# Primulas of the Petiolaris-Sonchifolia Section.

BY

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At the Primula conference * in 1913 I expressed the opinion that our knowledge of the species allied to *P. petiolaris* was far from satisfactory, and that for a clearer elucidation of the status of the so-called varieties it would be necessary to study the growing plants. Recently, however, an opportunity for further research has been afforded by the bringing together of all the necessary specimens from the herbaria of the Royal Botanic Garden, Calcutta, the Royal Gardens, Kew, and the Royal Botanic Garden, Edinburgh. The examination of this abundant material has served to confirm many of the opinions formed previously which, however, could not be put forward at the Primula conference owing to the inadequate material then at my disposal. The new species which have had to be described quite eclipsed previously formed expectations, and it is largely on account of this great multiplication of species that it was deemed advisable to bring together in definite form the conclusions arrived at.

## HISTORICAL.

The first two species to be published were *P. petiolaris* and *P. nana*, both described by Wallich in 1824 from his Nepaul collections.† In 1882 the dwarf alpine Sikkim *P. Hookeri* was described and figured by Watt. In the end of the same year that part of the Flora of British India dealing with the Primulaceae was published. How the present-day views of species correspond with those of Hooker is well illustrated by noting that the seven varieties of *P. petiolaris* enumerated in the Flora of British India are in the present paper regarded as constituting sixteen distinct species. In 1885 the first Chinese species—*P. sonchifolia*—was described by Franchet from Delavay's Yunnan collection, and in the following year Franchet described *P. moupinensis* from David's Moupine collection.

* Journ. Roy. Hort. Soc., vol. xxxix, p. 187 (1913).

† References to the original publication for species mentioned will be found in the chronologically arranged list.

[Notes, R.B.G., Edin., Nos. XXIX–XXX, Jan. 1917.]

In 1904 * we have the first natural classification of all the known Indian Primulas put forward. Sir George Watt remarks in the course of his paper that he did not advance his classification as final, and that he regarded the establishing of new sections as probably essential. With regard to the section at present under discussion I quite concur in the necessity of limiting the scope of Watt's sections. Of the seventeen species enumerated by Watt as belonging to his section Petiolaris, only three are retained in that section in the present paper. The discrepancy between this small number retained in the section and the much larger number enumerated now from the same area is explained by the fact that Watt's three species are regarded as really composed of sixteen species, which simply means that the present writer cannot agree with Watt that this section is a very "sportive assemblage" of species. The remaining fourteen species included by Watt must be distributed amongst various other sections. Taking some of those which are well known in cultivation, one cannot say that *P. Forbesii* or *P. mollis* should be included in the same section as *P. Winteri*. It is matter for great regret that Sir George Watt, with his wide knowledge of the Indian Primulas in the field, did not see his way clear to multiply his sections instead of confining himself to an expression of belief that such a course might eventually be necessary.

In the following year (1905) there was published in Engler's Pflanzenreich Pax's monograph of Primula. The general classification of the genus follows very closely that proposed by the same author seventeen years previously.† His treatment of the section Petiolares as to the species included in it corresponds much more closely to that adopted in the present contribution than to that proposed by Watt which has been referred to above. In his later monograph Pax includes in his section Petiolares an Indian and a Chinese species which have since been excluded, viz. *P. Tanneri* and *P. pellucida*. The former, along with *P. Roylei*, *P. Griffithii*, *P. Gammieana*, etc., forms a very natural group, approaching in fruit character *P. sonchifolia*, *P. Whitei*, and *P. scapigera*, but in habit recalling more the *P. Moorcroftiana* alliance. *P. pellucida*,‡ on the other hand, belongs to the Malacoides section, and is closely allied to *P. Forbesii*. With these two exceptions the writer accepts the section Petiolares of Pax, but as the title of this paper shows he has linked with it the Sonchifolia section, which includes three species—*P. sonchifolia*, *P. taraxacoides*, and *P. Whitei*. Arguments, with a certain amount of justification, might be adduced against linking the *sonchifolia*

* Watt in Journ. Roy. Hort. Soc., vol. xxix, pp. 295–326.
† Pax in Engler Bot. Jahrb., vol. x, p. 75 (1888).
‡ Balf. f. in Journ. Roy. Hort. Soc., vol. xxxix, p. 150 (1913).

with the *petiolaris* type, but certainly no arguments would convince me that Pax was justified in placing *P. sonchifolia* in the same section as *P. japonica*, *P. Cockburniana*, *P. Poissonii*, etc. In favour of the petiolaris-sonchifolia link now adopted, one has the fact that the development form of *P. sonchifolia* as also the fruit is that of *P. Hookeri* and *P. vernicosa*, and to a slightly less degree of *P. Winteri* and *P. Edgeworthii*.

Reference to fruit character in this section would be incomplete without an admission that of many, or rather of the majority, the mature fruit is unknown. In *P. vernicosa* the capsule cracks irregularly round the top and crumbles away. This would appear to be the method of dehiscence also of *P. sonchifolia*, *P. scapigera*, *P. Whitei*, and probably of *P. bracteosa*. From the immature material of several of the other species, however, the writer concludes that there is evidence, but not wholly convincing evidence, of the presence of longitudinally dehiscing capsules.

As a preliminary to the examination of Pax's treatment of the individual species it should be noted that of the seven species enumerated, Pax indicates that he saw specimens of only three, and that of the six varieties of *P. petiolaris* he saw specimens of only three. In his treatment of *P. petiolaris* Pax follows the Flora of British India, with the single exception that he rightly raises the variety *Edgeworthii* to specific rank. The fact that so few specimens were seen by Pax may account for such unequal treatment of two closely allied plants, viz. var. *pulverulenta*, Hook. f. and var. *Edgeworthii*, Hook. f. The former Pax retains as a variety of *P. petiolaris* and the latter he raises to a species.

Pax also raises to specific rank *P. petiolaris* var. *odontocalyx*, Franchet, but again evidently without having seen any authentic specimens.

Three years later G. Forrest added another species from his Yunnan collections, viz. *P. taliensis*. In the same paper Forrest describes and illustrates another new species—*P. gratissima*—which was, however, recognised later to be Franchet's *P. sonchifolia*. Anyone working from Pax's monograph would be justified in redescribing Franchet's species when one considers with what species Pax placed the plant.

The introduction of *P. petiolaris* var. *pulverulenta*, Hook. f. to cultivation led W. Watson to recognise the plant as a distinct species under the name *P. Winteri*. Whether this plant is really distinct from the true *P. nana* of Nepaul or not will only be solved by the receipt of additional material from Nepaul.

In *P. Whitei* W. W. Smith described the Bhutan representative of the Yunnan and Upper Burma *P. sonchifolia*.

