

New Species of Primula.

BY

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I.

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***Primula aemula*, Balf. fil. et Forrest.**

Robusta epilosa efarinosa glaberrima. Folia rosulata floribus coaetanea basi squamis alabastri circumcincta magna ad 30 cm. longa ad 6 cm. lata carnosula anguste obovato-oblonga obtusa hic illic mucronulata minute denticulata in petiolum alatum haud distinctum deorsum attenuata utrinque laevissima subtus glauca venis primariis e costa media prominula acutissime adscendentibus. Scapus crassus ad 7 dm. altus verticillos 4-5 multifloros inter se remotos et umbellam terminalem gerens; bractee virides a basi vaginata auriculata abrupte acuminatae quasi caudatae pedicellis breviores infimae ad 15 mm. longae supremae minores; pedicelli validi ad 3.5 cm. longi apice declinati, sub fructu erecti stricti ad 6 cm. longi anthopodio magno semilenticulari terminati. Calyx late campanulatus ad 1 cm. longus crassus tubo costis 5 viridibus vittato ad medium fissus lobis erectis adpressis a basi lanceolatis acuminatis haud hydatheodo corneo terminatis. Corollae flavae aureo-oculatae tubus infundibuliformis supra stamina ampliatus ad 1.4 cm. longus calycem superans membranaceus extus nitidus intus annulo magno 5-lobato instructus infra stamina vix rugosus, limbi plani discus subpuberulus 3 mm. latus, lobi crassi oblongo-ovati ad 9 mm. longi 5 mm. lati integri obtusi mucronulati. Stamina antheris 2.5 mm. longis et connectivo brunneo, in flore brevistylo filamentis conspicuis applanatis 1.5 mm. longis orem tubi corollini versus inserta antherarum apicibus ultra annulum paullo exsertis, in flore longistylo filamentis inconspicuis prope medium tubi inserta apicibus antherarum circ. 5 mm. ab annulo remotis.

Ovarium globosum stylopodio non coronatum; stylus brevis vix calycem aequans, longus corollae tubo vix brevior; stigma capitatum purpureum lobulatum. Capsula magna ad 1.7 cm. longa calyce duplo-longior cylindrica crustacea extus longitudinaliter striata erubescens ab apice valvis 5-10 incrassatis dehiscent. Semina angulata subrhomboidea ad 1 mm. diam.; testa brunnea spongiosa.

Ex affinitate minus cognitae *P. reflexae*, Petitm. sed verticillis pluribus multifloris, bracteis basi non sacciformibus, calyce non nigro-striato, limbo corollino plano, lobis non rotundatis differt.

Yunnan:—Open mountain pasture on mountains of the Chungtien plateau. Alt. 11,000 ft. Lat. 27° 55' N. Plant of 24-30 inches. Flowers bright yellow with a satiny sheen on exterior. G. Forrest. No. 10,687. July 1913; No. 11,284. Sept. 1913. In fruit. In Herb. Edin.

A magnificent species. It finds its nearest Chinese allies undoubtedly in *P. orbicularis*, Hemsley and *P. reflexa*, Petitm. These agree according to descriptions in having orbicular petals, and by that character should be at once diagnosed from *P. aemula*, Balf. fil. et Forrest. *P. orbicularis*, Hemsley is also a farinose species, which *P. aemula*, Balf. fil. et Forrest is not, and *P. reflexa*, Petitm. has reflexed petals as in *P. szechuanica*, Pax—a character not found in *P. aemula*, Balf. fil. et Forrest.

P. orbicularis, Hemsl. was discovered by Wilson in the region about Tatsien-lu, and from seed collected by him it was raised by Veitch & Son in 1906. The plant was figured in the Botanical Magazine under tab. 8135, and a dried specimen of the cultivated plant is preserved in the Kew Herbarium marked "Wilson 3003A?" I have not seen in any collection a native specimen Wilson 3003A, and, as the plant has died out of cultivation, this dried cultivated specimen is probably the only material representation of it. I have compared it with Forrest's plant here described, and there is no doubt about their distinctness.

P. reflexa, Petitm. is a more difficult subject with which to make comparison, as the species is little known. But Petit-mengin's description is inapplicable to Forrest's plant conspicuously as regards the vegetative apparatus which is altogether different from that of *P. sikkimensis*, Hook.—which *P. reflexa*, Petitm. is said to resemble,—and then the saccate bracts of *P. reflexa*, Petitm. ought to separate it readily from *P. aemula*, Balf. fil. et Forrest.

Another yellow-flowered species, *P. tsetzouenensis*, Petitm. is described as having leaves cordiform at base and also saccate bracts—characters which do not suit *P. aemula*, Balf. fil. et Forrest.

Primula alsophila, Balf. fil. et Farrer.

Sylvestris humicola stolonifera late stolonibus fragilibus radicanlibus sub muscos repens. Folia petiolata ad 10 cm. longa 2-3 basi vaginantia rhizomatis corona exeuntia caetera evaginantia e stolonibus singulatim inter se remota orientia; lamina cordato-palmatifida ad 3 cm. longa ad 4 cm. lata 7-lobata lobis quadratis acutis acute tri-lobulatis margine piloso-ciliata sinu angusto utrinque sparsim pilosula laeto-viridis subtus pallidior; petiolus tenuis pilis albidis sparsissime obsitus. Scapus ad 15 cm. longus gracillimus infra sparsim albo-pilosus superne puberulus umbellam 2-3-floram gerens; bracteae 2-3 ad 6 mm. longae lineari-subulatae membranaceae puberulae; pedicelli filiformes ad 2 cm. longi minutissime sparsimque puberuli nunc purpurascens; anthopodium turbinatum. Calyx ad 6 mm. longus late campanulatus sepalorum nervis centralibus paullo prominulis viridi-vittatus intervallis pallidioribus subpergameneis punctatis ultra medium fissus lobis divaricatis a basi lanceolato-acuminatis minutissime subpuberulis et ciliolatis viridibus nervo medio conspicuo. Corollae lilacinae tubus 1.2 cm. longus cylindricus membranaceus in flore brevistylis supra stamina ampliatus intus transverse rugosus annulatus annulo rotato lobis per paria antipetalis deorsum concavis, limbi concavi discus 1.5 mm. latus, lobi imbricati obovati ad 7 mm. longi profunde fissi. Stamina filamentis latis basi expansis et antheris 1.5 mm. longis ad faucem tubi corollini antherarum apicibus fere exsertis inserta. Ovarium pyriforme; stylus brevis tubo calycino vix longior; stigma magnum discoideum.

Species sectionis *Geranioidis* habitu repente, foliis, umbella pauciflora satis distinguenda.

Tibet. Farrer and Purdom. No. 178. 1914. Banks of very deep moss and woodland decay, only in the very highest woodland zone of the Thibetan forests round the Bei Ling, at 11,000-12,000 ft., among the *Pyrolas*—*uniflora* and *rotundifolia*. A most dainty and charming plant, running freely underground, and forming carpets many yards across. Flowers July 21 (prime a little earlier); seed mid-October. In Herb. Edin.

This is a most delightful species, quite different from all others of the section *Geranioides*. The long creeping stolons with slight rooting system are most striking—suggestive of the growth-form of the plants with which it grows in the moss. Stolons occur in many *Primulas*, but I know of no other species with the type of stolon shown by this plant. That it is com-mensal might be surmised from its habit, and I find, as is usual in plants of its habitat, that its stolons are traversed by a mycelium. Whether, as is the case in *Pyrola*, *Malaxis*, and other like plants, the mycelium extends to the leaves, I have not material to

determine, but one may expect to find it there, and that the plant, like its comrades, has the capacity through its guest fungus of fixing for itself from the atmosphere its nitrogen supply.

Primula alta, Balf. fil. et Forrest.

Multiceps puberula radicibus tenuibus et alabastris squamulis parvis vestita, foliis floribusque coetaneis. Folia rosulata ad 7 cm. longa ad 2.5 cm. lata obovata vel oblonga vel oblanceolata apice obtusa vel rotundata integra vel obscurissime denticulata in foliis vetustis venarum extremitate hydathodali rigido-setulosa margine subciliata utrinque molliter puberula costa media tenui venisque primariis inconspicuis deorsum in petiolum alatum lamina breviorē sensim attenuata. Scapus elatus gracilis ad 35 cm. altus apice plus minusve luteo-farinosus umbellam multifloram congestam gerens; bractae submembranaceae plus minusve luteo-farinosae exteriores ad 5 mm. longae infra vaginam latam basi gibbosam formantes supra in caudiculam ligulatam obtusam purpurascentem subito contractae; pedicelli bracteis breviores 3.5 mm. longi luteo-farinosi; anthopodium turbinatum magnum flore abstrictum. Calyx 6 mm. longus poculiformis plus minusve luteo-farinosus; tubus membranaceus tenuis albidus nunc purpurascens ultra medium fissus lobis a basi lanceolatis acutis ciliatis atropurpureis. Corollae limbus purpureus luteo-oculatus tubus flavidus vel rubescens ad 9 mm. longus cylindricus in flore brevistylō superne ampliatus extus glaber intus exannulatus supra stamina transverse rugosus infra membranaceus, limbi patuli vix 1 mm. lati discus puberulus, lobi ad 6.5 mm. longi obovati profunde bipartiti. Stamina filamentis brevissimis antheris 2 mm. longis, in flore longistylō basin tubi corollini versus inserta antherarum apicibus ab ore circ. 5 mm. remotis calycis lobis dimidio-breviora, in flore brevistylō supra medium inserta apicibus ab ore circ. 2.5 mm. remotis. Ovarium ovoideum; stylus longus corollae tubo vix dimidio-brevior, brevis calyce dimidio-brevior; stigma capitatum obconoideum depressum. Capsula ovoidea melichlora calyce inclusa valvis 5 ab apice dehiscens; placenta stipitata globoso-ovoidea. Semina brunnea minuta 0.5 mm. diam.; testa cellulis aeriferis corrugata.

Species Sectionis Denticulatae ex affinitate *P. radiatae*, Balf. fil. et Forrest sed foliis molliter pubescentibus fere integris, scapo elongato, calycis tubo membranaceo, et notis aliis segregata.

Yunnan. Moist pastureland. Hills N.W. of Tengyueh. Alt. 6000–7000 ft. Lat. 25° 10' N. Plant of 9–15 inches. Flowers deep purplish blue. G. Forrest. No. 9679. February 1913. In Herb. Edin.

This is one of the southern forms of the widespread type of *P. denticulata*, Sm. and a very distinct one it is. Its small rosette of obovate puberulous leaves, from which a scape of great length for the size of the rosette ascends, gives it a well-marked character. The rhizome forms several rosettes, and there may be several scapes ascending from the same tuft. Its calyx has a curious membranous inflated appearance in dried specimens. It is the Chinese representative of the Himalayan *P. erosoides* (Watt), Balf. fil. et W. W. Sm.

***Primula annulata*, Balf. fil. et Ward.**

Pusilla efarinosa rhizomate tenui ramoso late repente vestigiis foliorum vetustorum oblecto. Folia puberula rosulata ad 1.5 cm. longa 5 mm. lata spathulata vel oblongo-spathulata obtusa margine regulariter serrata vel serrato-lobata deorsum sensim in petiolum alatum lamina longiorem evaginantem attenuata. Scapus ad 3.5 cm. altus gracilis uniflorus puberulus; bracteae duae parvulae puberulae virides lanceolatae subulatae alternae superior major ad 2.5 mm. longa; pedicellus erectus ad 3.5 mm. longus puberulus; anthopodium parvum. Calyx 3.5 mm. longus campanulatus viridis puberulus ultra medium fissus lobis triangularibus vel oblongo-deltoides obtusis vel acutis nunc obscure dentatis ciliatis. Corollae violaceae tubus ad 4 mm. longus calycem triente vel quadrante superans supra stamina ampliatus extus erubescens intus ad orem minute puberulus annulo prominulo lobato instructus, limbi discus puberulus brevissimus, lobi ad 3 mm. longi obcuneati ad medium divaricatum bipartiti. Stamina filamentis brevissimis antheris 0.5 mm. longis in flore longistylis ad medium tubi corollini inserta calyce inclusa. Ovarium sphaeroideum; stylus longus vix calyce longior stamina paullo superans. Capsula oblonga calyce vix aucto omnino inclusa; placenta columnaris.

