 7—8,000 ft., No. 4642 *Ribu*!
622. Didymocarpus Mortoni C. B. Clarke
Ari, 5—6,000 ft., No. 4519.
623. Didymocarpus pulchra C. B. Clarke
Above Gangtok, 7,000 ft.

236. Didissandra C. B. Clarke

624. Didissandra lanuginosa C. B. Clarke
Cheungtong, Chakung Chu. 5—7000 ft., No. 3345

237. Chirita Ham.

625. Chirita pumila Don
Karponang, Dikchu, 7—8,000 ft., Nos. 3038 bis. 3825.
626. Chirita macrophylla Wall.
Karponang, 7,000 ft., No. 2972.
627. Chirita Clarkei Hook. f.
Gangtok, Karponang, 7—8,000 ft., No. 3038.

LXVI.—ACANTHACEÆ.

238. Thunbergia Linn.

628. Thunbergia lutea Linn. f.
Phadonchen, 6—7,000 ft.

239. Strobilanthes Bl.

629. Strobilanthes divaricatus T. And.

Phadonchen, 7—9,000 ft.

630. Strobilanthes Wallichii Nees

Phadonchen, Ningbil, 8—11,000 ft., No. 4143.

LXVII.—SELAGINEÆ.

240. Lagotis Gærtn.

631. Lagotis Clarkei Hook. f.

Nathui La, Tosa, Yakla, 14—15,000 ft., Nos. 3457, 3947, 4043, 4097.

As this species was described from imperfect material I add the following notes taken in the field. Rootstock stout, stems up to 15 cm., flexuous, ascending, leafy towards the apex; leaves elliptic-ovate, acute or obtuse, irregularly toothed; spike up to 5 cm; bracts toothed or entire, lower 1·5 cm., upper 6—7 cm.; calyx shorter than the lower bracts, longer than the upper ones, normally 1 cm. long, spathaceous, hooded, enclosing the corolla; nerves reticulate, the two main ones convergent towards apex but not always meeting; the spathe-like calyx is oblong, with one side cut to one half, but with no other indication of lobing, greenish; corolla when open only 2 mm. shorter than calyx, greenish-translucent, oblong, cleft to ¼, 2-lipped, lower lip recurved, broad, rounded, not lobed, upper lip scarcely dilated at the slightly hooded tip; filaments adnate to margins of upper lip; style as long as the stamens; stigma very slightly bifid.

632. Lagotis crassifolia Prain

Tanka La, *Gammie!*

633. Lagotis glauca Gærtn. VAR. **sikkimensis**

Changu, Nathui La, Gnatong, 12—14,000 ft., Nos. 3185, 3241, 4314.

The following notes are taken from my field-book. Rootstock 2—3 cm. thick with numerous fleshy root fibres; stem 36—45 cm. long, suberect, 1 cm. thick, much compressed, naked below the middle; radical leaves numerous, 10—15, large and fleshy, petiole up to 15 cm. long, 10—12 mm. broad; lamina up to 7 cm. long, elliptic-obovate, coarsely toothed subobtuse; cauline leaves narrowly ovate, up to 9 cm. long, 4 cm. broad, remotely dentate, sessile, semi-amplexicaul; nerves slender, translucent, decumbent; spike up to 15 cm.; bracts 1—1·25 cm., ovate, subacute, toothed, slightly longer than the calyx and about equalling the corolla tube, glaucous; calyx a glaucous translucent spathe cleft to the base in front, rounded at the apex where it is slightly erose, even minutely fimbriate, with two non-converging greenish nerves; the corolla lobe and a small part of the tubes protrude from the cleft of the spathe, corolla bluish-white, oblong-tubular, 12—13 mm. long, 2—3 mm. broad, two-lipped; lips 2—3 mm. long, upper if anything slightly longer, ovate, rounded entire apex, lower cleft to the base into linear lobes; the lobes at first whitish, soon fading to a dirty brown in the open flower; anthers with very short filaments in the sinuses between upper and lower lobes; a green gland, larger than the immature ovary on the anterior side of the ovary; stigma capitate, obscurely cleft; style included. The larger specimens seem to me to bridge the gap between this species and *L. spectabilis* Kurz which both Hooker and Prain regard as a doubtfully valid species. See Journ. As. Soc. Beng., lxv, 65.

LXVIII.—VERBENACEÆ.

241. Verbena Linn.

634. Verbena officinalis Linn.
Temi, Gangtok, 5—6,000 ft.

242. Premna Linn.

635. Premna interrupta Wall.
Gangtok, Karponang, 5—7,000 ft.

LXIX.—LABIATÆ.

243. Plectranthus L'Herit.

636. Plectranthus macranthus Hook. f.
Sedongchen, Gangtok, 6—7,000 ft., No. 2953.
637. Plectranthus scrophularioides Wall.
Phadonchen, 8—9,000 ft.
638. Plectranthus repens Wall.
Keadom, 8,000 ft., No. 4752 *Ribu*!

244. Elsholtzia Willd.

639. Elsholtzia strobilifera Benth.
Lower Dikchu 7—10,000 ft.

245. Calamintha Moench.

640. Calamintha umbrosa Benth.
Common, 8—11,000 ft.

246. Melissa Linn.

641. Melissa parviflora Benth.
Phadonchen, 8—9,000 ft., No. 4435.

247. Salvia Linn.

642. Salvia campanulata Linn.
Nathui La, Changu, Dikchu, 10—13,000 ft

248 Nepeta Linn.

643, Nepeta lamiopsis Benth.
Changu, 11—12,000 ft., No. 3644.