At the Primula conference it was deemed prudent to raise to

specific rank only two more of the varieties of *P. petiolaris*, viz. var. *sulphurea* and var. *Stracheyi*, both from Kumaon. Up to the end of 1913 we find that four of Hooker's seven varieties of *P. petiolaris* had been raised to specific rank. The varieties still remaining at this time and up to the present year are var. 1 *petiolaris proper*, var. 2 *nana*, and var. 7 *scapigera*. In var. 1 Hooker included probably only one species, viz. the true *P. petiolaris* from Nepaul. In var. 2 he included, according to the writer's views, six or seven species, and in var 7, two species.

Last year Professor Balfour described from Yunnan *P. taraxacoides*, a plant closely allied to *P. sonchifolia*.

In course of publication there is also *P. vernicosa* from Yunnan and Upper Burma, which may be regarded as the Eastern representative of the Sikkim *P. Hookeri*.

The material consulted in the elaboration of the present paper consisted of the specimens preserved in the herbaria of the Royal Botanic Gardens at Calcutta and Edinburgh, and the Royal Gardens, Kew, and to the responsible heads of these departments I beg to record sincere thanks for kindly placing the specimens at my disposal. To Professor I. B. Balfour, F.R.S., I am also much indebted for useful constructive criticism during the progress of the work. M. F. Gagnepain of the Paris herbarium has also kindly supplied very useful critical notes on several of Franchet's species, the types of which were not examined by me. To Mr. S. A. Skan, Royal Gardens, Kew, I am also indebted for references to and quotations from literature not otherwise available.

## LIST OF SPECIES CHRONOLOGICALLY ARRANGED.

**With type locality, and within brackets any further recorded distribution of the species.**

*P. petiolaris*, Wall. in Roxb. Fl. Ind., vol. ii, p. 22 (1824). Nepaul.

*P. nana*, Wall. in Roxb. Fl. Ind., vol. ii, p. 23 (1824). Nepaul.

*P. Hookeri*, Watt in Journ. Linn. Soc., vol. xx, p. 14, t. 8B. (1882). Sikkim.

*P. sonchifolia*, Franchet in Bull. Soc. Bot. Fr., vol. xxxii, p. 266 (1885). Yunnan [Upper Burma].

*P. moupinensis*, Franchet in Bull. Soc. Bot. Fr., vol. xxxiii, p. 67 (1886). Moupin.

*P. Edgeworthii*, Pax in Engler Pflanzenr. Primulac., p. 41 (1905). N.W. Himalaya.

*P. odontocalyx*, Pax in Engler Pflanzenr. Primulac., p. 41 (1905). Szechuan.

*P. taliensis*, G. Forrest in Notes Roy. Bot. Gard. Edin., vol. v, p. 220, t. xxxii (1908). Yunnan.
*P. Winteri*, W. Watson in Gard. Chron., vol. xlix, p. 130, fig. 63 (1911). Kumaon.
*P. Whitei*, W. W. Smith in Rec. Bot. Surv. Ind., vol. iv, p. 268 (1911). Bhutan.
*P. Drummondiana*, Craib in Journ. Roy. Hort. Soc., vol. xxxix, pp. 186 et 190 (1913). Kumaon.
*P. sulphurea*, Craib in Journ. Roy. Hort. Soc., vol. xxxix, pp. 186 et 190 (1913). Kumaon.
*P. taraxacoides*, Balf. f. in Notes Roy. Bot. Gard. Edin., vol. ix, p. 49 (1915). Yunnan.
*P. vernicosa*, F. K. Ward in Notes Roy. Bot. Gard. Edin., vol. ix, p. 203 (1916). Yunnan; Upper Burma.
*P. Boothii*, Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 249 (1917). Bhutan.
*P. bracteosa*, Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 250 (1917). Bhutan; W. Sikkim.
*P. Cunninghamii*, King ex Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 250 (1917). E. Sikkim; Tibet.
*P. deuteronana*, Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 251 (1917). Sikkim.
*P. gracilipes*, Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 252 (1917). E. Sikkim.
*P. hupehensis*, Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 252 (1917). Hupeh.
*P. irregularis*, Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 253 (1917). W. Sikkim.
*P. saxicola*, Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 254 (1917). N.W. Himalaya.
*P. scapigera*, Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 254 (1917). W. Sikkim.
*P. Scullyi*, Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 255 (1917). Nepaul; W. Sikkim.
*P. sessilis*, Royle ex Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 256 (1917). N.W. Himalaya.

## ALPHABETICAL LIST OF THE SPECIES.

*P. Boothii*, Craib
*P. bracteosa*, Craib
*P. Cunninghamii*, King ex Craib
*P. deuteronana*, Craib
*P. Drummondiana*, Craib
*P. Edgeworthii*, Pax
*P. gracilipes*, Craib
*P. Hookeri*, Watt
*P. hupehensis*, Craib
*P. irregularis*, Craib
*P. moupinensis*, Franchet
*P. nana*, Wall.
*P. odontocalyx*, Pax

*P. petiolaris*, Wall.
*P. saxicola*, Craib
*P. scapigera*, Craib
*P. Scullyi*, Craib
*P. sessilis*, Royle ex Craib
*P. sonchifolia*, Franchet
*P. sulphurea*, Craib
*P. taliensis*, G. Forrest
*P. taraxacoides*, Balf. f.
*P. vernicosa*, F. K. Ward
*P. Whitei*, W. W. Smith
*P. Winteri*, W. Watson.

## GROUPING OF THE SPECIES.

Among the species enumerated there can be recognised seven quite natural groups as follows :—

1. Including *P. Hookeri* from Sikkim and *P. vernicosa* from Yunnan and Upper Burma, dwarf alpines with very compact foliage, coriaceous imbricate bud scales persistent at flowering time and closely investing the foliage, of which the outer members are very much broadened and sheathing at their bases. The small white flowers are borne on minute, nearly always 2-flowered scapes, but appear as if quite sessile, immersed in the compact foliage or just overtopping the leaves ; flowers and leaves coetaneous or nearly so. By this one character of the immersed, apparently sessile flowers, these two species can be immediately distinguished from all the other species of the section. *P. taliensis* is occasionally very small, with the flowers scarcely as long as the leaves, but a distinct pedicel and a more or less distinct scape is always found. Plants of *P. vernicosa* fruiting here last year, one in the open, the other under glass, had the scape fully 2.5 inches long. For some time after the fruit had set there was very little sign of elongation of the scape, which, however, lengthened very rapidly as the fruit approached maturity.

2. Represented by one species—*P. taliensis* from Yunnan. Small, stalked capitate or club-shaped glands are to be found in practically every member of the section, yet in only two species, viz. *P. taliensis* and *P. Drummondiana*, are there distinct gland-tipped hairs. In the latter these hairs are confined to the upper surface of the leaf, and are there found only towards the margin, whereas in *P. taliensis* they occur practically all over the plant, and are very dense on the scape and pedicels. *P. taliensis* is a small plant, with usually spathulate or obovate, more or less distinctly petioled, toothed leaves. The flowers are borne on 2–7-flowered short scapes, and are subequal to the leaves or more often just overtop the leaves. The corolla lobes are toothed or sometimes almost fringed, and the tube is exannulate. The calyx lobes, which are shorter than the tube, are sometimes acutely acuminate, sometimes more or less distinctly toothed on one side, and very often 3-toothed at the

apex. In this toothing of the calyx lobes *P. taliensis* resembles very much *P. odontocalyx*. The capsule, judging by the immature fruiting specimens, is included in the calyx tube.