Species pusilla aspectu *P. yunnanensis*, Franch., et *P. bellae*, Franch., sed ab hac oris barbati inopia ab illa corollae prominulo annulo recedit.

N.W. Yunnan. A-tun-tsu. On a limestone peak, 14,000 ft. June 1913. F. Kingdon Ward. No. 511. In Herb. Edin.

Two or three plants collected by Ward under the number 511 but without further designation are all that we have of this distinct species. The habit of the specimens shows that the plant is one of mossy loose soils such as we associate with *P. membranifolia*, Franch., *P. yunnanensis*, Franch., and like forms. The delicate rhizome branches are closely invested with the brown dry leaves of previous years. The small flower with a distinct prominent annulus not barbate is a characteristic feature of the plant.

Primula Calderiana, Balf. fil. et Cooper.

Glabra efarinosa rhizomate parvo foliis longe petiolatis. Folia crassiuscula ad 12 cm. longa ad 1.5 cm. lata oblanceolata obtusa margine eroso-denticulata ecartilaginea utrinque punctis albidis quasi squamatis cellularum aeriferarum instructa subtus efoveolata costa media prominula deorsum in petiolum angustum alatum vaginantem sensim attenuata. Scapus ad 15 cm. altus gracilis infra glaber superne velutino-puberulus et purpurascens umbellam circa 12-floram gerens; bracteae ad 7 mm. longae a basi lata acuminatae nigro-purpureae velutino-puberulae; pedicelli filiformes flexiles nigro-purpurei puberuli ad 1.5 cm. longi; anthopodium magnum obconoideum. Calyx ad 6 mm. longus crassus campanulatus nigro-purpureus puberulus ad vel vix ultra medium fissus lobis ovatis obtusis. Corollae atropurpureae crassae tubus in flore brevistylis ad 1 cm. longus in longistylis 1 cm. longus calycem superans supra stamina subito ampliatus extus glaber intus cellulis aeriferis albidis notatus ad orem annulo magno luteo coroneiformi instructus infra stamina sub-membranaceus, limbi patuli discus puberulus circa 8 mm. latus, lobi circa 6 mm. longi et lati oblongi vel elliptici vel rotundati emarginati vel suberosi. Stamina magna filamentis 1 mm. longis ad basin latis et strumis intermediis corollinis annulum formantibus conjunctis, antheris 2 mm. longis, in flore longistylis fere ad medium tubi corollini inserta apicibus antherarum ab annulo circ. 2 mm. remotis, in flore brevistylis apicem tubi versus inserta apicibus circ. 0.5 mm. ab annulo remotis. Ovarium discoideum; stylus longus exsertus, brevis calyce brevior; stigma magnum ovoideum lobulatum.

Species ex affinitate *P. Gammicanae*, King forsan microforma, foliis oblanceolatis longioribus, floribus minoribus paucioribus, calyce nigro-purpureo non angulato, corolla extus non velutina et annuli forma distinguenda.

Sikkim. Above Changu. Alt. 12,500 ft. Purple; very variable, but common on peat hill tops. R. E. Cooper. No. 20. 28th June 1913. In Herb. Edin.

Sikkim. Changu. Alt. 12,000 ft. W. W. Smith. No. 3285. June 1910. In Herb. Calc.

One of the many forms which have been confused under the name *P. obtusifolia*, Royle. As matter of fact *P. obtusifolia*, Royle, is a rare plant of the North-West Himalayas, and all the plants from Sikkim and the East Himalaya which have been referred to *P. obtusifolia*, Royle, belong to other species.

Primula celsiaeformis, Balf. fil.

Herbacea omnino subasperula pilis glandulisque obsita rhizomate parvo folia pauca petiolata et scapum racemosum

floribus inter se inaequaliter remotis vestitum emittente. Folia ad 24 cm. longa; lamina ad 10 cm. longa ad 5 cm. lata oblonga vel oblongo-elliptica apice obtusa vel rotundata margine late crenulato-undulata crenis hydathodo corneo venarum denticulatis basi inaequilateralis latere uno subdecurrente altero rotundato sinum semi-cordatum formante costa media subtus prominula in sectione semicirculari cum venis primariis subpatulis percursa utrinque glandulis capitatis brevissime stipitatis obsita supra subbullata et pilis albis longis conspersa subtus subfavosa elevato-venulosa ad costam mediam et venas dense hirsuto-tomentosa; petiolus ad 15 cm. longus lamina longior erectus plus minusve pubescens vel tomentosus vel sublanatus basi in vaginam parvam expansus. Scapus robustus ad 40 cm. longus hirsuto-tomentosus racemum longum cum floribus breviter pedicellatis irregulariter dispositis gerens; bracteae ad 6 mm. longae lineari-subulatae vel anguste ligulatae apice subulatae glanduloso-pubescentes; pedicelli stricti horizontales ad 1.5 cm. longi glanduloso-pubescentes; anthopodium breve. Calyx obconicus ad 7 mm. longus foliaceus patens extus venuloso-reticulatus scabriusculus praesertim ad venas intus evenulosus vel venulis haud elevatis obscure subbullatus dense scabriusculo-puberulus ad medium fissus lobis late triangularibus ciliatis acutis plus minusve denticulatis. Corollae violaceae tubus ad 1.2 cm. longus cylindricus ad insertionem staminum constrictus extus intusque puberulus infra stamina paullo rugosus annulatus lobis 5 antipetalis crenulatis conjunctis, limbi discus poculiformis 3 mm. latus puberulus, lobi magni puberuli imbricati fere 1 cm. longi late obovati membranacei profunde angustaque fissi ciliolati. Stamina in flore longistylis filamentis conspicuis deorsum expansis et conjunctis pseudo-annulum formantibus antherisque 1.5 cm. longis infra medium tubi corollini inserta calyce breviora. Ovarium subdiscoideum muro ubique crustaceo; stylus longus tenuis basi tumidus tubo corollino multo brevior; stigma oblongum. Capsula globosa muro per totum incrassato stylum persistentem gerens calyce accreto ad 2 cm. longo late patente viridi foliaceo lobisque prominenter hydathodo corneo denticulatis inclusa.

Species ex affinitate *P. blattariformis*, Franch., foliis oblongis longe petiolatis subtus subfavis glandulis capitatis plurimis vestitis, pedicellis longioribus, staminum insertionem et notis aliis facile distinguenda.

West China. Rocks of Ta-tchai. Alt. 1800 ft. July. E. E. Maire. In Herb. Edin.

Quite a distinct purple-flowered species of the section *Malvacea*. From *P. blattariformis*, Franch. its nearest ally,

the long-stalked leaves distinguish it at sight, and there are many other easily recognised distinctions some of which I have noted above.

The Malvacea series of *Primula* is a compact and definite one. The species are all herbaceous forms with coarse leaves and long racemose inflorescences bearing flowers the calyx of which is diagnostic. It is foliaceous with well-developed reticulate venation more or less elevated, and the obconical tube expands into broad spreading lobes. In fruit the whole enlarges to form a platter-like expansion in the middle of which rests the globose capsule, the wall of which is thickened throughout its whole extent. The species now known—not all with completeness—are :—

P. malvacea, Franch., *P. blattariformis*, Franch., *P. Tenana*, Bonati, *P. celsiaeformis*, Balf. fil.—all purple or lilac-flowered forms.

P. bathangensis, Petitm., *P. pintchouanensis*, Petitm.—yellow-flowered forms.

At the time of the *Primula* Conference I included *P. neurocalyx*, Franch., in this section. I was wrong. It finds its nearest allies in the *Mollis* section.

Of *P. racemosa*, Bonati, which I had not seen at the time of the Conference, and which I upheld doubtfully as a species, I am now able to say, after an examination of a type specimen, that it is only a poor plant of *P. bathangensis*, Petitm. To make up for the casting out of his *P. racemosa*, Bonati, I console M. Bonati by raising his *P. blattariformis*, Franch., var. *Duclouxii*, Bonati, to the rank of a species. Unfortunately the name *Duclouxii* has been already attached by Petitmengin to a microform of *P. malacoides*, Franch. and the name *P. Tenana* now given to Bonati's plant is in honour of its collector Père Siméon Ten. M. Bonati sent to me a sheet of this for examination. The following is the diagnosis :—

P. Tenana, Bonati: *P. blattariformis*, Franch. var. *Duclouxii*, Bonati in Bull. Soc. Bot. France, sér. 4, ix (1909), 465.

A *P. blattariformis*, Franch. differt foliis mollibus haud scabridis brevibus (4–5 cm. longis, 3–4 cm. latis) basi cordatis profunde lobatis, lobis rotundis; scapo scabrido haud lanato; pedicellis longioribus (1–2 cm.); bracteis latioribus calyce multo brevioribus; floribus minoribus; forma calycis post anthesin ultra 2 cm. diametientis.

Yunnan. Makong near Tong-Tchouan. Coll. Siméon Ten. In Herb. Paris under *Ducloux*, No. 556.

An addition to the list of the Malvacea Primulas.

I have no further information about *P. pintchouanensis*, Petitm. and include it as a species with still a doubt.

Primula cephalantha, Balf. fil.

Pilosa rhizomate parvo. Folia rosulata petiolata ad 10 cm. longa ad 2 cm. lata; lamina anguste oblonga vel sublan-
ceolata obtusa margine serrato-lobata vel inaequaliter grosse
dentata supra pubescens subtus pallidior pilis villosis prae-
sertim ad venas obiecta deorsum in petiolum lamina brevior
vel eam aequantem alatum villosum attenuata. Scapus ad
25 cm. altus glaber superne plus minusve luteo-farinosus capi-
tulum pluriflorum subspicatum gerens; bractae externae ad
7 mm. longae membranaceae plus minusve luteo-farinosae
deflexae basi lata vaginantes minutissime ciliatae superne
acuminatae calycem aequantes interiores minores; pedicelli
subnulli; anthopodium latum flore abstrictum. Flos de-
flexus. Calyx tenuiter membranaceus pallide viridis cupuli-
formis dense luteo-farinosus ad 4 mm. longus haud ad medium
fissus lobis mucronulatis inaequalibus posteriore maximo rotun-
dato anteriore angustiore ovato vel oblongo obtuso vel sub-
acuto. Corollae purpureae anguste tubulosae limbo concavo
tubus ad 8 mm. longus extus luteo-farinosus intus glaber ex-
annulatus infra stamina in flore brevistylis rugosus, limbi discus
2.5 mm. longus luteo-farinosus, lobi aperti breves 2.5 mm.
longi erecti oblongi vel subquadrati vel subrectangulares nec
rotundati apice vix integri nec emarginati. Stamina floris
brevistyli ad faucem inserta antheris ex tubo prolatis, floris
brevistyli ad basin tubi corollini, filamentis brevissimis. Ova-
rium globosum; stylus longus exsertus, brevis calyce brevior;
stigma discoideum. Capsula globosa calyce paullo aucto
densissime luteo-farinoso inclusa.

Species Sectionis Muscarioidis optime distincta. Ex affini-
tate *P. pinnatifida*, Franch., foliis pilis dense vestitis, bracteis
vaginantibus, lobis corollinis vix integris haud rotundatis
differt.

Yunnan. High plateau of Je-mo-tchouan. Alt. 9600 ft.
Flowers blue violet. July. E. E. Maire. In Herb. Edin.

Perhaps the nearest affinity of *P. cephalantha*, Balf. fil. is
with *P. pinnatifida*, Franch. Broadly, the form of leaf is the
same, but *P. cephalantha*, Balf. fil. is a much more hairy form
and never has the bright green foliage that characterises *P.*
pinnatifida, Franch. The inflorescence and flower of the two
plants differ. In *P. cephalantha*, Balf. fil. the head is more
spicate, the outer bracts have a broad sheathing base, the
posterior calyx lobe is not denticulate and the others are rarely
acute, the corolla lobes are not imbricate and have not the broad
rotundate quite entire shape of those of *P. pinnatifida*, Franch.
Lastly, as the fruit is formed the yellow meal that is developed
forms a dense coating on the bracts and calyx—a feature not

seen in *P. pinnatifida*, Franch. To *P. Giraladiana*, Pax there is a superficial resemblance, but that plant has bright green leaves with few hairs and without the lobation seen in *P. cephalantha*, Balf. fil. and then the corolla lobes are differently shaped. *P. cernua*, Franch. which is also distinctly recalled has spatulate leaves.