249. Dracocephalum Linn.

644. Dracocephalum speciosum Benth.
Common on the Chola range, 12—14,500 ft., No. 4283.

250. Brunella Linn.

645. Brunella vulgaris Linn.
Common, 7—1,200 ft.

251. Phlomis Linn.

646. Phlomis macrophylla Wall.
Changu, Chola, 10—12,000 ft., common.

647. Phlomis setigera Falc.
Changu, Laghep, 11—13,000 ft., No. 4262.

648. Phlomis bracteosa Royle
Changu, Chola, 11—14,000 ft., Nos. 3214, 3738, 4093.

252. Notochæte Benth.

649. Notochæte hamosa Benth.
Karponang, Phadonchen, 6—8,000 ft.

253. Eriophyton Benth.

650. Eriophyton Wallichianum Benth.
Ningbil, Tanka La, 14—25,000 ft., No. 4216.

254. Leucosceptrum Smith

651. Leucosceptrum canum Sm.
Phadonchen, 6—8,000 ft., common.

255. Ajuga Linn.

652. Ajuga lobata Don
Karponang, 8—9,000 ft.

LXX.—PLANTAGINEÆ.

256. Plantago Linn.

653. Plantago tibetica H. f. & T.
Gnatong, 13,000 ft., No. 4610.

LXXI.—POLYGONACEÆ.

257. Polygonum Linn.

654. Polygonum delicatulum Meissn.
Changu, Chamnago, 11—14,000 ft., No 3802. Very common.

655. Polygonum filicaule Wall.

Laghep, Chola, 9—13,000 ft., Nos. 2980, 3389. Very common.

VAR. **villosa**

Sherabthang, Chola, 13—14,000 ft., No. 3478.

VAR. **cæspitosa**

Changu, 12—14,000 ft., No. 3522.

656. Polygonum viviparum Linn.

Chola range, 12—14,000 ft., No. 3629. Common.

657. Polygonum sphærostachyum Meissn.

Changu, Tosa, Kapoop, 12—14,000 ft., No. 3407.

658. Polygonum perpusillum Hook. f.

Chola range, 13—15,000 ft., Nos. 3545, 4044. Common.

659. Polygonum amplexicaule Don VAR. **speciosa**

Laghep, Fieunggong, Gnatong, 10—12,000 ft., Nos. 3882, 4367

660. Polygonum vacciniifolia Wall.

Changu, Chola, 11—1,300 ft., No. 3740.

661. Polygonum flaccidum Meissn. VAR. **hispida**

Phadonchen, 7,000 ft., No. 4448.

662. Polygonum alatum Ham.

Common, 5—10,000 ft.

663. Polygonum runcinatum Ham.

Dikchu Valley, Laghep, 9—11,000 ft.

664. Polygonum sinuatum Royle

Phadonchen, 10,000 ft., No. 4391.

665. Polygonum molle Don

Phadonchen, 8,000 ft.

666. Polygonum polystachyum Wall.

Chola range, 12—13,000 ft., common.

667. Polygonum campanulatum Hook. f.

Chola range, 8—12,000 ft., No. 4366. Common.

668. Polygonum nummularifolium Meissn.

Chola range, 14—15,000 ft., very common.

258. **Rheum** Linn.

669. Rheum acuminatum H. f. & T.

Changu, Chola, 11—12,000 ft. Common.

670. Rheum nobile H. f. & T.

Changu, Chola, 13—15,000 ft. Not so common as in northern Sikkim.

259. Oxyria Hill

671. Oxyria digyna Hill

Changu, 10—13,000 ft.

260. Rumex Linn.

672. Rumex nepalensis Spreng.

Karponang, 7—9,000 ft.

LXXII.—ARISTOLOCHIACEÆ.

261. Aristolochia Linn.

673. Aristolochia Roxburghiana Koltzsch

Ari, 4—5,000 ft.

LXXIII.—PIPERACEÆ.

262. Houttuynia Thunb.

674. Houttuynia cordata Thunb.

Temi, Gangtok, Phadonchen, 5—6,000 ft.

263. Piper Linn.

675. Piper nepalense Miq.

Phadonchen, 7,000 ft., Nos. 4470, 4471.

LXXIV.—CHLORANTHACEÆ.

264. Circæaster Maxim.

676. Circæaster agrestis Maxim.

Ningbil, 13,000 ft., Nos. 4125, 4503 *Ribu*! Also recorded from the Sebu Valley, 14,000 ft., 1142, *Gammie*!

These are the first records for the East Himalaya. Hooker notes the hooked bristles on the carpels as aids to dispersion, Fl. Brit. Ind. (v, 101). Our specimens were found at a deserted camping-ground; the wandering shepherds and their flocks are no doubt the agents which unconsciously distribute the seeds of this little known plant.

LXXV.—LAURINEÆ.

265. Beilschmiedia Nees

677. Beilschmiedia Gammieana King

Phadonchen, Keadom, Lower Chakung Chu, 6—8,000 ft., No. 4757 *Ribu*!

266. Cinnamomum Bl.

678. Cinnamomum obtusifolium Nees
Gangtok, Ari, 4—6,000 ft.

267. Actinodaphne Nees

679. Actinodaphne sikkimensis Meissn.
Phadonchen, 7—8,000 ft.

268. Litsæa Lamk.

680. Litsæa citrata Bl.
Phadonchen, Karponang, 7—8,000 ft.
681. Litsæa sericea Wall.
Karponang, Laghep, 8—10,000 ft., No. 2986.
682. Litsæa elongata Wall.
Phadonchen, 7—8,000 ft.
683. Litsæa salicifolia Roxb.
Song, Ari, 4—5,000 ft.
684. Litsæa oblonga Wall.
Ari, 4—6,000 ft.

269. Lindera Thunb.

85. Lindera pulcherrima Benth.
Phadonchen, 8,500 ft.
686. Lindera ? sikkimensis Meissn.
Laghep, 10,000 ft., No. 3284.

This is an imperfectly known species referred doubtfully to *Lindera*. The Laghep specimens have female flowers ; male flowers and fruit still unknown.

LXXVI.—THYMELAEACEÆ.