3. Including *P. sonchifolia* from Yunnan and Upper Burma, *P. taraxacoides* from Yunnan, and *P. Whitei* from Bhutan. Here we find the same type of development as in the first group, but the plants themselves are much larger and more robust. At flowering time there are many stiff large bud scales persistent. Flowers and leaves develop practically simultaneously. In *P. sonchifolia* and *P. taraxacoides* the scape is quite evident at flowering time, but in *P. Whitei*—at least as far as the flowering material to hand shows—the scape is not visible, being much shorter than the leaves. In fruit, however, the scape elongates rapidly, and is ultimately subequal to or longer than the leaves. The scape is nearly always many-flowered, the bracts at the base of the pedicels being elongate and narrow in *P. Whitei*, but short and rather broad at the base in the other two species. The calyx lobes are somewhat variable at the apex—in *P. Whitei* they are longer than the tube, and are somewhat deeply 3- to 5-lobed at the apex, with rather narrow finger-like lobes, whereas in the other two species the lobes are shorter than the tube, and are entire or more or less denticulate or sublobulate. The large corollas have their lobes varying from denticulate in *P. Whitei* to almost fringed, as often occurs in *P. sonchifolia*. The depressed globose capsule is subequal to the calyx tube.

4. Agreeing with the last group in that the flower and leaf development are simultaneous, or practically so, are four species which occur in the Himalayas from Nepaul westwards, viz. *P. nana*, *P. Edgeworthii*, *P. Winteri*, and *P. saxicola*. The bud scales again are persistent at flowering time, but they are fewer in number and are more or less recurved, and not rigidly erect and so giving a more or less cylindrical shape to the base of the plant. This character, in conjunction with the leaf dimorphism, gives us the distinguishing marks of the group. The leaves which are present at flowering time, and which are still expanding, are mostly spathulate or obovate, and are narrowed into a broadly winged, scarcely differentiated petiole. After flowering these leaves disappear, and their place is taken by long petioled leaves, more or less ovate in shape, and truncate or cordate at the base, which are developed from a lateral bud or from lateral buds. In the centre of each lateral bud is developed the large, usually farinose, winter bud. The scape is not appreciable, or may attain a slight elongation. The calyx is green, and again we have variation in the amount of toothing of the lobes. For the most part the lobes are entire, but solitary teeth or almost lobules on one or both sides are not infrequent. The corolla

is large, with its lobes regularly or irregularly denticulate. The depressed globose capsule is included in the calyx tube or slightly exserted from it.

It is necessary now to say something of the plant named *P. nana*, by Wallich, as distinct from what is meant by *P. nana* of later authors. In the Calcutta herbarium there are two sheets of Wallich's type, consisting of very incomplete material. There is no corolla, no fruit, and none of the later developed leaves, but from the general habit of the plant there can, I think, be little doubt as to its inclusion in this group. In fact the only character by which I could distinguish this incomplete material from the well-known *P. Winteri* was in the calyx lobes having a more decidedly pinnate nervation.

Again, as regards *P. saxicola*, it would be well to note that while good flowering specimens have not been seen, its affinity with *P. Edgeworthii* can scarcely be doubted. In fact so similar are the two that one of the specimens on which *P. saxicola* was founded was quoted by Pax * under his *P. Edgeworthii*.

5. In this group, which occurs in the Himalayas from Tibet and Bhutan westwards, as also in the remaining two groups, we depart from the coetaneous flower and leaf development, and likewise—unless occasionally in *P. petiolaris*—from the persistent bud scales. Here we have plants with a dense rosette of leaves, of which at least the outer are fully formed at flowering time. Flowers in the majority are numerous, and are borne on a scape which is so reduced that it may be said to be wholly wanting. The seven representatives of the group may be conveniently divided into two lots, depending on the lobing or toothing of the corolla :—

(*a*) Corolla lobes rather deeply divided into two, or more rarely three, lobules, which are oblong with a rounded apex—*P. sulphurea* and *P. Drummondiana* from N.W. Himalayas, and *P. Cunninghamii* from East Sikkim and Tibet. *P. Drummondiana* can readily be distinguished from its allies by the multicellular glandular hairs on the upper surface of the leaf towards the margin, and *P. sulphurea* by the character which suggested the name—the abundant sulphur farina which persists on the lower surface of the leaf.

(*b*) Corolla lobes acuminate or 3-toothed, sometimes irregularly toothed, the teeth more or less deltoid and acute—*P. sessilis* from N.W. Himalayas, *P. petiolaris* from Nepaul, *P. Scullyi* from Nepaul and Sikkim, and *P. deuteronana* and *P. gracilipes* from Sikkim. Of these probably the most easily recognised is *P. petiolaris* with its outer, elliptic, long petioled leaves, and its rather long and finely attentuate calyx lobes.

* Engler Pflanzenr. Primulaceae, p. 41.

In the others these petioled leaves are wanting at flowering time or only casually present. *P. deuteronana*, the only species of the section with the corolla tube villous inside, is easily recognised by that character, as also by its rather thick, more or less bullate leaves which dry a pale green. *P. sessilis* has long, often aristate-acuminate, calyx lobes, and the corolla lobes are nearly always caudate-acuminate. *P. gracilipes* can be distinguished from *P. Scullyi* by its green, not brown, calyx, its narrower leaves and longer pedicels.

6. In *P. irregularis* and *P. scapigera* from West Sikkim, *P. Boothii* from Bhutan, *P. bracteosa* from Bhutan and East Sikkim, and *P. moupinensis* from China, we have a set of plants closely allied to the last, but usually much larger, and with a scape more or less conspicuous at flowering time, and quite elongate in fruit. The leaves in fruit are characterised by some being long petioled and often cordate or truncate at the base. The depressed globose capsule is included in the calyx, and is shorter than the calyx tube or subequal to it. Of these *P. irregularis* with its oblong calyx lobes, variable at the apex, and its dense coating of stalked capitate glands on the pedicels and on the outside of the calyx is very distinct. *P. Boothii*, of which Griffith * gives an excellent figure, has the scape rather short or scarcely developed, and is distinguished from *P. scapigera* by the regular toothing of the corolla lobes and by the corolla in bud being farinose. *P. bracteosa*, at least in fruit, has some of the inner bracts expanded into well-developed petioled leaves.