***Primula chionantha*, Balf. fil. et Forrest.**

Robusta farinosa epilosa radicibus crassis foliorum rosula sub anthesi evoluta alabastri squamis plurimis ad 8 cm. longis rubris nitidis chartaceis cincta. Folia magna ad 25 cm. longa ad 5 cm. lata lanceolata vel oblanceolata vel oblongo-obovata vel oblongo-elliptica crassa acuta vel obtusa integra deorsum in petiolum alatum costa media prominula sensim attenuata supra nuda subtus plus minusve luteo-farinosa. Scapus robustus ad 40 cm. altus plus minusve luteo-farinosus umbellam plurifloram et verticillos inferos 2-3 gerens; bracteae a basi 3 mm. lata angustatae obtusae ad 1.5 cm. longae inferne extus purpurascens superne nigro-virides et sparsim luteo-farinosae intus dense luteo-farinosae; pedicelli crassi luteo-farinosi reflexi sub anthesi bracteas vix superantes sub fructu purpurascens et multo elongati; anthopodium magnum latum. Calyx ad 9 mm. longus vel minor globoso-campanulatus extus nigro-viridis vel purpurascens luteo-farinosus praesertim ad sinus segmentorum lobis ligulatis apice angustatis obtusis vel subtruncatis intus dense luteo-farinosus. Corollae tenuis membranaceae niveae tubus ad 1.2 cm. longus in flore brevistylis cylindricus supra stamina ampliatus in flore longistylis infundibuliformis extus intusque glaber nitidus annulo albo lobato instructus, limbi discus ad 2 mm. latus, lobi elliptici vel ovati vel rotundati integri ciliati ad 8 mm. longi. Stamina filamentis conspicuis antheris 2.5 mm. longis in flore longistylis infra medium tubi corollini inserta calyce inclusa, in flore brevistylis fere exserta. Ovarium hemisphaeroideum in dimidio superiori lobulatum incrassatum; stylus longus calyce duplo longior fere corolla exsertus, brevis calyce triente brevior; stigma globosum. Capsula pallida cylindrica calycem triente superans ab apice valvis 5 breviter dehiscens; placenta columnaris stipitata. Semina complanata testa plus minusve spongiosa.

Planta magnifica sectionis Nivalis ab microformis omnibus orientalibus *P. nivalis*, Pallas floribus albis verticillatim dispositis distinguenda.

Yunnan. Mountains of the Chungtien plateau. Lat. 27° 55' N. Alt. 12,000-13,000 ft. Plant of 14-30 inches. Flowers pure snow-white, fragrant. On open alpine meadows. G. Forrest, No. 10,686. July 1913. In Herb. Edin.

This is indeed a noble plant, best described as a large white-flowered *P. nivalis*, Pallas in which several whorls of flowers are developed in addition to the terminal umbel.

***Primula citrina*, Balf. fil. et Purdom.**

Albo-farinosa foliis paucis petiolatis sub anthesi cataphyllis pallide brunneis membranaceis alabastri cinctis. Folia laete viridia ad 7 cm. longa; lamina late ovata vel elliptica vel orbicularis ad 3 cm. longa ad 2 cm. lata apice obtusa vel rotundata margine inaequaliter serrato-dentata basi abrupte in petiolum cuneatim contracta supra sparsim puberula subtus dense albo-farinosa; petiolus lamina duplo-longior anguste membranaceo-alatus basi vaginans. Scapus ad 5 cm. altus foliis brevior subtiliter puberulus umbellam 3-5-floram gerens; bractee lanceolato-acuminatae ad 7 mm. longae uninerviae subtiliter puberulae basi subauriculatae leviter carinatae et incrassatae; pedicelli bracteis longiores ad 1.5 cm. longi tenues erecti stricti vix puberuli; anthopodium conspicuum. Calyx ad 6 cm. longus anguste campanulatus tubo 5-nervio puberulo ultra medium fissus lobis adpressis lineari-lanceolatis acutis membranaceis ciliolatis. Corollae citrinae tubus ad 1.4 cm. longus calyce longior exannulatus intus leviter rugosus, lobi obcordati 7 mm. longi profunde emarginati. Floris longistyli stamina ad medium tubi corollini inserta. Ovarium globosum; stylus longus filiformis tubum corollinum aequans; stigma parvum rubrum.

Species *P. flavae*, Maxim. affinis sed petiolo angusto, scapo foliis brevior, bracteis pedicellis multo brevioribus, calyce campanulato segmentis acutis diversa.

Western Kansu. Lien Wha Shan. 12,000 ft. Coll. Purdom. No. 739. In Herb. Kew.

This is a bright species which I have described from Purdom's dried specimens in Kew Herbarium. Messrs. Veitch have been so good as to present to the Royal Botanic Garden a living plant of a *Primula* raised from Purdom seeds said to be of this plant, but in its growth so far—it is not a plant of easy cultivation—it does not show the characters of Purdom's dried specimens, but rather impresses me as being the plant described by Maximowicz as *P. flava*, Maxim.* I have seen no example of Maximowicz's plant, and Purdom's dried specimens differ conspicuously from the description of *P. flava*, Maxim. in the petioles, which are long and narrow (not broad), in the scape shorter than the foliage (not "much longer"), in the campanulate puberulous calyx not tubular and mealy, in the bracts much (not slightly) shorter than the pedicels. It must be remembered, however, that *P. citrina*, Balf. fil. et Purdom is described from

* Maxim. in Bull. Acad. St. Petersb. xxvii (1881), 497.

a limited number of specimens from one collecting, and that *P. flava*, Maxim. also is described from one collecting by Przevalski on the Upper Hoangho in Kansu. Further knowledge may modify the view I have expressed.

A remarkable feature seen on Purdom's specimens is a coarse warting over the surface of the lamina. Mr. M. Y. Orr, Assistant in the Laboratory of the Royal Botanic Garden, has been so good as to examine these warts for me, and reports:—

"(a) The pustules are groups of enlarged and malformed cells of the upper epidermis of the leaf.

"(b) Each cell of a group is full of bacteria—a bacillus sp.—the original living contents of these cells having disappeared.

"These pustules appear to be 'bacterial galls,' but the condition of the specimen makes it almost impossible to say whether the bacillus is the cause of the malformation, or whether it is merely following in the wake of some other causative disease."

Primula compsantha, Balf. fil. et Forrest.

Epilosa rhizomate brevi foliorum praeteritorum vestigiis vestito. Folia membranacea sub anthesi parva ad 5 cm. longa ad 1 cm. lata oblongo-spathulata obtusa crenato-dentata deorsum integra et in petiolum alatum alis membranaceis senism attenuata supra viridia subtus luteo-farinosa venis primariis e costa media prominula regulariter pinnatim orientibus. Scapus ad 9 cm. longus tenuis ad apicem sparse farinosus umbellam parvam 2-4-floram gerens; bracteae paucae ad 6 mm. longae curvatim adscendentes sparsim farinosae a basi vaginata auriculata acuminatae sine hydathodo conspicuo terminali margine minutissime ciliatae; pedicelli erecti bracteis plerumque longiores saepe aequilongi vel eis breviores sparsim farinosi; anthopodium parvum. Calyx poculiformis in flore brevistylis 6 mm. in flore longistylis 8 mm. longus costis viridibus intervallis submembranaceis luteo-farinosus vittatus ultra medium fissus lobis ligulatis obtusis. Corollae tubus subinfundibuliformis floris brevistyli 1.2 cm. longistyli 1 cm. longus membranaceus pallide flavus intus sparsim ad orem dense puberulus exannulatus supra stamina paullo ampliatus infra stamina vix rugosus, limbi patuli discus 2 mm. latus, lobi rosei (Forrest) 8 mm. longi oblongi emarginati. Stamina fere sessilia floris brevistyli supra medium tubi corollini inserta antherarum apicibus circ. 2 mm. ab ore remotis, floris longistyli basin versus inserta antheris calyce multo brevioribus. Ovarium ovoideum; stylus longus tubum corollae aequans, brevis calyce brevior; stigma discoideum depressum sublobulatum.

Ex affinitate *P. minoris*, Balf. fil., calyce viridi, corolla exannulata facile distinguenda.

Yunnan. Open stony pasture. Mountains in the N.E. of the Yangtze bend. Lat. $27^{\circ} 45' N$. Alt. 11,000 ft. Plant of 3-5 inches. Flowers rose with greenish-yellow eye. Fragrant. G. Forrest. No. 10,567. July 1913. In Herb. Edin.

A small Chinese species of which we do not know the fruit, and its position is therefore not yet certain. It recalls in many ways *P. minor*, Balf. fil. et Ward but the absence of the conspicuous annulus of that species is a strong diagnostic mark. Instead of an annulus the throat has a fairly dense assemblage of minute hairs at the eye which according to Mr. Forrest is greenish yellow. It is altogether a more delicate species than *P. minor*, Balf. fil. et Ward and has a flower that is large for the size of the plant, the corolla, Mr. Forrest says, being rose-coloured.

***Primula conspersa*, Balf. fil. et Purdom.**

Herba foliis petiolatis rosulatis epilosis subtus farina alba conspersis. Folia ad 5 cm. longa; lamina ad 3.5 cm. longa ad 1.5 cm. lata oblongo-lanceolata coriacea paginis concoloribus apice obtusa margine dentibus brevibus subapiculatis dispariliter sectilis basi in petiolum subalatum ad 1.5 cm. longum subcuneatim attenuata. Scapus pro planta elatus ad 2.5 dm. altus plus minusve albo-farinosus umbellam multifloram nunc verticillo inferiori gerens; bractee cum pedicellis albo-farinosae circa 7 mm. longae 1.5 mm. latae pedicellis multo breviores a basi lata subtus pulvinatim convexa vix gibbosa sursum attenuatae acutae subcarinatae; pedicelli ad 1.5 longi stricti; anthopodium turbinatum 0.5 mm. longum. Calyx extus intusque plus minusve farinosus 5 mm. longus subfusiformis 5-angulatus ultra medium fissus lobis sinu membranaceo elongato-triangularibus acutis ad tubum corollae applicitis brevissime ciliatis interdum purpurascens. Corollae pallide lilacinae aurantiaco-oculatae tubus luteus cylindricus 8.5 mm. longus 1.5 mm. latus extus sparsim albo-farinosus intus lobato-annulatus supra stamina aurantiaco-rugosus in flore brevistylis per trientem superiorem amplius, in longistylis non amplius, limbi plani discus 0.5 mm. diam., lobi subtus farina conspersi 9 mm. longi bifidi crenulati. Stamina in flore longistylis ad medium tubi corollini inserta filamentis circa 0.5 mm. longis vix basi dilatatis antherarum apicibus ab annulo circ. 2.8 mm. remotis, in brevistylis annulum juxta inserta apicibus subexsertis. Ovarium ovoideum; stylus longus exsertus, brevis ad 2 mm. longus calyce brevior; stigma discoideum pallide flavo-viride. Capsula subcylindrica.

Ex affinitate *P. auriculatae*, Lam., foliis sparsim farinosis bracteis vix gibbosis calycis forma notata.

West Kansu. Chioni and Minchow. Damp soils. 8000–9000 ft. Purdom. No. 687. In Herb. Kew.

This plant was discovered by Purdom when exploring for Veitch & Son and was introduced to cultivation by them in 1913.