270. Daphne Linn.

687. Daphne cannabina Linn.
Gangtok, Ari, Laghep, 4—10,000 ft.

271. Edgeworthia Meissn.

688. Edgeworthia Gardneri Meissn
Phadonchen, 7—8,000 ft.

LXXVII.—ELÆAGNACEÆ.

272. Hippophae Linn.

689. Hippophae salicifolia Don
Lachung, Chakung Chu, 9—10,000 ft.

LXXVIII.—SANTALACEÆ.

273. Pyrularia Michx.

690. Pyrularia edulis A.DC.
Phadonchen, 6,000 ft.

LXXIX.—EUPHORBIACEÆ.

274. Euphorbia Linn.

691. Euphorbia himalayensis Boiss.
Changu, Gnatong, 13,000 ft., Nos. 3161, 4243.

692. Euphorbia sikkimensis Boiss.
Lachung, W. of Tanka La, 8—10,000 ft.

275. Sarococca Lindl.

693. Sarococca pruniformis Lindl.
Chakung Chu, 8 - 9,000 ft.

276. Bridelia Willd.

694. Bridelia montana Willd.
Ari, 5 - 6,000 ft.

277. Glochidion Forst.

695. Glochidion acuminatum Muell. Arg.
Phadonchen, 7,000 ft.

278. Croton Linn.

696. Croton Tiglium Linn.
Ari, 5,000 ft., No. 4517. Probably of recent introduction.

279. Daphniphyllum Bl.

697. Daphniphyllum himalayense Muell. Arg.
Samatek, Chakung Chu, 8—9,000 ft.

280. Mallotus Lour.

698. Mallotus nepalensis Muell. Arg.
Phadonchen, 7—8,000 ft.

281. Baliospermum Bl.

699. Baliospermum corymbiferum Hook. f.
Ari, 5,000 ft, No. 4516.

LXXX.—URTICACEÆ.

282. Laportea Gaud.

700. Laportea terminalis Wight
Karponang, 7—8,000 ft.

283. Girardinia Gaud.

701. Girardinia heterophylla Dene.
Phadonchen, 6—7,000 ft.

284. Pilea Lindl.

702. Pilea ternifolia Wedd.
Karponang, 8—9,000 ft.

703. Pilea Symmeria Wedd.
Common, 8—12,000 ft., Nos. 2987, 3980.

704. Pilea scripta Wedd.
Ari, 5—6,000 feet.

285. Lecanthus Wedd.

705. Lecanthus Wightii Wedd.
Common, 6—10,000 ft., Nos. 2958, 4397, 4465.

286. Elatostema Forst.

706. Elatostema subincisum Wedd.
Laghep, Phadonchen, 7—10,000 ft., Nos. 3382, 4456.

707. Elatostema Hookerianum Wedd.
Gangtok, 6,000 ft., No. 2957.

708. Elatostema surculosum Wight
Karponang, 8—9,000 feet, No. 3025.

709. Elatostema obtusum Wedd.
Laghep, 10,000 ft., No. 3381.

287. Boehmeria Jacq.

710. Boehmeria malabarica Wedd.
Phadonchen, Ari, 5,000 feet.

711. Boehmeria platyphylla Don
Phadonchen, 7—8,000 ft.

288. Chamabainia Wight

712. Chamabainia cuspidata Wight
Gangtok, 6—7,000 ft., No. 2956.

289. Pouzolzia Gaud.

713. Pouzolzia viminea Wedd.
Phadonchen, 6--7,000 ft., No. 4447.

290. Debregeasia Gaud.

714. Debregeasia velutina Gaud.
Phandonchen, 5—6,000 ft.

291. Parietaria Tournef.

715. Parietaria debilis Forst.
Changu, Chola, 12—13,000 ft., Nos. 3800, 4122, 4225.

LXXXI.—JUGLANDEÆ.

292. Juglans Linn.

716. Juglans regia Linn.
Phadonchen, 7—9,000 ft.

293. Engelhardtia Leschen.

717. Engelhardtia spicata Bl.
Phadonchen, 5—6,000 ft.

LXXXII.—CUPULIFERÆ.

294. Betula Tourn.

718. Betula utilis Don
Chola range, 11—13,000 ft., very common.

295. Alnus Gaertn.

719. Alnus nepalensis Don
Phadonchen, 7,000 ft.

296. Quercus Linn.

720. Quercus semecarpifolia Sm.
Dikchu Valley, *Gammie* !

721. Quercus glauca Thunb.
Gangtok, 5—6,000 ft.

722. Quercus lamellosa Sm.
Phadonchen, 7—8,000 ft.

723. Quercus fenestrata Roxb.
Phadonchen, Ari, 6—8,000 ft., No. 4511.

297. Castanopsis Spach

724. Castanopsis Hystrix A.DC.
Phadonchen, 7—8,000 ft.

725. Castanopsis tribuloides A.DC.
Gangtok, Phadonchen, 6—7,000 ft.

298. Corylus Linn.

726. Corylus ferox Wall.
Dikchu, Cheuntong, No. 4802 *Ribu* !

LXXXIII.—SALICINEÆ.

299. Salix Linn.

727. Salix sikkimensis Anderss.
Dikchu, Chakung Chu, 11—13,000 ft., Nos. 3755, 3796, 4002.

728. Salix Daltoniana Anderss.
Changu, 11—12,000 ft., No. 4597 *Ribu*.

729. Salix, sp. aff **Daltoniana** Anderss.
Changu, 13,000 ft. Nos. 3149, 3150.

730. Salix eriostachya Wall.
Gnatong, 12,000 ft., No. 4390.

731. Salix serpyllum Anderss.
Tosa, 14—15,000 ft., No. 3950.

732. Salix sp. near **flabellaris** Anderss.
Changu, 11—12,000 ft., No. 4598 *Ribu* !

733. Salix Lindleyana Wall.
Kapoop, Chola, 13—14,000 feet, Nos. 3437, 3698.

734. Salix calyculata Hook. f.
Common on the Chola range, 12—14,000 feet, Nos. 3151, 3152, 3219, 3931, 3932.

735. Salix oreophila Hook. f.
Changu, Chola, 13—15,000 ft., Nos. 3148, 3464, 3916, 4454.

736. Salix Thomsoniana Anderss.
Gnatong, 11,000 feet, *King's collector* !

737. Salix sp.
Changu, 11—12,000 ft., No. 4599 *Ribu* !

MONOCOTYLEDONES.