7. The last group includes only Chinese representatives—*P. odontocalyx* and *P. hupehensis*. So far as habit is concerned, they might be reckoned intermediate between the last two groups. In size they belong to the *sessilis* alliance, but here a distinct scape is found. Again, in the lobing of the corolla lobes they resemble *P. sulphurea* and its allies. A distinct annulus is developed at the top of the tube. No fruiting specimens have been seen of either species. From the photographs examined, and also from the available specimens, the writer is strongly of opinion that Farges' collection, which is the type of *P. odontocalyx*, consists of two species. In the key and enumeration the species is limited to the specimens collected by Faber, which agree with Wilson, 1831, in the shallowly denticulate leaves and obconical calyx, whose lobes show almost constantly the character on which Franchet founded his specific name. The other specimens collected by Farges, probably identical with the plant collected by Henry and named *P. hupehensis*, can be easily distinguished by the erose-denticulate leaves and nearly cylindrical calyx.

* Griffith, Ic. Pl. As., vol. iv, t. 485, fig. 2.

## KEY TO THE SPECIES.

In the following key it must be noted that the true *P. nana* is omitted. This omission has been necessitated by the scanty material available of this species. As explained above, Wallich's *P. nana* is very closely allied to the well-known *P. Winteri*.

Leaves not fully developed when flowers open, i.e. flowers and leaves coetaneous or approximately so.
Leaves glandular pubescent on both surfaces, margin usually rather deeply toothed, sometimes lobulate; scape developed though sometimes very short, pedicels and calyx glandular-pilose; calyx lobes subequal to or shorter than the tube, usually 3-toothed, sometimes irregularly toothed; corolla lobes usually sharply 3-lobed; efarinose plant, 2.5–6 cm. high . . . 3. *taliensis*.
Leaves glabrous or with short glandular papillae; farinose or not.
Flowers white, comparatively small, quite immersed in the rosette of leaves or just overtopping the leaves, appearing as if quite sessile; base of plant closely invested by imbricate scales and sheathing leaf-bases.
Calyx not markedly veined, its lobes more or less deltoid, not or scarcely imbricate; whole plant at flowering time 1–2 cm. high and 1–3 cm. diameter . . . . 1. *Hookeri*.
Calyx markedly veined, its lobes rounded, strongly imbricate; whole plant at flowering time 2.5–7 cm. diameter. 2. *vernicosa*.
Flowers not immersed in the leaves but with distinct pedicels; scape present or not.
Calyx lobes shorter than the tube, corolla tube annulate.
Leaves oblanceolate, deeply lobulate, the lobules incised-dentate, scape shorter than the leaves; otherwise very similar to *P. sonchifolia* . . . . 4. *taraxacoides*.
Leaves broadly oblanceolate or more often oblong to elliptic, shallowly lobulate, the lobules dentate; scape at flowering time subequal to or longer than the expanding leaves, usually many-flowered; pedicels 6–20 mm. long; outer bracts 3–5 mm. long, broad at base; corolla blue or white, the lobes usually more or less fringed; closely imbricating, rigid bud scales persistent at flowering; sulphur farina nearly always present . . . . 5. *sonchifolia*.
Calyx lobes subequal to or longer than the tube.
Calyx lobes oblong, trilobed or rarely 4–5 lobed at the apex; scape at flowering time much shorter than the leaves, many-flowered; bracts narrow, about 1.5 cm. long; pedicels about 3–3.5 cm. long; corolla annulate, the lobes more or less dentate; scales at base as in *P. sonchifolia*; farina present . . . . . 6. *Whitei*.
Calyx lobes acute or acuminate, only casually few-lobed or toothed.
Corolla lobes regularly toothed or sinuate-toothed along the margin; bud scales persisting at flowering time; leaves glaucous like pedicels and calyx with pale farina, during flowering spathulate or obovate-spathulate narrowed into a winged petiole, succeeded by larger leaves long petioled and truncate or cordate at the base, in the centre of which

is developed the winter bud; scape 0 or if present shorter than the leaves; bracts broad only at the very base, the outer ones 5–8 mm. long; pedicels 4–7 cm. long, the flowers equalling or overtopping the leaves . . . . . 7. *Winteri*.

Corolla lobes 3-toothed or irregularly toothed or lobulate.

Calyx brown or pale brown, its lobes narrow and long attenuate with one prominent median nerve, only occasionally denticulate near the apex; bud scales very rarely persisting at flowering time; outer long petioled leaves elliptic or ovate-elliptic nearly always present, inner leaves more or less spathulate, narrowed into broadly winged petiole; scape not developed; efarinose . . . . . 18. *petiolaris*.

Calyx green, its lobes rather broad and not long attenuate.

Calyx lobes, especially in fruit, markedly 3-nerved (1 median, 2 intramarginal); fruit slightly exserted from calyx tube; leaves membranous, green, those surrounding the escapose inflorescence spathulate or elliptic-spathulate, narrowed into distinct petiole, succeeded in fruit by larger ovate leaves, long petioled and cordate at the base, in the centre of which is developed the winter bud . 10. *saxicola*.

Calyx lobes without the conspicuous intramarginal nerves; fruit included in calyx tube; some of the bud scales persisting at flowering time; flowers subequal to or slightly overtopping the expanding farinose leaves; succession of leaves as in *P. Winteri* . . . . . 9. *Edgeworthii*.

Leaves fully developed at the time the flowers open; bud scales deciduous before flowering.

Leaves distinctly glandular pubescent on the upper surface, either all over or towards the margin only.

Leaves pubescent all over the upper surface, and also on the lower, especially on midrib and nerves, margin usually rather deeply toothed, sometimes lobulate; scape developed though sometimes very short; pedicels and calyx glandular-pilose; calyx lobes mostly 3- or irregularly toothed, subequal to or shorter than the tube; corolla lobes mostly sharply 3-lobed; efarinose . . . . . 3. *taliensis*.

Leaves pubescent on upper surface only towards the repand-denticulate margin; scape not developed; pedicels and calyx glabrous or with minute glandular papillae only; calyx lobes entire, decidedly longer than tube; corolla lobes bilobed; sparsely farinose . . . . . 12. *Drummondiana*.

Leaves glabrous or with minute glandular papillae only.

Scape wanting, or if present very short and quite concealed by the dense foliage.

Corolla lobes emarginate or rather deeply 2- or 3-lobed, the lobules oblong and rounded at the apex; leaves in a dense rosette, all uniform and sessile or with a broadly winged scarcely differentiated petiole.

Corolla lobes emarginate, the tube 15 mm. long; scape usually present . . . . . 20. *moupinensis*.