***Primula coryphaea*, Balf. fil. et Ward.**

Minutissima radicibus flavidis efarinosa pilosa alabastris foliaceis axillaribus plurimis instructa. Folia dense rosulata petiolata ad 6.5 mm. longa spathulata; lamina ad 2.5 mm. diam. elliptica vel suborbicularis basi cuneata inciso-lobata lobis acutis revolutis utrinque viridis; petiolus anguste alatus laminam aequans vel vix longior. Scapus validus puberulus 3 mm. longus foliis brevior uniflorus 2-bracteatus; bractee alternae glabrae virides 5 mm. longae ligulatae acutae uninnerviae inferior a flore 1 mm. superior calycem juxta inserta. Calyx 5.5 mm. longus tubulosus 5-costatus costis purpurascens intervallibus pallidis purpureo-punctatis ad medium fissus lobis oblongis acutis obscure undulato-crenulatis penniveniis venis purpureis. Corollae cyaneo-violaceae tubus cylindricus 7 mm. longus calycem paullo superans extus glaber intus paullo rugosus ad faucem pilis albis longis dense pulvinatim aggregatis clausus, lobi obcuneati fere ad medium bilobulati. Stamina in flore longistylis ad basin tubi corollini supra ovarium inserta antheris parvis vix 1 mm. longis filamentis fere nullis. Ovarium ovoideum; stylus longus fragilis corollae tubo longior; stigma pyriforme inter pilos faucis prolatum.

Sectionis Bellae species efarinosa *P. indobellae*, Balf. fil. et W. W. Sm., et *P. Bonatianae*, Petitm. similis sed bractearum dispositione formaque, flore cyaneo-violaceo notisque aliis distincta.

Burma. On open summit of granite mountains, occupying patches of coarse sandy soil between the patches of dwarf Rhododendron; forms tufts or carpets. Alt. 13,000 ft. Flowers rich blue violet. Hairs of throat white. F. Kingdon Ward. No. 1805. 16th July 1914. In Herb. Edin.

A beautiful dwarf species of the efarinose series of the Section Bella. Two other efarinose species belong to the series—*P. Bonatiana*, Petitm. and *P. indobella*, Balf. fil. et W. W. Sm. From the former—a species only briefly described by Petitmengin—it differs by its much smaller size, its bracts, the form of calyx and its lobes, the form of the corolla lobes. From the latter by its bracts and its corolla tube without hairs outside.

The discovery of this species furnishes a link connecting the

true *P. bella*, Franch. of China with the Bhutan form *P. indobella*, Balf. fil. et W. W. Sm.

***Primula fasciculata*, Balf. fil. et Ward.**

Pusilla epilosa rhizomate parvo vaginis siccis foliorum veterum oblecto foliis rosulatis longe petiolatis. Folia ad 2 cm. longa; lamina oblonga vel elliptica vel subovata obtusa vel apice rotundata margine integra cartilaginea ad 8 mm. longa ad 4 mm. lata crassiuscula subtus plus minusve sparsim farinosa; petiolus lamina 2-3-plo longior alatus longe vaginans. Flores plurimi axillares solitarii; pedicelli ad 5 cm. longi tenues; anthopodium conspicuum. Calyx tubulosus ad 4 mm. longus 5-costatus intervallis pallidioribus granulosus ad quadrantem fissus lobis deltoideis hydathodo corneo terminatis. Corollae pallide roseae flavo-oculatae tubus in flore brevistylus infra cylindricus supra stamina sursum ampliatus ad 6 mm. longus extus pallidus intus non rugosus annulo parvo ad orem instructus, lobi ex disco angustissimo limbi horizontaliter patentes 5 mm. longi obovati emarginati. Stamina in flore brevistylus ad orem tubi corollini inserta antheris 1.5 mm. longis semiexsertis filamentis brevibus. Ovarium globosum ad trientem supremum incrassatum 5-valvatum lobatum; stylus brevis albidus calycis tubum aequans validus; stigma parvum anguste capitatum.

Planta aspectu *P. tibeticae*, Watt sed floribus majoribus solitariis axillaribus differt.

Yunnan. Flowers deep rose-pink with orange eye. Covering bogs on the Chungtien plateau. 11,000-12,000 ft. May 1913. F. Kingdon Ward. No. 279. In Herb. Edin.

In dried specimens like the East Himalayan *P. tibetica*, Watt especially the form of that species in which the scape is very short and concealed within the leaves. Perhaps one ought to look at *P. fasciculata*, Balf. fil. et Ward as the West Chinese representative of the Himalayan *P. tibetica*, Watt. I find no trace of a scape in any specimen, and the flowers are always solitary in the axils of the leaves. The flowers in *P. fasciculata*, Balf. fil. et Ward do not show the characteristic reflexing of the petals of *P. tibetica*, Watt. The leaves of *P. tibetica*, Watt are said to have no meal, but I find it always—especially in young leaves.

***Primula florida*, Balf. fil. et Forrest.**

Rhizoma parvum multiceps foliis petiolatis. Folia ad 8 cm. longa; lamina ad 3.5 cm. longa ad 3 cm. lata in forma et magnitudine varia oblonga elliptica ovata rotundata basi subtruncata vel subcordata venis primariis flabellatis in petiolum cuneatim attenuata obtusa vel apice rotundata margine

dentato-lobulata dentibus vel lobulis integris vel denticulatis hydathodo corneo terminatis supra pube quasi pulverulenta infra albo-farinosa vel pilis minutissimis capitatis glandulosis oblecta. Scapus gracilis ad 20 cm. altus minute puberulus superne albo-farinosus umbellam ad 9-floram gerens; bracteae ad 8 mm. longae 2 mm. latae pedicellis aequilongae vel eis longiores a basi lata ligulato-lanceolatae acutae crassiusculae albo-farinosae circum pedicellos cucullatae et plus minusve basi adhaerentes carinatae; pedicelli farinosi validi; anthopodium conspicuum. Calyx circa 6 mm. longus extus intusque albo-farinosus (regione interiore tubi circa ovarium excepto) 5-costatus ad medium fissus lobis a basi lanceolatis acutis. Corollae cyaneo-purpureae tubus cylindricus sursum amplius ad 12 mm. longus exannulatus glaber membranaceus intus infra stamina transverse rugosus, limbi discus concavus 5 mm. longus, lobi ad 7 mm. longi obovati vel subobcuneati imbricati emarginati subcrenulati. Stamina filamentis conspicuis in flore longistylis circ. 2 mm. a basi tubi corollini inserta antheris calyce inclusis in flore brevistylis e fauce paullo exserta. Ovarium ovoideum; stylus brevis 2 mm. longus segmentis calycis dimidio brevior, longus tubum corollae fere aequans tenuis; stigma discoideum depressum revolutum. Capsula cylindrica melichlora ad 5 mm. longa calyce inclusa tubo longior segmentis brevior superne incrassata valvis 5 ab apice dehiscens; placenta stipitata columnaris. Semina minuta oblonga 0.5 mm. longa; testa cellulis aeriferis subbullata.

Ex affinitate *P. Souliei*, Franch. sed farinosa omnino major et foliis lobulatis, scapo longiore, pedicellis brevioribus distinguenda.

Yunnan. Mountains in the N.E. of the Yangtze bend. Lat. $27^{\circ} 45'$ N. Open situations in stony pastures at the base of limestone cliffs. Alt. 12,000 ft. Plant of 6-14 inches. Flowers blue, fragrant. G. Forrest. No. 10,484. July 1913. In Herb. Edin.

Yunnan. Alt. 12,000-13,000 ft. Plant of 9-18 inches. Flowers purplish blue, tinged rose. Differing from 10,484 in being occasionally farinose, in stature, colour of blooms, etc. G. Forrest. No. 10,486. July 1913. In Herb. Edin.

Yunnan. Mountains of the Chungtien plateau. Alt. 12,000 ft. Lat. $27^{\circ} 55'$ N. Stony alpine pasture. Plant of 6-12 inches. Flowers deep purplish blue, tube suffused rose. G. Forrest. No. 10,774. Aug. 1913. In Herb. Edin.

Yunnan. G. Forrest. No. 11,198. Sept. 1913. In fruit. In Herb. Edin.

A beautiful species which seems to find its nearest relationship in *P. Souliei*, Franch. and *P. Legendrei*, Bonati. A larger plant than either of these species, its possession of

white meal is a ready mark of separation. The meal is not always present on the leaves, but invariably is upon the bracts, pedicels, and calyx. In fruit the calyx is densely farinose, both outside and in, excepting on the inside of the cup. I have not seen the fruit of *P. Souliei*, Franch., which is described by Franchet as ovate, by Pax as ovoid. In *P. florida*, Balf. fil. et Forrest, it is cylindric but short, exceeding by but little the calyx tube, and shorter than the lobes. The seeds are extremely small.

***Primula fragilis*, Balf. fil. et Ward.**

Pusilla stolonifera luteo-farinosa epilosa rhizomate tenui foliis desiccatis vetustis oblecto radicibus filiformibus. Folia membranacea ad 1.4 cm. longa 6 mm. lata spathulata obtusa superne dentata deorsum integra cuneatim in petiolum laminam aequantem anguste alatum evaginantem attenuata utrinque luteo-farinosa. Scapus filiformis ad 2.5 cm. altus plus minusve luteo-farinosus uniflorus; bracteae duae herbaceae luteo-farinosae subulatae alternae inaequales superior major 2 mm. longa pedicellum aequans; pedicellus erectus luteo-farinosus bracteae superiori aequilongus. Calyx luteo-farinosus minutus aperte campanulatus 2.5 mm. longus ad vel ultra medium fissus lobis elongato-triangularibus acutis. Corollae violaceae tenuis tubus 6 mm. longus cylindricus supra stamina in flore longistylus expansus erugosus exannulatus, limbi discus 1 mm. latus, lobi 3 mm. longi obcuneati divaricatim bifidi. Stamina filamentis brevissimis antheris 1.5 mm. longis in flore brevistylus fere exserta, in longistylus calyci aequilonga. Ovarium sphaeroideum; stylus brevis calyce brevior, longus tubum corollae aequans; stigma capitatum.

Species sectionis *Yunnanensis* forma *pusilla* distincta.

Upper Burma near Feng-shin-ling pass. Alt. 9000-10,000 ft. On limestone cliffs where it forms moss-like patches in half-shade. Flowers pale purple. F. Kingdon Ward. No. 1644. 7th June 1914. In Herb. Edin.

A minute stoloniferous plant which by its characters fully confirms the description given by Ward of its habitat. It has the assemblage of persistent dried brown leaves coating the thin stolonoid rhizomes which are so conspicuous in plants like *P. membranifolia*, Franch. and *P. yunnanensis*, Franch.

***Primula Gageana*, Balf. fil. et W. W. Sm.**

Paludicola efarinosa epilosa (corolla excepta). Folia breviter petiolata ad 7 cm. longa 2 cm. lata; lamina oblonga vel anguste elliptica vel subobovata obtusa margine cartilaginea remote leviter denticulata utrinque concolor subtus

glanduloso-foveolata deorsum in petiolum brevem late alatum attenuata. Scapus ad 10 cm. altus flores 1-8 umbellatim gerens; bracteae lineari-subulatae inaequales ad 6 mm. longae pedicellis breviores; pedicelli inaequales ad 1.5 cm. longi erecti; anthopodium conspicuum parvum. Flos ab apice pedicelli deflexus. Calyx campanulatus ad 5 mm. longus submembranaceus rubro-punctatus ad trientem fissus lobis late triangularibus vel subovatis minutissime fimbriatis nervo singulo nigro-rubro percursis hydathodo conspicuo nigrescente terminatis. Corollae purpureae subcrassiusculae tubus brevis in flore brevistylis cylindricus circa 5 mm. longus intus rugosus exannulatus (?) in flore longistylis infra stamina cylindricus sursum ampliatus laevis et annulo obscuro praeditus in ambobus extus parte calyce inclusa glabra excepta velutino-puberulus, limbi concavi campanulati discus extus intusque velutino-puberulus, lobi ad 4 mm. longi subrectangulares vel subcuneati apice subtruncati vel subconvexi erosi vel denticulati vel crenulati venulis undulatis vix anastomosantibus percursi. Staminum filamenta conspicua in flore brevistylis 2 mm. longa antheraeque 1 mm. longae ad apicem tubi corollini inserta apicibus exsertis, in flore longistylis filamenta 1 mm. longa antheraeque 1.5 mm. longae a basi tubi corollini circ. 2.5 mm. inserta apicibus circ. 2 mm. ab annulo remotis. Ovarium globosum; stylus longus exsertus calyce duplo longior, brevis validus calycem vix aequans; stigma discoideum.