LXXXIV—ORCHIDEÆ.

300. Liparis Richard.

738. Liparis pygmæa King & Pantling
Dikchu, 11,000 ft., No. 3769.

301. Tipularia Nutt.

739. Tipularia Josephi Reichb. f.
Dikchu 11,000 ft., No. 3828.

302. Dendrobium Schwartz

740. Dendrobium denudans Don
Gangtok, 4—6,000 ft., No. 4675 *Ribu* !

303. Bulbophyllum Thouars

741. Bulbophyllum odoratissimum Lindl.
Lower Dikchu, Samatek, 7,000 ft., No. 3354.

304. Coelogyne Lindl.

742. Coelogyne Hookeriana Lindl.
Lower Dikchu, Samatek, 8—9,000 ft., No. 3359.

305. Calanthe Br

743. Calanthe chloroleuca Lindl.

Lower Dikchu, Samatek, 7—8,000 ft., No. 3352.

306. Listera Br

744. Listera pinetorum Lindl.

Changu, Dikchu, 11—12,000 ft., Nos. 3200, 3759. Very common in the coniferous woods.

745. Listera Lindleyana King & Pantling

W. of Tanka La, 12,000 ft., No. 4720 *Ribu* !

307. Orchis Linn.

746. Orchis Chusua Don

Chola range, 10—12,000 ft., common.

747. Orchis spathulata Reichb. f.

Chola range, 11—18,000 ft., No. 3866. Common.

748. Orchis habenarioides King & Pantling

Changu, Dikchu, 11—12000 ft., No. 3763.

749. Orchis puberula King & Pantling

Dikchu, 10,000 ft., No. 3905.

308. Herminium Linn.

750. Herminium congestum Lindl.

Changu, Laghep, 11—12,000 ft., No. 3198.

751. Herminium orbiculare Hook. f.

Dikchu, Phadonchen, 9—11,000 ft., No. 3757.

309. Habenaria Willd.

752. Habenaria stenantha Hook. f.

Dikchu, 8—9,000 ft., No. 3898.

753. Habenaria oligantha Hook. f.

Laghep, Changu, 10—12,000 ft., No. 3197.

754 Habenaria leptocaulon Hook. f.

Dikchu, Fieunggong, 10—11000 ft., No. 3894.

755. Habenaria nematocaulon Hook. f.

Fieunggong, 12,000 ft., No. 3886.

756. Habenaria Bakeriana King & Pantling

Changu, Dikchu, 10—12,000 ft., Nos. 3503, 3756.

757. **Habenaria Cumminsiana** King & Pantling
Changu, 11,000 ft., No. 4235.

758. **Habenaria albo-marginata** King & Pantling
Changu, Chola, 10—13,000 ft., Nos. 3548, 3637. Common.

310. Satyrium Schwartz

759. **Satyrium nepalense** Don
Changu, 11—12,000 ft.

LXXXV.—SCITAMINEÆ.

311. Roscœa Smith

760. **Roscœa alpina** Royle
Laghep, Lachung, 10,000 ft., No. 3047.

761. **Roscœa purpurea** Smith
Lachung, 9—10,000 ft., No. 3340.
Not observed in the southern area.

312. Cautleya Royle

762. **Cautleya lutea** Royle
Phadonchen, 7,000 ft., No. 4472.

763. **Cautleya robusta** Baker
Gangtok, 6,000 ft.

313. Hedychium Kœnig

764. **Hedychium spicatum** Ham. VAR. **acuminatum.**
Phadonchen, 7,000 ft., No. 4469.

765. **Hedychium coccineum** Ham.
Ari, 5,000 ft., No. 4513.

LXXXVI.—HÆMODORACEÆ.

314. Aletris Linn.

766. **Aletris nepalensis** Hook. f.
Chola range, 10—14,000 ft., Nos. 3299, 3555. Common.

315. Ophiopogon Ker.

767. Ophiopogon Wallichianus Hook. f.
Gangtok, Karponang, 6—9,000 ft., Nos. 2968, 3035. Very common.

768. Ophiopogon intermedius Don
Changu, 9—10,000 ft.

LXXXVII.—IRIDEÆ.

316. Iris Linn.

769. Iris Clarkei Baker
Laghep, Changu, Dikchu, 10—12,000 ft., No. 3193. Frequent.

LXXXVIII.—LILIACEÆ.

317. Smilax Linn.

770. Smilax elegans Wall.
Karponang, 9—10,000 ft., No. 3076.

318. Polygonatum Tourn.

771. Polygonatum Hookeri Baker
Laghep, Changu, 12—13,000 ft., Nos. 3295, 3539.

772. Polygonatum verticillatum All.
Common throughout the Chola range, 9—14,000 ft.

773. Polygonatum cirrifolium Royle
Changu, Chola, 12—13,000 ft.

319. Streptopus Michaux

774. Streptopus simplex Don
Changu, Chola, Phadonchen, 8—12,000 ft.

320. Smilacina Desf.

775. Smilacina pallida Royle VAR. **typica**
Changu, 8—12,000 ft., No. 3102. Very common.

VAR. **purpurea**
Changu, 9—12,000 ft., Nos. 3108, 3134, 3206.