Corolla lobes rather deeply 2- or 3-lobed, the tube 7.5–10 mm. long ; scape not developed.
Leaves with a dense coating of sulphur farina on the under surface ; pedicels 1.5–2 cm. long . . 11. *sulphurea.*
Leaves efarinose or with sparse whitish or pale yellow farina ; pedicels not exceeding about 1 cm. in length . . . . . 13. *Cunninghamii.*
Corolla lobes acuminate or shallowly 3-lobed or irregularly lobed or dentate, the lobules or teeth triangular, acute or acuminate, sometimes obtuse but not rounded at the apex.
Corolla tube villous inside towards the apex ; leaves in a dense rosette, sessile or the outer with broadly winged short petioles, coriaceous, drying pale dull green, the broad midrib and the lateral nerves prominent below ; calyx lobes entire or casually tridentate at the apex ; almost efarinose at flowering time, densely sulphur-farinose before flowering . . . . . 17. *deuteronana.*
Corolla tube glabrous inside or with minute hairs only.
Corolla lobes distinctly acuminate or if tridentate then the central tooth acuminate ; leaves sessile or with a short or occasionally fairly long winged petiole, rather thin, efarinose ; calyx lobes entire, aristate or almost aristate-acuminate . . . . . 16. *sessilis.*
Corolla lobes or their teeth not acuminate (most often acute, very rarely subacuminate, but never distinctly long-acuminate).
Outside of calyx and the pedicels very densely covered with glandular papillae ; leaves in a dense rosette, the inner oblong, sessile, the outer more or less elliptic, long petioled ; buds with dense pale yellow farina ; calyx lobes nearly always trilobulate . . . . . 19. *irregularis.*
Outside of calyx and the pedicels minutely and sparsely puberulous or farinose, calyx lobes exceptionally tridentate.
Calyx brown or reddish-brown.
Corolla in bud farinose, its lobes regularly and subequally 3-toothed ; leaves in a dense rosette, as in *P. irregularis*, but outer petioled leaves sometimes wanting ; short scape sometimes present ; calyx lobes entire or casually tridentate . . . . . 21. *Boothii.*
Corolla in bud efarinose, its lobes usually unequally 3-toothed, but often irregularly toothed.
Scape present, though sometimes quite short, and included in the dense rosette of leaves which are all sessile, or with a short and broadly winged petiole, with occasionally the outer long petioled leaves still present ; calyx lobes entire, acuminate, acute . . . . 23. *scapigera.*
Scape wanting.
Leaf margin erose-denticulate, leaves all sessile, or a few outer ones with winged petioles about as long as the lamina, calyx lobes entire, acute or acuminate . . . . 15. *Scullyi.*

Leaf margin repand-denticulate, outer leaves with distinct petiole longer than the lamina, calyx lobes narrow, long attenuate at apex . . . . . 18. *petiolaris*.

Calyx green, scape not developed.

Leaves membranous, irregularly coarsely toothed or lobulate with the lobules toothed, later ones differing from earlier ones in being larger, cordate at base and long petioled, corolla lobes longer than broad . . . . . 10. *saxicola*

Leaves chartaceous, sharply erose-denticulate, all similar in shape, but the outer with longer and more distinct petioles, none cordate at base, corolla lobes nearly as broad as long . . . 14. *gracilipes*.

Scape present equal to or longer than the leaves or, if shorter than the leaves, still quite conspicuous owing to the lax foliage.

Corolla lobes 3-toothed or more or less irregularly toothed.

Calyx lobes spreading or subspreading, long and finely attenuate-acuminate or almost aristate-acuminate, the acumen often spirally twisted; leaves during flowering all uniform, spathulate or oblong-spathulate, sessile, or with short, broadly winged petiole, or a few with distinct long petioles, during fruiting ovate or occasionally elliptic leaves usually truncate at the base, with petiole much longer than lamina, developed from lateral buds; corolla lobes irregularly toothed, usually rather deeply 2–3-lobed, with the lobules many-toothed; fruit included in calyx tube, the markedly stiff calyx lobes persistent . . . . . 23. *scapigera*.

Calyx lobes acute or variously toothed or lobulate; leaves at flowering time dimorphous—some sessile or with a very broadly winged scarcely distinct petiole, others with a distinct long petiole subequal to or longer than the lamina.

Outer petioled leaves cuneate or acuminate, rarely subtruncate at base, margin sharply denticulate; none of the bracts expanded into petioled leaves; pedicels and calyx during flowering very densely covered with stalked capitate glands; calyx lobes not spreading and not very rigid, oblong, irregular at apex, rounded, shortly obtusely acuminate or more often 3-lobulate; corolla lobes sinuate dentate; capsule included in calyx tube 19. *irregularis*.

Outer petioled leaves truncate or cordate at the base, rarely cuneate, margin duplo-dentate; some of the inner bracts nearly always expanded into petioled leaves; pedicels and calyx during flowering puberulous with stalked capitate glands; calyx lobes not very rigid, variable in shape, mostly narrowly deltoid or oblong-deltoid, acute or shortly acuminate at apex; corolla lobes 3-toothed; capsule subequal to calyx tube . . . 22. *bracteosa*.

Corolla lobes emarginate or rather deeply bilobed, the lobules entire, rounded at apex.

Leaves rather shallowly repand-denticulate or denticulate, few in number and rather lax, usually elliptic or oblong-elliptic; scape 2-flowered; whole calyx obconic; corolla tube annulate . . . . . 25. *odontocalyx*.

Leaves sharply erose-denticulate, dense or subdense, oblanceolate to obovate; scape 2–6-flowered, but rarely 2-flowered; calyx cylindrical to campanulate; corolla tube annulate or not.

Corolla tube annulate; leaves not very dense, petioled at flowering time, the petiole usually rather broadly winged . . . . . 24. *hupehensis.*

Corolla tube exannulate; leaves at flowering time dense, sessile or with a scarcely distinct broadly winged petiole, occasionally a few outer long petioled leaves still persisting . . . . . 20. *moupinensis.*

## ENUMERATION OF THE SPECIES, WITH SYNONYMY AND DISTRIBUTION.

1. **P. Hookeri,** Watt in Journ. Linn. Soc., vol. xx, p. 14, t. 8B (1882); Hook. f., Fl. Brit. Ind., vol. iii, p. 494; Pax in Engler Bot. Jahrb., vol. x, p. 175; Watt in Journ. Roy. Hort. Soc., vol. xxix, pp. 300 et 320; Pax in Engler Pflanzenr. Primulac., p. 41.

Sikkim, 12,000 ft., Hook. f., Primula No. 25 (Herb. Kew et Calc.—type); Eumtso-la, 14,500 ft., open ground among scant herbage, Cave, 184 (Herb. Calc.); ibid., 15,000 ft., Smith et Cave, 1528 (Herb. Calc.); Tholoong, 14,000 ft., King's collector (Herb. Calc.).

2. **P. vernicosa,** F. K. Ward in Notes Roy. Bot. Gard. Edin., vol. ix, p. 203 (1916).

Yunnan, Mekong-Salween divide, W. slope, 12,000 ft., Ward, 94 (Herb. Edin.—type).

Upper Burma, Doker-la, Ka-gwr-pw, 14,000 ft., Ward, 974 (Herb. Edin.—type).

Cult. Hort. Edin.