Species pulchra ex affinitate *P. Kingii*, Watt sed minor et foliis oblongis obtusis, calyce submembranaceo lobis uninerviis, corollae loborum venatione distincta.

Sikkim. Joloong. Alt. 13,000 ft. Very high, near snow. July 1886. Purple. King's Collector. In Herb. Calc.

We know this plant in one set of specimens only in the Calcutta Herbarium. The collector describes the flowers as "purple," but their aspect in the dried specimens suggests more red than purple and a tint approaching somewhat that of the flowers of its ally *P. Kingii*, Watt. From *P. Kingii*, Watt it is readily distinguished by its foliage. The leaves in addition to their oblong obtuse outline never show the pale tint when dry to which Sir Joseph Hooker calls attention in *P. Kingii*, Watt, and then the calyx is very different. The ribbing due to the prominent dark veins in the calyx of *P. Kingii*, Watt is absent, and instead there is a single dark vein running out into each calyx segment. The corolla shows, but in less degree, the velvety puberulousness so characteristic of *P. Kingii*, Watt but the venation is curiously diverse in the two plants. The veins in the corolla lobes of *P. Kingii*, Watt

are straight and anastomose in characteristic fashion. Here in *P. Gageana* the veins are all undulate and run out through the lobes with hardly an anastomosis. The species is one well worthy of being searched for. It should be a pretty species for cultivation. The roots indicate that the plant grows in a habitat where there is an abundance of soil moisture.

***Primula glandulifera*, Balf. fil. et W. W. Sm.**

Pusilla caespitosa corolla excepta glanduloso-puberula. Folia petiolata ad 2 cm. longa; lamina ad 7 mm. lata petiolo brevior elliptica vel oblongo-elliptica vel subobcuneata apice rotundata circumcirca obtuse serrato-dentata deorsum in petiolum alatum gradatim attenuata. Scapus validus ad 5 mm. longus flores 2-4 sessiles pro planta magnos gerens; bracteae ligulatae sursum attenuatae 4-5 mm. longae obtusae vel obtusiusculae ad basin latam paullo inflatae vix gibbosae; pedicellus nullus. Calyx 5-6 mm. longus poculiformis rufo-punctatus fere ad basin fissus segmentis lanceolatis obtusis ciliatis. Corollae tubus 1 cm. longus exannulatus intus rugosus fauce et limbi basi granulosis, lobi 5 mm. longi 4 mm. lati obovati profunde emarginati membranacei. Stamina in flore brevistylis supra medium tubi corollini inserta. Stylus brevis 1 mm. longus calyce multo brevior; stigma globosum.

Ex affinitate specierum Sectionis Minutissimae foliis glanduliferis, scapo breve, bracteis subcalycinis, floribus sessilibus, distincta.

Kumaon. Above Napatcha in Kuth Valley. Alt. 13,000 ft. Duthie. No. 3137. 13th Sept. 1884. In Herb. Calc.

Kumaon. Above Dudhpani. About 13,000 ft. J. E. Reid. 27th July 1886. In Herb. Edin.

This species is known in a few specimens in the Edinburgh Herbarium of a *Primula* collected, 27th July 1886, by Mr. J. E. Reid, C.I.E., above Dudhpani, at an altitude of 13,000 ft., and marked by him as probably a new species. Sir George Watt writes on the sheet bearing Mr. Reid's specimen: "This is the plant collected by Duthie above Napatcha, 13,000 ft., in Kumaon 13.9.84, and named *P. near P. elliptica*, Royle. It is a perfectly good and new species belonging to the Section Denticulata, and is near *P. Heydei*, Watt. Until carefully examined it might be mistaken for *P. Stirtoniana*, Watt, and *P. minutissima*, Jacquem. var. *spathulata*, Hook. f. [*P. spathulifolia*, Craib]. It is also near *P. tenella*, King, a much misunderstood species from the position of the bract being disregarded."

Duthie's specimen in Calcutta Herbarium, the only other known, confirms Sir George Watt's identification, and also both his and Mr. Reid's comment that the plant is a new species.

The species is very distinct in the series of dwarf tufted Primulas with exannulate corollas. The glandular covering is that of *P. Walshii*, Craib, but the form of leaf of that species and its involucreally disposed bracts, as well as the flower characters, at once distinguish it. *P. spathulifolia*, Craib and *P. melichlora*, Balf. fil. et W. W. Sm. have leaves of form like those of our species, but neither of them is glandular and their inflorescence is not capitular. *P. Stirtoniana*, Watt is also very different both in form of foliage and in inflorescence. *P. minutissima*, Jacquem. is altogether a smaller plant with involucreal bracts, smaller flowers, and different flower details, and it is not glandular. *P. Heydei*, Watt is at once diagnosed by its long scape, and there are many other differences.

Primula Harrissii, Watt ex sched. in Herb. Edin.

Epilosa foliis floribusque coaetaneis sed sub anthesi nondum desquamatis. Folia crassa ad 5 cm. longa ad 1 cm. lata spathulata obtusa margine subcartilaginea plus minusve acute dentata utrinque glanduloso-foveolata deorsum in petiolum alatum vaginantem lamina brevior attenuata. Scapus ad 6 cm. longus robustus glaber umbellam circ. 6-floram gerens; bractae latae ad 4 mm. longae subvaginant acuminatae carinatae et basi subtus in saccum brevem rotundatum 0.5 mm. diam. expansae; pedicelli rigidi erecti ad 7 mm. longi in anthopodium longum sursum gradatim expansi. Calyx ad 5 mm. longus campanulatus obscure 5-costatus glaber ad medium fissus lobis longe lanceolatis obtusis. Corollae tubus 8 mm. longus cylindricus in flore brevistylo supra stamina amplius intus fauce farinosus supra stamina plus minusve transverse rugosus rugis supremis ad orem annulatim projectis, limbi discus farinosus 1 mm. latus, lobi obcordati vel obovati 5 mm. longi integri profunde emarginati. Stamina filamentis brevibus antherisque 1.5 mm. longis, in flore longistylo a basi tubi corollini 2 mm. ovarium juxta inserta calyce inclusa, in flore brevistylo ad medium tubi corollini ultra calycem inserta antherarum apicibus ab ore 2 mm. remotis. Ovarium oblongum in triente supremo stylopodio valvatim incrassatum; stylus longus ultra medium tubi corollini elongatus, brevis tubum calycis aequans; stigma magnum ovoideum.

P. roseae, Royle peraffinis sed minor et foliis floribusque coaetaneis distincta.

Chitral. Guger. 8500–11,000 ft. Coll. Harriss. No. 16,333. 19th May 1895. In Herb. Calc., Edin. et Kew.

Afghanistan. Griffith. No. 3512. In Herb. Calc. et Kew.

Afghanistan. Griffith. No. 1058, Journal. In Herb. Kew.

Sir George Watt recognised this plant as a species distinct

from *P. rosea*, Royle and names it *P. Harrissii*, Watt in his herbarium now at Edinburgh. In his account of Indian Primulas to the Royal Horticultural Society * he refers to it by name as an undescribed species, and nowhere has it been described. I have therefore described it above and add that it is one of the microforms of the aggregate *P. rosea*, Royle, distinguished from the type plant by its less stature and the smaller mould of all its parts. Also it is apparently not precocious, as *P. rosea*, Royle is.

P. rosea, Royle exhibits several distinct microforms in its wide distribution over the N.W. Himalaya. It was first described and figured by Royle † in 1839 in specimens collected at Kedarkante. Five years later Duby ‡ included the species in his monograph and described under the name *P. elegans*, Duby, a plant—No. 508 of Jacquemont's in the Paris Herbarium—which he recognised as being near *P. rosea*, Royle—"An revera distincta?" Sir Joseph Hooker § cites *P. elegans*, Duby, as a variety of *P. rosea*, Royle distinguishing it by its "corolla smaller, tube longer, lobes narrower." Pax || merges *P. elegans*, Duby in *P. rosea*, Royle. A curious history attaches to these two forms, *P. rosea*, Royle and *P. elegans*, Duby. In 1879 Sir Joseph Hooker figured in the Botanical Magazine (1879), tab. 6437 under the name *P. rosea*, Royle a plant which had just been introduced to cultivation raised from seeds collected by Dr. Aitchison, "which were widely distributed, and from which, I believe, all the plants hitherto cultivated have been grown. We received the first flowering specimen from Mr. Ware of Tottenham; a few days afterwards it flowered at Kew and in many other collections. It is quite an alpine species. Thomson gathered it at 10,000 ft., and Griffith found it in Afghanistan in snow ravines at 11,000 ft. Dr. Aitchison has sent dried specimens of what is either a larger form or distinct species from a much lower level, 500 ft. at Gulmarz in Kashmir, and these have much larger obovate oblong and sharply toothed leaves with rounded apices." In Kew Herbarium is a sheet of Aitchison's Gulmarz specimens—Aitchison, No. 7. On the sheet is the following note by Aitchison: "See Bot. Mag. tab. 6437. The seeds for raising which were collected from the same locality at Gulmarz." This tells us that the plant figured in the Botanical Magazine, tab. 6437, is really the larger form which Sir Joseph Hooker suggested might be a distinct species and not the true *P. rosea*, Royle.

* Watt, Observations on Indian Primulas in Journ. R.H.S. xxix (1904), 299.

† Royle, Illustr. (1839), 311, t. 75, fig. 1.

‡ Duby, in DC. Prod. viii (1844), 41.

§ Hook. f. in Fl. Brit. In. iii (1882), 488.

|| Pax, Primulaceae in Engler's Pflanzenr. (1905), 81.

In addition to Aitchison's specimens from Gulmarz there are in Kew Herbarium specimens from the same locality and from Sumbliali collected on 16th July 1892 by Duthie. An examination of them as well as of Aitchison's specimens and comparison with a somewhat fragmentary example of Jacquemont's type in Kew Herbarium received from Paris leads me to the conclusion that the Gulmarz and Sumbliali plants are *P. elegans*, Duby which is distinct from *P. rosea*, Royle, and the Botanical Magazine figure is therefore a representative of *P. elegans*, Duby. The plants in cultivation which all came from Aitchison's seed would therefore be *P. elegans*, Duby. Seeds under the name *P. rosea*, Royle have doubtless come to this country frequently since 1879, and the true *P. rosea*, Royle has been and is probably in cultivation alongside of *P. elegans*, Duby. It is likely enough that hybrids between them have been raised. This may in part account for the differences that appear in cultivated *P. rosea*, Royle. I have not given special attention to the cultivated form—and the standpoint is new ; but it is of common observation that some plants are precocious, others coetaneous, some have smaller narrower leaves, others larger broader ones, and then there are the named forms *grandiflora*, *splendens*, and probably others. I recollect that the late Mr. Selfe Leonard at one time had several more or less marked forms in his collection at the Guildford Nurseries. All this points to the need for more study of *P. rosea*, Royle in our gardens.

P. rhodantha, Balf. fil. et W. W. Sm. collected by Aitchison in the Kurrum Valley under No. 462, and by Harsukh under No. 14,931, is another dwarf form of the *P. rosea*, Royle aggregate with petiolate leaves and a short scape included in the foliage. See p. 39.

P. rosiflora, Balf. fil. et W. W. Sm. found by Harriss (Nos. 16,334, 16,335), and also by Gilg in Chitral, is a more dwarf microform in which there is almost no scape, the pedicels are long, and the corolla tube shows a prominently lobed annulus. See p. 41.

P. radicata, Balf. fil. et W. W. Sm.* gathered by Younghusband in Chitral during 1894, is another dwarf alpine of this series in which the solitary flowers are also embedded in the leaves which are very thick and coriaceous.

Primula helvenacea, Balf. fil. et Ward.