776. Smilacina oleracea H. f. & T.
Karponang, 8—9,000 ft., very common.

321. Allium Linn.

777. Allium Wallichii Kunth

Chamnago, Gnatong, 11—12,000 ft. Nos. 3801, 4373.

778. Allium victorialis Linn.

Very common throughout the area, 12—14,000 ft.

322. Lilium Linn.

779. Lilium giganteum Wall.

Lachung, Lower Chakung Chu, 9—10,000 ft.

780. Lilium roseum Wall.

Dikchu, Lachung, 10—11,000 ft., Nos. 3711, 4545 *Ribu* !

323. Fritillaria Linn.

781. Fritillaria Stracheyi Hook. f.

Changu, Gnatong, 9—13,000 ft., Nos. 3097, 3104.

782. Fritillaria cirrhosa Don

Changu, W. of Tanka La, 11—12,000 ft., No. 3213.

324. Lloydia Salisb.

783. Lloydia serotina Reichb.

Common throughout the area, 12—15,000 ft.

VAR. **sikkimensis minima.**

Changu, Nathui La, 13—14,000 ft., Nos. 3175, 3468.

325. Tofieldia Huds.

784. Tofieldia himalaica Baker

Laghep, Dikchu, 10—11,000 ft., Nos. 3048, 3826.

326. Disporum Salisb.

785. Disporum calcaratum Don

Karponang, 7—8,000 ft.

327. Clintonia Rafin.

786. Clintonia alpina Kunth

Chola, Dikchu, 11—12,000 ft., occasional.

328. Paris Linn.

787. Paris polyphylla Smith

Fleunggong, Laghep, 8—10,000 ft.

LXXXIX.—COMMELINACEÆ.

329. Commelina Linn.

788. Commelina obliqua Ham.
Gangtok, Phadonchen, 4—7,000 ft.

330. Cyanotis Don

789. Cyanotis barbata Don
Phadonchen, 7,000 ft. No. 4457.

331. Streptolirion Edgew.

790. Streptolirion volubile Edgew.
Karponang, Phadonchen, 6—9,000 ft., common.

XC.—JUNCACEÆ.

332. Juncus Linn.

791. Juncus effusus Linn.
Dikchu, 9—10,000 ft., No. 3822.

792. Juncus ochraceus Buchen.
Laghep, Karponang, 7—9,000 ft.

793. Juncus Grisebachii Buchen.
Changu, Chola, Gnatong, 12—13,000 ft., Nos. 3704, 4163, 4356.

794. Juncus chrysocarpus Buchen.
Chamnago, Yakla, Tosa, 10—13,000 ft., Nos. 3642, 4489 *Ribu*!

795. Juncus prismatocarpus Br.
Karponang, Phadonchen, 7—10,000 ft.

796. Juncus triglumis Linn.
Changu, Chola, 11—14,000 ft., Nos. 3648, 3853, 3922.

797. Juncus leucomelas Royle
Common throughout the area, 10—14,000 ft., Nos. 3063, 3270, 3423, 3752, 3808.

798. Juncus Thomsoni Buchen.
Sherabthang, 13,000 ft., No. 4516 *Ribu*!

799. Juncus leucanthus Royle
Changu, Chamnago, 12—13,000 ft., Nos. 3155, 3313, 3809.

800. Juncus sp. nov ? aff. *J. leucanthi* vel. *J. leucomelanos.*

Stem very slender, tufted, 8—10 cm. high, basal sheaths poorly developed, chestnut brown. Basal leaves very slender, capilliform usually about one half the length of the stem, flexuous, curved ; about the middle of the stem 1—2 capillary bracts resembling the leaves and bearing axillary bulbils. Cyme solitary, 1—2 flowered, 4—5· mm. in diameter. Bracts of the flower equalling the sepals or smaller, sometimes only half the length, ovate-lanceolate, acute or acuminate, brown ; bracts of the bulbils 2—3 times as long, capillary with a broad base. Sepals linear oblong, acute, or subacute, membranous, pale yellow, 3 mm. long ; anthers ½-⅓rd as long as the filaments, exserted ; style long exserted with short stigmas. Capsule obovoid-oblong, cuspidately beaked. Seeds ovoid, scarcely tailed. Bulbils 2—3 mm. long, ovoid, tipped with 1—2 very short capillary leaves.

Sikkim Himalaya, Changu 13,000 ft., No. 3502 *Smith* and without definite place, *King's collector* !

Among Himalayan species appears to come nearest *Juncus leucanthus*, but the solitary flower-head contains one or two flowers only and about 1—2 cm. below the flower appear 1—2 bracts with bulbils. Occasionally the flower at the apex is replaced by bulbils. I cannot consider it a reduced form of either of these two species.

801. Juncus membranaceus Royle

Chamnago, 12,000 ft., No. 3642.

802. Juncus sphacelatus Dene.

Changu, 12—13,000 ft., No. 4280.

803. Juncus himalensis Klotzsch & Garcke

Very common throughout the area, 10—14,000 ft., Nos. 3075, 3531, 3606, 3857.

804. Juncus sikkimensis Hook. f.

Common on the Chola range, 12—14,500 ft., Nos. 3425, 3851, 4034, 4100.

VAR. **monocephala.**

Changu, 12—13,000 ft., No. 3615.

805. Juncus sp. nov. vel forma minima *J. sikkimensis* Hook. f.

VAR. **monocephalæ.**

A slender plant, generally 2—3 cm. high, more rarely attaining 10 cm., densely caespitose but scarcely stoloniferous. Rootstock slender ; stem filiform, base clothed with a few loose sheathes, which tend to split striately into fibres. Leaf solitary or few, terete, filiform, acute, slightly channelled above, equalling or shorter than the stem inserted near the base. Inflorescence of only one flower terminating the stem. Bracts

two, filiform, one equalling or a little shorter than the sepals, the other rarely equalling more usually 2—3 times longer than the sepals. Sepals 3 mm. long, patent, glumaceous, linear-lanceolate, black brown. Anthers 2—3 times longer than the filaments equalling or slightly less than the perianth. Style slightly longer than triquetrous ovary, together 5 mm. long, stigmas 3, purplish, slightly longer than the style. Capsule equalling the sepals, ovoid, acute, more or less beaked, dark-brown, shining, 3-septate; seeds few, ½ mm. long, elliptic-ovoid, without tails, chartaceous, minutely rugose; testa somewhat shiny.