3. **P. taliensis,** G. Forrest in Notes Roy. Bot. Gard. Edin., vol. v, p. 220, t. xxxii (1908).

Yunnan, eastern flank of the Tali range, 10,000–11,000 ft., open stony pasture land, Forrest, 1805 (Herb. Edin.—type); Shweli-Salween divide, open stony moist pasture, Forrest, 11,942 (Herb. Edin.); hills beyond Teng-yueh, Howell, 144 (Herb. Edin.).

4. **P. taraxacoides,** Balf. f. in Notes Roy. Bot. Gard. Edin., vol. ix, p. 49 (1915).

Yunnan, rocks of Ma-long, 9000 ft., E. E. Maire (Herb. Bonati—type).

5. **P. sonchifolia,** Franchet in Bull. Soc. Bot. Fr., vol. xxxii, p. 266 (1885); Pax in Engler Bot. Jahrb., vol. x, p. 218; Forbes et Hemsl. in Journ. Linn. Soc., vol. xxvi, p. 43; Pax in Engler Pflanzenr. Primulac., p. 129.

*P. gratissima,* G. Forrest in Notes Roy. Bot. Gard. Edin., vol. v, p. 219, t. xxxB, xxxi (1908).

Yunnan, Tali range, 11,000–13,000 ft., Forrest, 1808, 1812, 11,618 (Herb. Edin.); Lichiang range, 9000–14,000 ft., Forrest, 2167, 6521, 6723, 10,089 (Herb. Edin.); Mountains of Chiengtien plateau, 12,000–14,000 ft., Forrest, 12,403 (Herb. Edin.); Tsang-chan, Delavay, sine num., Delavay, 750 (Herb. Edin.); Mo-so-yn, Delavay (Herb. Edin.); N.W. Yunnan, Monbeig, 175 (Herb. Edin.); Yunnan, Maire (Herb. Edin.); N.W. Yunnan and E. Tibet, Ward (Herb. Edin.).

Upper Burma, Irrawaddy-Salween divide, Hpimaw Pass, Ward, 1572 (Herb. Edin.).

6. **P. Whitei,** W. W. Smith in Rec. Bot. Surv. Ind., vol. iv, No. 5, p. 268 (1911).

Bhutan, Pile-la, 10,100 ft., White, 122 (Herb. Calc.—type); ibid. by stream under Rhododendron scrub, 10,500 ft., Cooper, 3970 (Herb. Edin.); Tongsa, Yato-la, 11,000 ft., Cooper, 4213 (Herb. Edin.); Yato-la ridge, 10,000–11,000 ft., Cooper, 4134 (Herb. Edin.); Pumthang, 12,000 ft., Cooper, 4122 (Herb. Edin.).

7. **P. Winteri,** W. Watson in Gard. Chron., vol. xlix, p. 130, fig. 63 (1911); Craib in Journ. Roy. Hort. Soc., vol. xxxix, p. 186, fig. 89.

*P. petiolaris,* Wall., var. *pulverulenta,* Hook. f., Fl. Brit. Ind., vol. iii, p. 493 (1882); Pax in Engler Bot. Jahrb., vol. x, p. 175; Pax in Engler Pflanzenr. Primulac., p. 41.

Kumaon, Pindree, 12,000 ft., Strachey and Winterbottom, Primula No. 9, pro parte (Herb. Kew), Madden, 350 (Herb. Edin.), Madden, sine num. (Herb. Kew); Namik, 12,000 ft., Madden, 563 (Herb. Kew); Champwa, 12,000 ft., Strachey and Winterbottom, Primula No. 9 (Herb. Calc.); Dhakouree and valley of Soonderdunga glacier, 13,000 ft., T. Anderson (Herb. Calc.); Wall. Cat., 603, pro parte (Herb. Calc.).

Cult. Hort. Kew, Edin., &c.

8. **P. nana,** Wall. in Roxb. Fl. Ind., vol. ii, p. 23 (1824), haud auct. posteriores.

Nepaul, Wall. Cat. 612 et sine num. (Herb. Calc.).

9. **P. Edgeworthii,** Pax in Engler Pflanzenr. Primulac., p. 41 (1905), pro parte.

*P. petiolaris,* Wall., var. *Edgeworthii,* Hook. f., Fl. Brit. Ind., vol. iii, p. 493 (1882) ; Pax in Engler Bot. Jahrb., vol. x, p. 175 ; Watt in Journ. Roy. Hort. Soc., vol. xxix, pp. 300 et 320.

*P. petiolaris,* Collett, Fl. Simlensis, p. 298, non Wall.

Simla, T. Thomson (Herb. Kew et Calc.) ; Hattu-killa, 10,400 ft., Dubuc (Herb. Edin.) ; Hattugarh, 10,500 ft., Gamble, 6116C, 6116D (Herb. Calc.) ; Hattu, 10,000 ft., Watt, 8362A (Herb. Edin.) ; Mathiana to Bagi, 8000–9000 ft., Watt, 8362 (Herb. Edin.).

Garhwal, Tungnath, 8000–9000 ft., Edgeworth, 463 (Herb. Kew—type) ; Tungnath, near temple, May 1874 (Herb. Edin., sine collectore).

Kumaon, Madhari Pass, 8000 ft., Strachey and Winterbottom, Primula No. 8 (Herb. Kew) ; Pindree, 11,500–12,000 ft., Strachey and Winterbottom, Primula No. 9, pro parte, No. 11, pro parte (Herb. Kew).

10. **P. saxicola,** Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 254 (1917).

*P. Edgeworthii,* Pax in Engler Pflanzenr. Primulac., p. 41, quoad plantam Duthieanam, non *P. petiolaris,* Wall., var. *Edgeworthii,* Hook. f.

Kulu, 5000 m., Drummond, 8925 (Herb. Edin.—type) ; Chachpur valley, 6000 ft., Duthie, 21,067 (Herb. Kew et Calc.).

11. **P. sulphurea,** Craib in Journ. Roy. Hort. Soc., vol. xxxix, pp. 186 et 190 (1913).

*P. petiolaris,* Wall., var. *sulphurea,* Hook. f., Fl. Brit. Ind., vol. iii, p. 493 (1882) ; Pax in Engler Bot. Jahrb., vol. x, p. 175 ; Pax in Engler Pflanzenr. Primulac., p. 41.

Kumaon, below Suring, 4500 ft., Strachey and Winterbottom, 247 (Primula No. 10, Herb. Calc. et Kew—type).

12. **P. Drummondiana,** Craib in Journ. Roy. Hort. Soc., vol. xxxix, pp. 186 et 190 (1913).

*P. petiolaris,* Wall., var. *Stracheyi,* Hook. f., Fl. Brit. Ind., vol. iii, p. 493 (1882) ; Pax in Engler Bot. Jahrb., vol. x, p. 174 ; Pax in Engler Pflanzenr. Primulac., p. 41.