Luteo-farinosa epilosa foliis longe petiolatis. Folia ad 10 cm. longa ; lamina elliptica vel obovato-oblonga ad 2.5 cm. longa 1.5 cm. lata apice obtusa vel rotundata margine lobulato-dentata dentibus subobtusis supra opaca sparsim farinosa subtus

* This species will be described in a later page in these "Notes."

dense luteo-farinosa deorsum in petiolum longum ad 8 cm. longum gradatim attenuata; petiolus anguste alatus in vaginam longam purpuream expansus. Scapus ad 20 cm. altus robustus plus minusve luteo-farinosus umbellam ad 8-floram gerens; bracteae ad 1.2 cm. longae lineari-subulatae erectae minute ciliatae extus virides sparse farinosae intus dense luteo-farinosae basi subtus paullo incrassatae; pedicelli inaequales longiores ad 3 cm. breviores 1 cm. longi validi dense luteo-farinosi; anthopodium parvum. Calyx crassiusculus ad 8 mm. longus tubo brevissimo 1 cm. longo extus nigro-viridi sinibus intersepalinis luteo-farinosus intus glabro lobis ligulatis acutis adpressis intus dense luteo-farinosus. Corollae purpureae tenuissimae membranaceae in flore longistylus tubus cylindricus 1.2 cm. longus extus intusque glaber efarinosus erugosus annulo magno lobato instructus, limbi discus minutus, lobi magni patentis 1 cm. longi obovati retusi crenulati. Stamina filamentis brevibus et antheris latis 2 mm. longis basin tubi corollini versus inserta antherarum apicibus vix ad medium calycis attingentibus. Ovarium hemisphaeroideum superne incrassatum; stylus longus validus tubo corollino triente brevior; stigma breviter ovoideum.

Species *P. callianthae*, Franch. affinis sed foliis longe petiolatis, bracteis longioribus differt.

N.W. Yunnan. Mekong-Salween divide near A-tun-tsu. Precipices, 15,000 ft. F. Kingdon Ward. No. 827. 20th July 1913. In Herb. Edin.

This striking new species has, without doubt, affinity with *P. calliantha*, Franch. but its long stalked leaves with small lamina distinguish it at a glance.

***Primula indobella*, Balf. fil. et W. W. Sm.**

Perpusilla dense caespitosa radicibus basi erubescens efarinosa stolonifera stolonibus brevibus. Folia glabra crassiuscula petiolata rosulata ad 8 mm. longa subspathulata; lamina regulariter crenato-lobata lobis recurvatis hydathodo terminatis; petiolus lamina longior ligulatus alis membranaceis integris. Scapus glaber ad 1 cm. longus folia subaequans vel eis longior uniflorus; bractea singula minuta membranacea subulata subcalycina et calyci adpressa; pedicellus nullus. Calyx poculiformis ad 4 mm. longus corollae tubo brevior viridis glaber ad medium fissus lobis latis oblongis obtusis nunc subtruncatis denticulatis. Corollae crassiusculae in flore brevistylus tubus 6 mm. longus infundibuliformis extus pubescens intus fauce dense albo-barbatus caeteroquin glaber, limbi discus concavus, lobi ad 5 mm. longi obcuneati profunde bifidi segmentis divaricatis. Stamina ad faucem inserta, antheris 1.5 mm. longis. Ovarium globosum; stylus vix calycis tubum aequans; stigma capitatum.

Species *efarinosa* Sectionis *Bellae* bractea singula subulata, corollae tubo extus pubescente, floribus cyaneis facile distinguenda.

Bhutan. Dang-dong. J. C. White. 10th July 1906. In Herb. Calc.

An interesting Western extension of the type of *P. bella*, Franch. which hitherto is known only from Yunnan.

***Primula leimonophila*, Balf. fil.**

Glabra *efarinosa* rhizomate brevi. Folia subcoriacea ad 6.5 cm. longa; lamina 1.4 cm. lata lanceolata acuminata a medio deorsum in petiolum dimidio brevior membrae alata gradatim attenuata margine linea alba cartilaginea et in dimidio superiore dentibus firmis remotis recurvis notata. Scapus ad 2 dm. altus umbellam 4-6-floram unilateraliter subnutantem gerens sub umbella atropurpureus ibique plus minusve rugosus et glanduloso-puberulus; bractae uninerviae atropurpureae exteriores ad 8 mm. interiores saepe 4 mm. longae basi expansae auriculatae et dorsaliter tumidae vel subinflatae neque calcaratae sursum anguste acuminatae; pedicelli distincti atropurpurei subscabridi vel asperuli bracteis exterioribus vix breviores interioribus duplo longiores; anthopodium ad 1.5 mm. longum. Calyx 5 mm. longus cylindricus corollae tubum aequans 5-costatus intervallis pergamentaceis atropurpureis punctatus scabriusculus ad medium fissus lobis a basi lanceolatis acutis uninerviis mucronulatis. Corollae cyaneae tubus ad 5 mm. longus in flore brevistylus crassiusculus intus rugosus in flore longistylus tenuis intus puberulus haud rugosus annulo 5-lobato lobis magnis inflatis infra orem instructus, in ambobus limbi concavi discus ampliatus circa 5 mm. latus plus minusve minute puberulus, lobi circa 5 mm. longi oblongi lateribus parallelis fere ligulati subtruncati late emarginati. Stamina antheris ad 1.5 mm. longis in flore brevistylus filamentis conspicuis fere 1 mm. longis deorsum expansis ad orem tubi corollini sine lobulis distinctis interstaminalibus inserta antherisque in cupulam disci corollini longe projectis, in flore longistylus filamentis brevibus vix 5 mm. longis deorsum expansis et lobis purpureis intersepalinis annulatim conjunctis prope basin tubi corollini inserta antherisque calyce brevioribus. Ovarium globosum parvum; stylus brevis calycis tubum aequans, longus circa 6 mm. longus limbi disco aequilongus; stigma globosum.

Species ad *P. argutidentem*, Franch. et *P. amethystinam*, Franch. spectans sed foliis lanceolatis acuminatis non ovatis vel ovato-oblongis distinguenda.

Hunan. Pastures of Yo-Chow. Alt. 9900 ft. June. E. E. Maire. Flowers Prussian blue. In Herb. Edin.

This beautiful species belongs to a series of which materials for a complete analysis are still wanting, especially living plants. No one of the series is definitely in cultivation though some may soon be so. Its immediate Chinese allies are *P. argutidens*, Franch., *P. amethystina*, Franch., *P. brevifolia*, Forrest, and *P. silaensis*, Franch. *P. petrophyes*, Balf. fil. may be an alpine microform of it. Then there are the Indian *P. Kingii*, Watt and *P. Gageana*, Balf. fil. All these are purple-blue or claret flowered species. *P. Faberi*, Oliv. is the only yellow-flowered species of the series as yet known, and it is Chinese.

P. amethystina, Pax * is a chimera and includes *P. argutidens*, Franch. and *P. amethystina*, Franch. The two species are distinct as Petitmengin † has shown.

A conspicuous feature in all the forms of the series is the cartilaginous margin of the glabrous somewhat glaucous leaf with sharp recurved teeth in the upper half. The umbel of more or less stalked flowers is secund. The nodding flowers and ampliate corolla limb recall the Soldanelloid Section, but in the foundation form of that section, and in the forms which without question are co-phyletic, the leaves are pinnatisectly dentate, have no horny margin, and are more or less pubescent.

***Primula lhasaensis*, Balf. fil. et W. W. Sm.**

Farinosa epilosa rhizomate brevi crasso. Folia rosulata ad 7 cm. longa ad 2 cm. lata oblongo-spathulata acuta margine subcartilaginea inaequaliter denticulata dentibus hydathodo terminatis crassa supra punctata subtus plus minusve farinosa deorsum gradatim attenuata et integra petiolum brevem alatum vaginantem formantia. Scapus validus strictus ad 16 cm. longus superne plus minusve farinosus umbellam 4-8-floram gerens; bracteae lineari-subulatae ad 1.2 cm. longae basi subincrassatae pedicellis breviores; pedicelli ad 2.5 cm. longi sparsim farinosi stricti erecti tenues; anthopodium conspicuum disciforme. Calyx ad 1 cm. longus tubulosus 5-costatus intervallis pergamentaceis ultra medium fissus lobis a basi lanceolato-acuminatis hydathodo terminatis intus albo-farinosis. Corollae forsan violaceae tubus in flore brevistylis 1.6 cm. longus infra stamina anguste cylindricus supra stamina expansus extus efarinosus intus tenuiter rugosus fauce puberulus annuloque parvo instructus, limbi discus 1 mm. latus puberulus, lobi 5 mm. longi vel longiores obcuneati profunde bifidi. Stamina filamentis conspicuis antheris 2 mm. longis in flore brevistylis orem tubi corollini versus inserta antherarum apicibus 0.75 mm. ab annulo remotis in flore longistylis ad medium tubi corollini et supra

* Pax, Monogr. Primul. in Engler's Pflanzenr. (1905), 118.

† Petitmengin in Bull. Soc. Sci. Nancy, sér. 3, viii (1907), 8.

calyces inserta. Ovarium ovoideum in triente superno lobulatum incrassatum; stylus longus tenuis corollini tubum aequans, brevis calycem vix aequans; stigma capitatum lobulatum.

Planta forsitan *P. Jaffreyanae*, King microforma sed robustior et foliis bracteisque longioribus, calyce tubuloso longiore, corollae tubo longiore, annulo minore notata.

Tibet. Hills above Lhasa. Walton. August 1904. In Herb. Calc.

This seems to be a Northern representative of the Chumbi *P. Jaffreyana*, King.

The Lhasa plant at first sight seems very different from *P. Jaffreyana*, King, having longer leaves, much more markedly toothed and less distinctly petioled, stouter and larger scapes, longer bracts and pedicels, and the flower with a larger and tubular calyx with long acuminate segments, the corolla tube is also longer, the annulus less distinctly marked, and the insertion of the stamens not the same. At the same time the Lhasa plant may be only a microform of *P. Jaffreyana*, King. Both species have a similar leaf construction of a distinct kind. The leaves are somewhat thick, and the upper side has a glistening look in dried specimens, due to the presence of many foveolae of a minute kind at base of each of which is a glandular hair. In dried specimens there are over the surface a number of brown tannin spots.

A series of specimens in the Calcutta Herbarium collected also by Capt. Walton, about Khamba in July 1904, at alt. 16,000 ft., resemble *P. lhasaensis*, Balf. fil. et W. W. Sm. more closely than *P. Jaffreyana*, King, yet in some ways seem to be near the latter species. It may be a form connecting the extremes of an aggregate as we know it.

I may note here that Sir George King* refers to *P. Jaffreyana*, King as approaching *P. tibetica*, Watt but differing in its "much larger more membranous leaves." To my eye the plant is really not in the alliance of *P. tibetica*, Watt which belongs to the series including *P. sibirica*, Jacq., *P. involucrata*, Wall., *P. Wardii*, Balf. fil., while *P. Jaffreyana*, King has none of the conspicuous bract characters that distinguish them. Its place seems to me to be rather along with such forms as *P. florida*, Balf. fil., *P. hazarica*, Duthie, *P. Legendrei*, Bonati, *P. Souliei*, Franch. and other forms which constitute a characteristic enough section more or less farinose with leaves more or less stalked without cartilaginous margins, bracts linear subulate pulvinately thickened below at the base, ribbed calyces with parchment intervals, long corolla tubes, and delicate annulus. But at the moment I am not able to fix the limits of sections including such forms.

* King in Journ. Asiat. Soc. Bengal, lvii, 2 (1888), ii, 228, t. x.

Primula meiantha, Balf. fil. et W. W. Sm.