Sikkim Himalaya at an elevation of 12—14,000 ft., Jongri, No. 202 *Gammie* ! below Dzalep La, *King's collector* ! at Nathui La, Changu Tosa, Chakung, Chu, Nos. 3202, 3465, 3854, 4046 *Smith*.

A very small plant occurring in both west and east Sikkim in the region of heavy rainfall. In structure of flower its affinities are with the variety of *J. sikkimensis* mentioned above but the single flower marks it off from the series in which *J. sikkimensis* is placed. It is a long way from typical *J. sikkimensis* but appears to be connected with the variety *monocephala* by a series of intermediates. The difference is chiefly one of size but is so marked that in my opinion the plant will have to be considered specifically distinct.

806. Juncus Clarkei Buchen.

Chola, Phadonchen, 11—12,000 ft., Nos. 3810, 4419.

333. Luzula DC

807. Luzula effusa Buchen.

Laghep, 11,000 ft., No. 3059.

808. Luzula campestris DC.

Laghep, Changu, Chola, 10—13,000 ft., Nos. 3371, 3646.

XCI.—AROIDEÆ.

334. Arisæma Mart.

809. Arisæma Griffithii Schott

Changu, 10—12,000 ft., No. 3184.

810. Arisæma utile Hook. f.

Changu, 11—12,000 ft.

811. Arisæma speciosum Mart.

Karponang, Phadonchen, 6—9,000 ft., No. 3034.

812. Arisæma Wallichianum Hook. f.

Changu, 11—13,000 ft., No. 3223.

813. Arisæma tortuosum Schott.
Phadonchen, 7—8,000 ft., common.

814. Arisæma consanguineum Schott
Phadonchen, 7—8,000 ft., common.

815. Arisæma concinnum Schott
Phadonchen, 7—9,000 ft.

816. Arisæma Jacquemontii Bl.
Laghep, Changu, Chola, 10—14,000 ft., Nos. 3057, 3595. Very common.

XCII.—ERIOCAULEÆ.

335. Eriocaulon Linn.

817. Eriocaulon alpestre H. f. & T.
Chamnago, 12—13,000 ft., No. 4542 *Ribu*!

XCIII.—CYPERACEÆ.

336. Pycreus Beauv.

818. Pycreus sanguinolentus Nees
Phadonchen, 7—8,000 ft., No. 4402.

337. Fimbristylis Vahl

819. Fimbristylis complanata Link VAR.
Phadonchen, 6—7,000 ft, No 4443.

338. Scirpus Linn.

820. Scirpus caricis Retz.
Chola, 11—12,000 ft., Nos. 3654, 3706.

339. Cobresia Willd.

821. Cobresia schoenoides (C. A. Mey) Steud.
Kapoop, 13,000 ft., No. 3124.

822. Cobresia capiliifolia (Done) C. B. Clarke
Dikchu, 13,000 ft., No. 3753. New to Sikkim.

823. Cobresia nepalensis (Nees) Kükenth.
Chakung Chu, Sherabthang, 13—14,000 ft., Nos. 4009, 4515 *Ribu*!
VAR. **elachista** (C. B. Clarke) Kükenth.
Chakung Chu, Changu, 12—13,000 ft., Nos. 3247, 3855.

824. **Cobresia seticulmis** Boeck.
Changu, Chakung Chu, Tosa, 11—15,000 ft., Nos. 3100, 3959, 3977.

825. **Cobresia Hookeri** C. B. Clarke
Sherabthang, Tosa, 14,000 ft., Nos. 3449, 4494 *Ribu*!

826. **Cobresia uncinoides** (Boott) C. B. Clarke
Sherabthang, Yakla, 14—15,000 ft., Nos. 3180, 4562.

827. **Cobresia curticeps** (C. B. Clarke) Kükenth.
Changu, Chola, Gnatong, 11—12,000 ft., Nos. 3501, 3707, 3975, 4369.

828. **Cobresia curvata** (Boott) Kükenth.
Changu, 12,000 ft., No. 3506.

340. Carex Linn.

829. **Carex nubigena** D. Don
Changu, Tosa, 12—14,000 ft., Nos. 3215, 4482 *Ribu*!

830. **Carex** sp. aff. **nubigena**
Chamnago, 12,000 ft., No. 3655.

831. **Carex notha** Kunth
Chola, 11—12,000 ft., No. 3727.

832. **Carex rara** Boott subsp. **capillacea** Boott
Laghep, Changu, Chola, Yakla, 10—13,000 ft., Nos. 3496, 3647.

833. **Carex cruciata** Wahl.
Karponang, 6—8,000 ft.

834. **Carex filicina** Nees VAR. **meiogyna**
Karponang, Phadonchen, 8—10,000 ft., Nos. 3008, 4383.
Phadonchen, 8—10,000 ft., No. 4403.
var. inter *meiogynam* et *minorem*.

835. **Carex decora** Boott
Changu, 13,000 ft., No. 3530.

836. **Carex munda** Boott
Laghep, Changu, Chola, 10—13,000 ft., Nos. 3388, 3495, 3754, 3933.

837. **Carex Lehmanni** Drej.
Changu, Chola, 11—13,000 ft., No. 4142.

838. **Carex obscura** Nees
Chola, Tosa, 11—14,000 ft., Nos. 3562, 3642, 3745, 3964.