Kumaon, above Namik, 8000 ft., Strachey and Winterbottom, 1803 (Primula No. 12, Herb. Calc. et Kew—type) ; pass above Namik, 8500 ft., Madden, 353 (Herb. Edin.).

13. **P. Cunninghamii,** King ex Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 250 (1917).

*P. petiolaris*, Wall., var. *nana*, Hook. f., Fl. Brit. Ind., vol. iii, p. 493, pro parte ; Pax in Engler Bot. Jahrb., vol. x, p. 174, pro parte ? ; Pax in Engler Pflanzenr. Primulac., p. 40, pro parte ? non *P. nana*, Wall.

Sikkim, Jaffrey's collector (King's type—Herb. Calc.), 10,000 ft., Cunningham (Herb. Calc.), 13,000 ft., Gammie (Herb. Calc.), Cave, 7287 (Herb. Edin.) ; Lingtu and Natung, 11,000–13,000 ft., Pantling (Herb. Calc.) ; Natung, King's collector (Herb. Calc.) . Sheraothang, among gravel and turf, 13,000 ft., Cooper, 969 (Herb. Edin.) ; Changu, Cave (Herb. Edin.) ; below Changu, Ribu et Rhomoo, 4601 (Herb. Calc.) ; Chumbi Thang, Ribu, 9 (Herb Calc.).

Tibet, Younghusband, 21 (Herb. Calc.) ; Gyantse to Phari, Walton (Herb. Calc.).

14. **P. gracilipes,** Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 252 (1917).

Sikkim, Yeumthang, 11,000 ft., Cave (Herb. Edin.—type) ; Begger, 12,500 ft., Cave (Herb. Edin.) ; Changu, 12,000 ft., Smith, 3287 (Herb. Calc.) ; Dickchoo, 11,000 ft., C. B. Clarke, 27,797B (Herb. Kew) ; ? Yatung, Hobson (Herb. Kew) ; ? Jang kar chha and up to Jang kar la, Walsh, 118 (Herb. Kew).

15. **P. Scullyi,** Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 255 (1917).

*P. nana*, Watt in Journ. Roy. Hort. Soc., vol. xxix, pp. 300 et 320, saltem pro parte, fig. 73C, non Wall.

*P. petiolaris*, Wall., var. *nana*, Hook. f., Fl. Brit. Ind., vol. iii, p. 493, pro parte ; Pax in Engler Bot. Jahrb., vol. x, p. 174, pro parte ; Pax in Engler Pflanzenr. Primulac., p. 40, pro parte ; Bot. Mag., t. 7079B, non *P. nana*, Wall.

Nepaul, Scully (Herb. Calc.).

Sikkim, 13,000 ft., Watt, 5269 (Herb. Calc. et Edin.), Hook. f. (Herb. Calc. et Kew) ; Singaleelah range, 12,000 ft., Watt, 5263 (Herb. Edin. et Kew), 12,500 ft., Cave (Herb. Edin.) ; near Phallut, 11,500 ft., Lace, 2265 (Herb. Calc. et Kew) ; Tonglu, Elwes in Herb. C. B. Clarke, 27,482 (Herb. Kew) ? ; Yalloong valley wood, 10,000–12,000 ft., Hook. f. (Herb. Kew) ; Wallanchoon, 10,000–12,000 ft., Hook. f. (Herb. Kew) ; below Jongri, Pey kiong la, King's collector, pro parte (Herb. Calc.) ; above Lachen on moist exposed places, 11,000 ft., Pantling (Herb. Calc.).

**P. Scullyi,** Craib, var. **Searightii,** Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 256 (1917).

Chumbi, 8000–9000 ft., Searight, 44 (Herb. Calc.); Pey goong la, King's collector, 433 (Herb. Calc.).

16. **P. sessilis,** Royle ex Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 256 (1917).

*P. petiolaris,* Wall., var. *nana,* Hook. f., Fl. Brit. Ind., vol. iii, p. 493, pro parte; Pax in Engler Bot. Jahrb., vol. x, p. 174, pro parte; Pax in Engler Pflanzenr. Primulac., p. 40, pro parte, non *P. nana,* Wall.

*P. petiolaris,* Watt in Journ. Roy. Hort. Soc., vol. xxix, fig. 73a′ non Wall.

N.W. India, Royle (Herb. Calc.), Cleghorn (Herb. Edin.); Chamba State, 8000 ft., Watt, 4273, pro parte (Herb. Edin.); Bashahr, Watt, 2877 (Herb. Edin.), Bági Forest, 8000 ft., Lace, 78 (Herb. Edin.); Jaunsar, Harké Dún, 11,000 ft., Rogers (Herb. Calc.); Kulu, 5000 m., Drummond, 8926 (Herb. Edin.); Simla, Govan (Herb. Edin.); Hattu, 10,000 ft., Gamble, 6117C (Herb. Calc.); Tihri Garwhál, 11,000–12,000 ft., Duthie, 14,520 (Herb. Calc.); Kidarkanta, 10,000–12,000 ft., Duthie, 1184 (Herb. Calc.), Gamble, 24,314, 24,360 (Herb. Calc.), Duthie (Herb. Edin. et Kew); Kumaon, Wall. Cat., 603, pro parte (Herb. Kew et Calc.), T. Anderson (Herb. Calc. et Edin.); Dhakouree and Soonderdunga glacier, T. Anderson (Herb. Calc.); Pindree, 11,000 ft., Collett, 123 (Herb. Calc.); Madhari Pass, 9000 ft., Strachey and Winterbottom, 659 (Primula No. 11, Herb. Calc.); Champwa, 12,000 ft., Strachey and Winterbottom, 247 (Primula No. 11, Herb. Calc.).

17. **P. deuteronana,** Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 251 (1917).

*P. petiolaris,* Wall., var. *nana,* Hook. f., Fl. Brit. Ind., vol. iii, p. 493, pro parte; Pax in Engler Bot. Jahrb., vol. x, p. 174, pro parte; Pax in Engler Pflanzenr. Primulac., p. 40, pro parte, non *P. nana,* Wall.

*P. Stirtoniana,* Watt in Journ. Roy. Hort. Soc., vol. xxix, fig. 73B, non Watt in Journ. Linn. Soc., vol. xx, p. 15.

Sikkim, Nye gu la, 13,000 ft., King's collector (Herb. Calc.); Pey kiong la, below Jongri, King's collector, pro parte (Herb. Calc.); Singaleelah, Sirkia la, 14,000 ft., Watt, 5425 (Herb. Edin., Calc. et Kew); Singaleelah, Hook. f. (Herb. Kew).

18. **P. petiolaris,** Wall. in Roxb. Fl. Ind., vol. ii, p. 22 (1824); id., Tent. Fl. Nepal., p. 42 (pl. Blinkworth. excl.), t. 31; DC. Prodr., vol. viii, p. 37, saltem pro parte.

*P. Cushia*, Ham. Mss. in Herb. Mus. Brit.

*P. tridentata*, D. Don, Prodr. Fl. Nepal., p. 77 (1825), saltem pro parte.