Monocarpica annua foliis rosulatis petiolatis. Folia ad 3.5 cm. longa; lamina oblonga ad 2 cm. longa ad 1 cm. lata vel multo minor obtusa sinuato-lobata lobis acutis utrinque pilis longis articulatis hispida basi lateribus rotundatis vel subtruncatis in petiolum breviter cuneatim contractis; petiolus laminam aequans vel ea brevior vix alatus. Scapi plures ad 10 cm. alti stricti tenues basi hirsuti superne plus minusve albo-farinosi umbellam plurifloram (ad 15-) unam nunc verticillo accessorio inferiori gerentes; bracteae ad 4 mm. longae virides angustae ligulatae acutae puberulae; pedicelli ad 1.5 cm. longi filiformes stricti inaequales puberuli. Calyx ad 2.5 mm. longus anguste campanulatus membranaceus puberulus plus minusve albo-farinosus vix ad medium fissus lobis inaequalibus lanceolatis vel oblongis triangulari-deltoides acutis vel obtusis integris vel dentatis. Corollae violaceae tubus 4 mm. longus cylindricus extus flavidus glaber intus fauce lineis strumosis annulatim obscure instructus, lobi 2 mm. longi obcuneati apice erosocrenulati. Stamina filamentis brevissimis in flore longistylis infra medium tubi corollini in flore brevistylis supra medium antherarum apicibus 1 mm. ab ore inserta. Ovarium ovoideum; stylus longus non exsertus, brevis tubum calycis aequans; stigma capitatum lobulatum. Capsula globosa calyce inclusa ab apice valvis 5 crustaceis dehiscens. Semina parva 0.5 mm. diam. nigro-brunnea angulata rhomboidea obscure scrobiculata.

Microforma *P. Forbesii*, Franch. floribus minutis distincta.

Burma. Shan Hills. General Sir Henry Collett, K.C.B., No. 1. 1887. In Herb. Calc.

Shan States. Mones. Alt. 3500 ft. January 1888. Coll. Manders. In Herb. Kew.

Shan Hills. Hepo. 3000 ft. 8th February 1888. Collett, No. 1. In Herb. Kew.

Upper Burma. Maymyo. Nadal Khan. No. 335. January 1889. In Herb. Calc.

Upper Burma. Southern Shan State Saga. Abdul Khalil. 1894. Flowers pink. In Herb. Calc.

Upper Burma. Shan Hills. E. Candler. 1897. In Herb. Calc. et Kew.

Upper Burma. Maymyo plateau. Alt. 3500 ft. Lace. No. 3143. 17th April 1908. In Herb. Edin., Calc. et Kew.

Upper Burma. Southern Shan States. Phillimore. No. 26. In Herb. Edin., Calc. et Kew.

This is the Burmese form of the Chinese *Malacoides* series. Its small flowers are a distinguishing feature. The leaves vary greatly in size from less than a centimeter upwards to the

maximum. The calyx is noteworthy on account of the irregular size of the lobes and their tendency to become toothed towards the apex.

Primula melichlora, Balf. fil. et W. W. Sm.

Caespitosa luteo-farinosa rhizomate lignoso. Folia ad 3.5 cm. longa ad 1 cm. lata; lamina oblonga vel anguste elliptica acuta margine argute et regulariter denticulata denticulis acutis deorsum in petiolum late alatum attenuata subtus dense luteo-farinosa supra sparsim farinosa subglauca venulosa. Flos solitarius; pedunculus 1 cm. longus farinosus bracteam singulam infra medium gerens; bractea ligulata membranacea uninervia farinosa ad 1.3 cm. longa pedicello longior. Calyx 6-7 mm. longus extus intusque farinosus ultra medium fissus lobis oblongis apice rotundatis vel subtruncatis mucronulatis vel obscure 3-denticulatis rarissime plus minusve acutis. Corollae crassae tubus 9 mm. longus extus glaber intus exannulatus fauce et limbi basi granulosis, lobi 4-5 mm. longi emarginati. Stamina floris longistyli basin tubi corollini versus brevistyli circa medium inserta. Stylus longus corolla dimidio brevior, brevis vix calycis tubo longior; stigma pyriforme. Capsula infra membranacea supra crustacea calyce lobis adpressis inclusa, a basi styli valvatim dehiscens.

P. spathulifolia, Craib foliis ellipticis, pedunculo farinoso longiore, bractea singula, calyce majore, corollae limbo minore differt.

Sikkim. Tosa. Alt. 14,000-15,000 ft. W. W. Smith. No. 4071. 3rd August 1910. In Herb. Calc.

This plant is known only in a set of specimens collected under No. 4071 by Mr. W. W. Smith in August 1910 at Tosa in Sikkim at an altitude of 14,000-15,000 ft. It is in the way of *P. spathulifolia*, Craib but has characters which point to its distinctness as a species, and its description as such may lead to special search for more specimens of it through which a clearer idea of it will be obtainable than the material now available affords. Mr. Smith's plants collected late in the year show but a few passed flowers and some bruised capsules.

The plant differs from *P. spathulifolia*, Craib in the following points:—longer narrowly elliptic not spatulate leaves which are more definitely and acutely cut, the longer farinose flower-pedicel, single bract longer than the pedicel, larger calyx, smaller corolla limb.

Primula minor, Balf. fil. et Ward.

Epilosa. Rhizoma tunicatum foliis praeteritis siccis contortis obtectum. Folia petiolata floribus coetanea sed post anthesin

accrescentia crassa ad 5 cm. longa ad 8 mm. lata oblongo-spathulata obtusa margine recurva regulariter minute crenato-dentata basi in petiolum vaginantem lamina longiore anguste alatum attenuata supra sparsim subtus dense luteo-farinosa costa media prominula excepta. Scapus ad 6 cm. altus sub fructu accrescens plus minusve farinosus apicem versus purpurascens umbellam unam 8-floram gerens; bracteae purpurascens plus minusve farinosae subtus connatae a basi lata vaginante acuminatim angustatae ad 7 mm. longae pedicellis longiores vel aequilongae; pedicelli validi erecti purpurascens et farinosi sub fructu aucti; anthopodium abstrictum. Calyx breviter tubulosus ad 8 mm. longus extus purpurascens nunc ubique extus intusque luteo-farinosus saepe lineis farinosis intersepalinis solum notatus ultra medium fissus lobis longis ligulatis adpressis apice obtusis vel acutis subcucullatis sine hydathodo conspicuo. Corollae violaceae oculo albo tubus cylindricus supra stamina ampliatus in flore brevistylo ad 1.5 cm. longus in longistylo ad 1.2 cm. longus extus fauce plus minusve farinosus intus annulo conspicuo 5-lobato instructus vix transverse rugosus tenuiter membranaceus, limbi discus 2 mm. latus, lobi patuli anguste obovati vel elliptici ad 1 cm. longi ad 6 mm. lati obscure crenati. Stamina filamentis distinctis antherisque oblongis circ. 2 mm. longis in flore brevistylo supra medium tubi corollini inserta apicibus antherarum 3 mm. ab annulo remotis, in longistylo basin versus inserta calyce inclusa. Ovarium ovoideum; stylus brevis tubo calycis dimidio longior, longus tubo corollini paullo brevior; stigma capitatum lobulatum. Capsula rufa longitudinaliter striata ad 1.4 cm. longa calyce duplo-longior cylindrica angusta apice 5-10 dentibus valvatim dehiscens.

Species affinis *P. pulchellae*, Franch. sed habitu nano, foliis supra farinosis, umbella pauciflora, pedicellis brevioribus floribusque erectis, calycis segmentis longioribus, petalis violaceis integris, capsula longiore recedit.

Yunnan. A-tun-tsu. Alt. 13,000-14,000 ft. A semi-alpine (note tufted habit and very fibrous roots) growing on open mountain slopes under rocks, etc. Situation dry. Not a great variation in colour, usually pale. Attacked by fungus. F. Kingdon Ward. No. 89. May 1911. In Herb. Edin.

Yunnan. F. Kingdon Ward. No. 432. 1913. In Herb. Edin.

This is a dwarf ally of *P. pulchella*, Franch. There are abundant specific distinctions. Apart from the smallness of stature the shorter leaves are farinose above, pedicels are short and erect, lengthening in fruit as do those of *P. pulchella*, Franch. The calyx gives a diagnostic mark in the much longer segments. Then the corolla lobes are entire. Finally,

the capsule is quite twice the size of that in *P. pulchella* and projects far beyond the calyx.

This pretty little species is now in cultivation from Ward's seeds, and has flowered with Bees Ltd. and also at the Royal Botanic Garden, Edinburgh.

***Primula nemoralis*, Balf. fil.**

Herba multiceps efarinosa foliis floribusque coetaneis. Folia papyracea ad 6 cm. longa ad 2 cm. lata glabra laevia sublyrata saepe drepanoidea obtusa irregulariter dentato-lobata dentibus latis acutis vel obtusis subtus pallidiora basi nonnunquam subpetiolata. Scapus folia subaequans apice cum pedicellis bracteisque minutissime puberulus umbellam unam 4-8-floram gerens; bractee inaequales exteriores ad 9 mm. longae pedicellos subaequantes a basi lata lanceolatae obtusae nunc apicem versus obscure denticulatae concavae membranaceae uninerviae; pedicelli validi bracteas subaequantes vel eis longiores. Calyx subtubulosus saepe plus minusve rubro-striatus ad 5 mm. longus 5-nervius ad trientem fissus lobis ovatis obtusis minutissime puberulis et ciliatis. Corollae violaceae tubus 9 mm. longus annulo lobato luteo instructus intus supra stamina puberulus infra membranaceus, lobi ad 6 mm. longi obovati bilobuli integri. Floris longistyli antherarum apices ab annulo circ. 2.5 mm. remoti, brevistyli ad annulum attingentes. Ovarium conoideum; stylus longus tubo corollino brevior, brevis calycem subaequans; stigma breviter cylindricum.

Species Sectionis Sonchifoliae bracteis longis concavis membranaceis distinguenda.

Yunnan. Ou Kia. In moist woods. Alt. 9000 ft. Leaves soft. Flowers violet. Coll. E. E. Maire. In Herb. Edin.

Not far removed, I think, from *P. sinuata*, Franch.* The leaf outline in the two plants is not quite the same, as I judge from Franchet's very short description and from a photograph of a Paris sheet of Franchet's type. The inflorescence has more flowers, and the scape is stouter and pedicels longer in Maire's plant. The bracts too are much larger and more involucrate in *P. nemoralis*, Balf. fil. Franchet's plant is so little known that I cannot write about its affinities with the confidence I would like. But I have ample grounds for saying that *P. sinuata*, Franch., has no place in the Soldanelloid Section of *Primula* alongside of *P. Wattii*, King where Pax places it. Pax had not seen the plant and gives it its position on the strength of Franchet's comment that its leaves are like those of *P. Wattii*, King; but then Franchet adds the form of corolla and that of the calyx are very different in the two plants.

* Franchet in Bull. Mus. Hist. Nat. Paris, i (1895), 65.

P. sinuata, Franch. is I have little doubt one of the *Sonchifolia* series.

***Primula oresbia*, Balf. fil.**

Perennis albofarinosa rhizomate brevi. Folia graciliter petiolata ad 5 cm. longa; lamina ovata vel elliptica ad 1.7 cm. longa ad 1.4 cm. lata profunde pinnatim inciso-dentata cum dente apicali dentibus mucrone hydathodali corneo terminatis supra viridis glandulis capitatis obscure pulverulenta subtus intense albofarinosa basi subito truncatim vel late cuneatim in petiolum contracta; petiolus ad 2.5 cm. longus vix alatus plus minusve albofarinosus. Scapus ad 12 cm. altus plerumque brevior validus albofarinoso-puberulus umbellam subsecundam 5-6-floram gerens; bracteae plus minusve albofarinosae 6-8 mm. longae lineari-lanceolatae crassiusculae acutae basi subvaginatae exteriores pedicellis longiores (saepe duplo) interiores breviores; pedicelli albofarinosi subnutantes; anthopodium subnullum. Calyx poculiformis angulatus 6 mm. longus dense albofarinosus ultra medium fissus lobis erectis ad 4-5 mm. longis anguste lanceolatis acuminatis hydathodo corneo terminatis nervo medio prominente. Corollae lilacinae tenuis ubique plus minusve albofarinosae tubus exannulatus 8 mm. longus cylindricus intus in floribus omnibus transverse rugosus, limbi subconcavi vix ampliati discus 2 mm. diam. valde coloratus et dense albofarinosus, lobi obcordati bifidi. Antherarum apices in flore longistylis ab ore corollae circ. 4.5 mm. remoti in brevistylis ad orem sed haud exserti. Ovarium parvum globosum; stylus longus 6.5 mm. longus exsertus, brevis 1 mm. longus; stigma subglobosum. Capsula angusta oblonga 3-4 mm. longa calyce inclusa valvis primariis bifidis ad basin dehiscentibus.