839. **Carex atrata** Linn subsp. **pullata** (Boott) Kükenth.
Changu, Kapoop, 12—13,000 ft., Nos. 3154, 3246, 3564.

840. Carex finitima Boott
Karponang, 8—10,000 ft., No. 3009.
841. Carex inanis Kunth
Karponang, 10,000 ft., No. 3044.
842. Carex hæmatostoma Nees
Dzalep, Ningbil, 12—14,000 ft., Nos. 3461, 4148, 4332.
843. Carex setosa Boott
Chamnago, 13,000 ft., No. 3841.

XCIV.—GRAMINEÆ.

341. Paspalum Linn.

844. Paspalum sanguinale Lamk.
Phadonchen, 8,000 ft., No. 4396.

342. Arundinella Raddi

845. Arundinella villosa Arn. VAR. **himalaica**
Lachung, Chakung Chu, 7—8,000 ft., No. 4738 *Kibu* !

343. Anthistiria Linn.

846. Anthistiria Hookeri Griseb.
Chamnago, Keadom, 8—10,000 ft., Nos. 4422 and 4760 *Kibu* !

344. Hierochloa Gmel.

847. Hierochloa flexuosa Hook. f.
Changu, Tosa, 10—14,000 ft., Nos. 3101, 3601, 3923.
848. Hierochloa Hookeri C. B. Clarke
Fieunggong, 11,000 ft., No. 3895.

345. Stipa Linn.

849. Stipa mongolica Turcz.
Chola, Tosa, 14—15,000 ft., Nos. 3918, 4056.
850. Stipa Orthoraphium Steud.
Laghep, Chola, Gnatong, 11—12,000 ft., Nos. 3967, 4368, 4369 *Kibu* !

346. Agrostis Linn.

851. Agrostis canina Linn.
Chamnago, 13,000 ft., No. 3845.

852. **Agrostis micrantha** Steud.
Phadonchen, 8—9,000 ft., Nos. 4420, 4429.

853. **Agrostis Clarkei** Hook. f.
Changu, 11,000 ft., No. 4239.

854. **Agrostis inæquiglumis** Griseb.
Changu, Chola, 11—13,000 ft., Nos. 3972, 4151, 4229.

855. **Agrostis divaricata** Griseb.
Ningbil, 13,000 ft., No. 4561.

347. Calamagrostis Adans.

856. **Calamagrostis emodensis** Griseb.
Gnatong, 10—11,000 ft.

857. **Calamagrostis tripilifera** Hook. f.
Changu, 12—13,000 ft., No. 4290.
VAR. **Cumminsii**
Sherabthang, 13,000 ft., No. 4302.

858. **Calamagrostis pilosula** Hook. f. VAR. **alpestris**
Chola, Chakung Chu, 12—14,000 ft., Nos. 3878, 4006.

348. Deyeuxia Clar.

859. **Deyeuxia scabrescens** Munro
Common on the Chola range, 12—13,500 ft., Nos. 3875, 4331.

860. **Deyeuxia pulchella** Hook. f.
Yakla, 14,500 ft.

349. Deschampsia Beauv.

861. **Deschampsia cæspitosa** Beauv.
Changu, Chola, 11—13,000 ft., No. 3650. Very common.

350. Avena Linn.

862. **Avena aspera** Munro
Gnatong, 12,000 ft., No. 4379.
VAR. **parviflora**
Changu, 11—12,000 ft., No. 3497.

863. **Avena subspicata** Clairv.
Chamnago, Ningbil, 12—13,000 ft., No. 4147.

864. **Avena flavescens** Linn.
Sherabthang, Ningbil, 12—13,000 ft., Nos. 4161, 4299.

351. Danthonia DC.

865. Danthonia cachemyriana Jaub. & Spach.
Laghep, Gnatong, 11—12,000 ft., Nos. 4374, 4554.

352. Tripogon Roth.

866. Tripogon filiformis Nees
Lachung, 7—8,000 ft., No. 4742 *Ribu*!

353. Poa Linn.

867. Poa pseudo-pratensis Hook. f.
Changu, Chola, Gnatong, 11—14,000 ft., Nos. 3225, 3779, 3883.

868 Poa nemoralis Linn VAR. **ligulata** Stapf
Chamnago, 12,000 ft., No. 3656.

869. Poa flexuosa Wahlb.
Common on the Chola range, 11—15,000 ft., No. 3605.

870. Poa khasiana Stapf
Chamnago, 11—12,000 ft., No. 3645.

871. Poa himalayana Nees
Chakung Chu, Yakla, 11—12,000 ft., Nos. 3965, 3973.

872. Poa Gammieana Hook. f. ?
Chamnago, 11—12,000 ft., No. 3793.

873. Poa sp.
Chamnago, 12,000 ft., No. 3652.

354. Glyceria Br.

874. Glyceria tonglensis C. B. Clarke.
Chakung Chu, 11—12,000 ft., No. 3976.

355. Festuca Linn.

875. Festuca valesiaca Schleich
Changu, 12,000 ft., No. 3499.

876. Festuca Cumminsii Stapf
Changu, Chamnago, 12—13,000 ft., Nos. 3844, 4305.

877. Festuca polycolea Stapf
Changu, Chola, 13—14,000 ft., Nos. 3460, 3519.

878. Festuca undata Stapf VAR. **aristata** ?
Chamnago, 12,000 ft., No. 3640.

879. Festuca kashmiriana Stapf
Ningbil, 14,500 ft., No. 4096.

880. Festuca rubra Linn.
Tosa, 13—14,000 ft., No. 3936.

881. Festuca sp.
Sherabthang, 13,000 ft., No. 4306.

356. Arundinaria Michx.

882. Arundinaria racemosa Munro
Chola Valley, 11—12,000 ft., No. 3723.

883. Arundinaria Falconeri Benth.
Karponang, Laghep, 8—9,000 ft.

GYMNOSPERMÆ.