*P. petiolaris*, Wall., var. *petiolaris proper*, Hook. f., Fl. Brit. Ind., vol. iii, p. 493 (1882).

*P. petiolaris*, Wall., var. *eupetiolaris*, Pax in Engler Bot. Jahrb., vol. x, p. 174 (1889); Pax in Engler Pflanzenr. Primulac., p. 40, saltem quoad pl. Wallichianam.

Nepaul, Wall. Cat., 603, pro parte (Herb. Calc., Edin. et Kew), Scully (Herb. Calc.).

The Singaleelah plant collected by Schlagintweit and referred by Pax to this species has not been seen by the writer. It is more likely to belong to the next species.

19. **P. irregularis,** Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 253 (1917).

*P. petiolaris*, Wall., var. *nana*, Hook. f., Fl. Brit. Ind., vol. iii, p. 493, pro parte; Pax in Engler Bot. Jahrb., vol. x, p. 174, pro parte; Pax in Engler Pflanzenr. Primulac., p. 40, pro parte, haud *P. nana*, Wall.

Sikkim, Chowbhangin, Cave (Herb. Edin.); Singaleelah, Hook. f. (Herb. Kew); ibid., 11,000 ft., Elwes in Herb. C. B. Clarke, 27,481 (Herb. Kew); Tonglu, 10,000 ft., Rhomoo, 811 (Herb. Edin.)

19*a*. *P. sp. nov.* affinis *P. irregulari*, Craib, et *P. moupinensi*, Franchet.

*P. petiolaris*, Wall., var. *sulphurea*, Forrest in Notes Roy. Bot. Gard. Edin., vol. v, p. 219; Diels in Notes Roy. Bot. Gard. Edin., vol. vii, p. 25, non Hook. f.

Yunnan, ascent of Niu Chang Pass, 14,000 ft., Forrest, 304 (Herb. Edin.).

This Yunnan plant is in habit very similar to *P. irregularis*, but differs in the leaf margin. Unfortunately there is but the one collection in very young bud.

20. **P. moupinensis,** Franchet in Bull. Soc. Bot. Fr., vol. xxxiii, p. 67 (1886); id. in Nuov. Arch. Mus. d'Hist. Nat., vol. x, p. 57, t. 14B (1887); Pax in Engler Bot. Jahrb., vol. x, p. 175; id. in Engler Pflanzenr. Primulac., p. 42 (*mupinensis*).

Moupin, David.

Of this species only a photograph of the type has been seen.

21. **P. Boothii,** Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 249 (1917).

*P. petiolaris*, Wall., var. *nana*, Hook. f., Fl. Brit. Ind., vol. iii, p. 493, pro parte ; Pax in Engler Bot. Jahrb., vol. x, p. 174, pro parte ; Pax in Engler Pflanzenr. Primulac., p. 40, pro parte, non *P. nana*, Wall.

*Primulae sp.*, Griff. Itin. Notes, p. 135 ; Griff. Ic., t. 485, f. 2.

Bhutan, Chardwar, Booth ? (Herb. Edin.) ; Tengepane and Meru mountains, Booth ? (Herb. Calc.) ; Booth ex Herb. Nuttall (Herb. Calc.) ; Simons (Herb. Edin.) ; Griffith, K. D. 3514 (Herb. Calc.) ; Griffith, 2315, 582—K. D. 3514, pro parte (Herb. Kew).

22. **P. bracteosa,** Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 250 (1917).

*P. petiolaris*, Wall., var. *scapigera*, Hook. f., Fl. Brit. Ind., vol. iii, p. 494 ; Pax in Engler Bot. Jahrb., vol. x, p. 175 ; Pax in Engler Pflanzenr. Primulac., p. 41, quoad plantas bhutanenses ; Watt in Journ. Roy. Hort. Soc., vol. xxix, p. 320.

Bhutan, Tongsa, Yato la, 10,000 ft., in moss by tree bases in shady forest, Cooper, 3981 (Herb. Edin.) ; Timpu, Duké la, 9000 ft., sandy soil in shade of light wet forest, Cooper, 3917 (Herb. Edin.) ; ascent to Woolooka, 8000–9500 ft., Griffith, K. D. 3514, pro parte (Herb. Kew) ; Griffith, K. D. 2314 (Herb. Kew).

Sikkim, Lachoong, 9000 ft., Pantling (Herb. Calc.) ; by road below Changu, 11,000 ft., Smith, 3183 (Herb. Calc.).

23. **P. scapigera,** Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 254 (1917).

*P. petiolaris*, Wall., var. *scapigera*, Hook. f., Fl. Brit. Ind., vol. iii, p. 494 ; Pax in Engler Bot. Jahrb., vol. x, p. 175 ; Pax in Engler Pflanzenr. Primulac., p. 41, quoad plantas sikkimenses.

*P. petiolaris*, Watt in Journ. Roy. Hort. Soc., vol. xxix, pp. 300 et 320, fig. 73A.

Sikkim, 8000–12,000 ft., Hook. f. (Herb. Calc., pro parte, Herb. Kew) ; Tonglu, 9000–10,000 ft., King (Herb. Calc.), Anderson, 259 (Herb. Calc.), Gamble, 9473 (Herb. Calc.), Gammie (Herb. Calc.), Lister (Herb. Calc.), Lace, 2264 (Herb. Calc. et Kew), Watt, 7013 (Herb. Edin. et Kew) ; Tonglu to Sandakphu, 7000–10,000 ft., Watt, 5331 (Herb. Edin.) ; Sandakphu, 11,000 ft., C. B. Clarke, 35,681B (Herb. Calc.), 35,681A (Herb. Kew) ; Phalut, 10,000 ft., Gammie, 62 (Herb. Calc.).

Included in the above are several rather well-marked varieties

or microforms, but the material to hand is not sufficient to justify their segregation. On the descent from Jongri Watt collected in the pine forest at 10,000 ft. (Watt, 5615, in Herb. Edin. et Kew) a scapigerous plant very different from the type in being much weaker and in having thinner, more deeply cut leaves and much smaller fruit.

24. **P. hupehensis,** Craib in Notes Roy. Bot. Gard. Edin., vol. vi, p. 252 (1917).

Hupeh, Fang, Henry (Herb. Kew—type).

25. **P. odontocalyx,** Pax in Engler Pflanzenr. Primulac., p. 41 (1905).

*P. petiolaris*, Wall., var. *odontocalyx*, Franchet in Morot, Journ. de Bot., vol. ix, p. 449 (1895) ; Diels in Engler Bot. Jahrb., vol. xxix, p. 520.

*P. tenuissima*, Pax in Engler Pflanzenr. Primulac., p. 42 (nomen tantum), pro parte.

Szechuan, near Chenkow-tin, Farges (Herb. Edin.).

Hupeh, Fang, 7400 ft., wet rocks, Wilson, 1831 (Herb. Edin.).