XCV.—CONIFERÆ.

357. Juniperus Linn.

884. Juniperus Wallichiana H. f. & T.
J. pseudo-sabina F.B.I. nec Fisch. & Mey.
Changu, Laghep, 10—12,000 ft.

358. Abies Juss.

885. Abies Webbiana Lindl.
Changu, Chola, Gnatong, 9—12,000 ft., common.

PTERIDOPHYTA.

XCVI.—POLYPODIACEÆ.

359. Diacalpe Blume

886. Diacalpe fœniculacea C.B. Clarke
Karponang, 8—9,000 ft., No. 3022.

360. Woodsia R. Br.

887. Woodsia lanosa Hook. & Baker
Chamnago, Ningbil, W. of Tanka La, 13—15,000 ft., Nos. 3626, 4218, 4555.

888. Woodsia elongata Hook.
Laghep, 11,000 ft., No. 3060.

361. Peranema Don

889. **Peranema cyatheoides** Don.
Laghep, 9—10,000 ft.

362. Hymenophyllum Linn.

890. **Hymenophyllum exsertum** Wall.
Karponang, 8—9,000 ft., No. 3014.

891. **Hymenophyllum polyanthos** Swartz
Changu, Chakung Chu, 11—12,000 ft., Nos. 3970, 4237.

363. Davallia Smith

892. **Davallia immersa** Wall.
Ari, 5—6,000 ft., No. 4518.

893. **Davallia pulchra** Don
Karponang, Chakung Chu, 8—9,000 ft.

364. Cheilanthes Schwarz

894. **Cheilanthes farinosa** Kaulf. VAR. **chrysophylla**
Karponang, 8,000 ft., No. 3026.

365. Cryptogramme R. Br.

895. **Cryptogramme crispa** R. Br.
Laghep, Kapoop, Ningbil, 12—13,000 ft., Nos. 4105, 4145, 4560.

366. Pteris Linn.

896. **Pteris biaurita** Linn.
Phadonchen, 7,000 ft., No. 4462.

367. Woodwardia Smith.

897. **Woodwardia radicans** Smith
Chakung Chu, Lachung, 7—9,000 ft., No. 3336.

368. Asplenium Linn.

898. **Asplenium alternans** Wall.
Laghep, 10,000 ft., No. 4559.

899. **Asplenium varians** Hook. & Grev. ?
Laghep, 9,000 ft., No. 4563.

900. Asplenium spinulosum Hook. & Baker
Yakla, 12,000 ft., *Atkinson* !

901. Asplenium thelypteroides Michx.
Kapoop, 12,000 ft., No. 3408.

902. Asplenium macrocarpum Hook.
Karponang, 8—9,000 ft., No. 3021.

VAR. **Atkinsoni**
Karponang, 8,000 ft., No. 3027.

903. Asplenium Filix-fœmina Bernh.
Laghep, Yakla, Chakung Chu, 10—13,000 ft., Nos. 8383, 4022.

904. Asplenium (Athyrium) Duthiei Bedd. ?
Changu, Chola, 12—13,000 ft., Nos. 3157, 3610.

369. Aspidium Schwartz

905. Aspidium lachenense Hook.
Chamnago, Ningbil. 12—14,000 ft., Nos. 3772, 4082, 4108.

906. Aspidium Atkinsoni C. B. Clarke
Chakung Chu, Yakla, 10—13,000 ft., No. 4557.

907. Aspidium ilicifolium Don
Karponang, Laghep, 8—11,000 ft., Nos. 3020, 4556.

908. Aspidium Prescottianum Wall.
Changu, Chola, 12—13,000 ft., Nos. 3210, 3879, 4268.

370. Nephrodium Richd.

909. Nephrodium Filix-Mas Richd. VAR. **parallelograma**
Phadonchen, Yakla, Changu, 8—12,000 ft., No. 4491.

910. Nephrodium odontoloma Hook. & Baker
Laghep, Changu, 11—12,000 ft., Nos. 3156, 4564.

911. Nephrodium Brunonianum Hook.
Changu, Chola, 12—14,000 ft., Nos. 3212, 3622, 4558.

371. Oleandra Cav.

912. Oleandra Wallichii Presl.
Phadonchen, 6—7,000 ft., No. 4441.

372. Polypodium Linn.

913. Polypodium lachnopus Wall.
Phadonchen, 6—8,000 ft.

914. Polypodium microrrhizoma C. B. Clarke
Karponang, 8—9,000 ft., No. 3018.

915. Polypodium argutum Wall.
Phadonchen, 7—8,000 ft., No. 4406.

916. Polypodium lineare Thunb.
Karponang, 7—8,000 ft.

917. Polypodium membranaceum Don
Phadonchen, 6—7,000 ft., No. 4442.

918. Polypodium cyrtolobum Sm.
Phadonchen, 7—8,000 ft., No. 4425.

919. Polypodium malacodon Hook.
Changu, Phadonchen, 8—12,000 ft., No. 3373.

920. Polypodium ebenipes Hook.
Chakung Chu, 8—10,000 ft.

921. Polypodium Lehmanni Mett.
Phadonchen, 7—8,000 ft., No. 4407.

922. Polypodium himalayense Hook.
Karponang, 8—9,000 ft., No. 3017.

373. Vittaria Smith.

923. Vittaria lineata Sw.
Phadonchen, 6—10,000 ft., No. 4440.

XCVII.—LYCOPODIACEÆ.

374. Lycopodium Linn.

924. Lycopodium Selago Linn.
Tosa, 14—15,000 ft., No. 4040.

XCVIII.—SELAGINELLACEÆ.

375. Selaginella Spreng.

925. Selaginella chrysocaulos Spreng.
Phadonchen, 7—8,000 ft., No. 4401.

INDEX.

[Species described are printed in heavier type]

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