Species *P. incisae*, Franch. affinis sed albofarinosa.

Hunan. Summit of Yo-Chow. Alt. 10,300 ft. E. E. Maire. In Herb. Edin.

I have not seen enough of *P. incisa*, Franch., to enable me to obtain a clear picture of its features, and the descriptions are not satisfactory. Franchet's type came from Muping, collected by David, and all Muping plants are very distinct. This I have not seen. With it Pax associates a plant from Mt. Omei collected by Faber and two plants collected by Pratt at Tatsienlu under the Nos. 31 and 161. In order to do this Pax has to modify Franchet's description in important particulars.

Franchet regarded his *P. incisa*, Franch., as near to *P. involuocrata*, Wall., but very distinct by the scabrid leaves with incised lobes. I cannot subscribe to the affinity, but Franchet's

reference to scabrid leaves as diagnostic seems to indicate a prominent mark. Pax, however, describes *P. incisa*, Franch. as having also glabrous leaves, and certainly Pratt's plants have leaves with this character. But Pratt's plants have not the glabrous scape which both Franchet and Pax describe for *P. incisa*, Franch. Then Pax introduces the character of golden meal on the pedicels—that is apparent in Pratt's plant No. 31, and I have seen it on two other specimens—Henry's No. 134 and Wilson's No. 4046A in Kew Herbarium. It is surely one that Franchet would not have overlooked in the Muping plant to which he ascribed golden meal sparingly on the calyx. Pax says of the calyx, "glaber vel intus farinosus."

Without doubt *P. incisa*, Franch. is a type around which are to be grouped microforms which further investigation must sift out.

The species I describe here under the name *P. oresbia*, Balf. fil., belongs to the aggregate but is certainly different from Franchet's *P. incisa*, Franch. and does not belong to Pax's chimaera. The intensely white farina on the under side of the leaves and all over the inflorescence, and particularly the calyx, is a mark of separation, and I have seen no form amongst those which I have examined with which our plant conforms exactly. Specimens of this *incisa* aggregate which I have seen in the Kew Herbarium are Henry, Nos. 134, 8869; Pratt, Nos. 31, 161, 258; Soulié, No. 383; Wilson, Nos. 4046, 4046A, 4046B. The form most like *P. oresbia*, Balf. fil. is Henry's No. 8869, but it has golden meal. There are also some good specimens in the Herbarium of the British Museum, but I have not yet been able to undertake the task of critical examination and comparison of them and the Kew specimens.

The examination of *P. oresbia*, Balf. fil. confirms me in the opinion I expressed at the Primula Conference that *P. incisa*, Franch. does not find its natural place in the Section Soldanelloides. These two species seem to occupy a position linking Soldanelloides with *Bella* and *Yunnanensis*.

Primula petrophyes, Balf. fil.

Glabra efarinosa rhizomate breve folisque rosulatis. Folia ad 3.5 cm. longa; lamina ad 5 mm. lata coriacea glauca anguste lanceolata acuminata a medio deorsum in petiolum aequilongum membranaceo-alatum vaginantem gradatim attenuata margine linea alba cartilaginea et denticulis subaculeatis recurvis notata. Scapus ad 8 cm. altus superne atropurpureus rugosus minute pulverulentus umbellam 3-5-floram unilateralem subnutantem gerens; bracteae purpurascentes exteriores ad 7 mm. longae a basi lata vaginante subauriculata carinata et pedicello con-

crescente elongato-lanceolatae acutae pulverulentae vena media prominula interiores minores; pedicelli validi bracteis multo breviores ad 4 mm. longi pulverulenti; anthopodium obconicoideum conspicuum. Calyx ad 5 mm. longus corollae tubo longior campanulatus pulverulentus costis 5 vix elevatis notatus ultra medium fissus lobis a basi lanceolatis acutis vena media notatis. Corollae coeruleae firmae in flore longistylus tubus ad 4 mm. longus calyce brevior extus pulverulentus intus puberulus haud rugosus ad orem annulo 5-lobato instructus, limbi concavi discus ad 3 mm. latus farinosus, lobi ad 2.5 mm. longi subrotundati vel oblongi integri vel paullo emarginati. Stamina in flore longistylus filamentis brevissimis antherisque 1-2.5 mm. longis supra medium tubi corollini sine lobis interstaminalibus inserta. Ovarium globosum; stylus longus validus limbi corollini discum aequans; stigma capitatum depressum.

P. leimonophila, Balf. fil. affinis sed minor et bracteis pedicellis longioribus, calyce campanulato, annulo ad orem corollae, loborum interstaminalium inopia diversa.

Hunan. Rocky plateaux of Yo-Chow. Alt. 10,200 ft. Flowers blue. Maire. In Herb. Edin.

A small species like a miniature *P. leimonophila*, Balf. fil. but it has many points of difference, of which I may note specially that of the flower. The corolla tube has a moderate-sized annulus which lies quite at the mouth of the corolla tube, whilst in *P. leimonophila*, Balf. fil. there is a very large inflated annulus lying a little below the mouth of the tube. The corolla lobes are small and rounded and hardly divergently emarginate. Then the short stamens—I have only seen the long-styled flower—have no interstaminal lobes forming an androecial annulus as in *P. leimonophila*, Balf. fil. Of other diagnostic characters note the long bracts, short stout pedicels, campanulate calyx with the intercostal areas not broad and pergammentaceous, and then the small linear foliage.

It may be this is an alpine microform of *P. leimonophila*, Balf. fil. but by the features to which I have drawn attention it may be readily recognised.

It belongs to the Amethystina Section.

Primula philoresia, Balf. fil. et Ward.

Perennis pygmaea rhizomate tenui ramoso foliis siccis anni praeteriti oblecto. Folia parva petiolata ad 1.2 cm. longa; lamina ovata ad 5 mm. longa 4 mm. lata crassa apice rotundata margine subintegra revoluta supra minutissime puberula subtus albo-farinoso basi subito in petiolum angustum membranaceo-alatum lamina longiorem contracta. Scapus 8 mm. longus foliis brevior puberulus florem unum pro planta magnum

gerens; bracteae tres inaequales puberulae virides sparsim farina conspersae involucrum subflorale formantes, exterior ab insertione lata ovato-acuminata 6 mm. longa interiores duae minores; pedicellus fere nullus. Calyx 6 mm. longus late campanulatus vix ad medium fissus viridis vel purpurascens extus farina conspersus lobis oblongis integris margine minutissime ciliatis. Corollae violaceae (?) tenuis tubus 9 mm. longus calycem superans extus puberulus intus annulatus et glanduloso-puberulus erugosus, limbi plani discus ad 2 mm. latus, lobi obcordati ad 8 mm. longi ad 7.5 mm. lati. Antherae in flore brevistylis breves ad medium tubi corollini insertae apicibus circ. 3.5 mm. ab annulo remotis. Ovarium globosum; stylus 2 mm. longus; stigma discoideum.

Species foliis et habitu *P. dryadifoliae*, Franch. sed multo minor et scapo unifloro foliis brevior, flore erecto, corollae tubo calycem superante, notis aliisque diversa.

N.W. Yunnan. Mekong-Salween divide near A-tun-tsu. 15,000 ft. F. Kingdon Ward. 18th July 1913. No. 798. In Herb. Edin.

A charming dwarf species which is so like *P. dryadifolia*, Franch. in form of foliage that one might at first regard it as a small form of that species. The leaves are however different apart from size in this, that their upper surface is covered with very short hairs which are absent in *P. dryadifolia*, Franch. The whole flower structure is different. The scape bears but one flower and is enclosed in the foliage; in *P. dryadifolia*, Franch. it is pushed out well beyond the leaves. The flower is erect, not slightly nodding. The calyx much shorter than the corolla suffices to tell this species at once from *P. dryadifolia*, Franch. where the corolla is shorter than the calyx.

Primula prionotes, Balf. fil. et Watt.

Epilosa rhizomate *P. sikkimensis*, Hook. paucifolia. Folia petiolata ad 18 cm. longa ad 3 cm. lata; lamina membranacea efarinosa elongata oblonga vel anguste elliptica obtusa vel acuta margine regulariter dentato-serrata subtus pallidior basi cuneatim abrupte vel gradatim in petiolum vix alatum vix vaginatum laminam aequantem attenuata. Scapus tenuis ad 35 cm. longus apice luteo-farinosus umbellam plurifloram gerens; bracteae angustae conduplicatae ad 9 mm. longae a basi lato sursum attenuatae obtusae vel acutae nunc quasi foliaceae carinatae basique subtus incrassatae; pedicelli filiformes plus minusve farinosi subreflexi. Calyx tubuloso-campanulatus ad 6 mm. longus corollae tubo multo brevior extus 5-costatus glaber plus minusve purpurascens et lineis purpureis striatus ad trientem fissus lobis deltoideo-triangulari-

bus hydathodo corneo terminatis intus dense luteo-farinosis. Corollae purpureae tubus tubuloso-infundibuliformis in flore longistylus ad 1.2 cm. longus supra stamina ampliatus in brevistylus brevior exannulatus intus infra stamina rugosus, limbi concavi luteo-farinosi discus 4 mm. latus, lobi rotundati vel oblongi erecti ad 5 mm. longi paullo emarginati. Antherae fere sessiles 3 mm. longae in flore longistylus basin tubi corollini versus inserta calyce multo breviores, brevistylus ad orem corollae inserta. Ovarium ovoideum superne incrassatum; stylus longus exsertus, brevis vix calycis tubum superans; stigma capitatum.

Planta inter species himalayenses sectionis Sikkimensis floribus purpureis distincta.

Tibet. Karo La. Alt. about 16,500 ft. Capt. H. J. Walton, I.M.S. July 1904. In Herb. Calc.

Sir George Watt recognised the distinctness of this plant as a species and named it on the Calcutta sheets *P. serrata*, sp. nov., but he did not publish a description. Unfortunately the name he suggested has been absorbed by Gusmus for a hybrid *P. minima* × *P. Wulfeniana*, which is not uncommon in gardens. The plant is the first Indian species as yet known of the Sikkimensis Section which has purple flowers, and its occurrence is of interest because we have already from China both a purple and yellow series of this Section. The only specimens known of *P. prionotes*, Balf. fil. et Watt are those collected by Capt. Walton during the Tibet Frontier Expedition in 1904.

Primula pseudomalacoides, L. B. Stewart.

Perennis multiceps pilosa rhizomate tenui foliis rosulatis petiolatis. Folia ad 10 cm. longa; lamina ad 4 cm. longa ad 2.5 cm. lata oblongo-elliptica vel elliptica crassa utrinque pilis albis hirtella subtus albo-farinosa costa media et venis primariis erubescens prominulis apice rotundata margine lobulata lobulis serrato-dentatis dentibus hydathodo corneo terminatis basi abrupta lateribus symmetricis vel asymmetricis sinum vix formantibus vel subcuneatis vel subtruncatis; petiolus lamina duplo-longior erubescens succulentus pilosus evaginans. Scapi plurimi graciles deinde decumbentes ad 40 cm. longi sparsim albo-farinosi verticillos plurifloros plures et umbellam terminalem gerentes; bractae parvae ad 5 mm. longae linearilanceolatae acutae utrinque albo-farinosae; pedicelli filiformes inaequales ad 4 cm. longi albo-farinosi divaricati apice deflexi; anthopodium fere nullum. Calyx ad 5 mm. longus campanulatus dense albo-farinosis tubo intus basi excepto vix ad medium fissus, lobis patentibus longe triangularibus acutis. Corollae

pallide lilacinae luteo-oculatae oculo albo-cincto tubus basi albidus supra flavidus extusque sparsim farinosus in flore brevistylo supra stamina ampliatus infra cylindricus ad 6 mm. longus ad orem lineis strumosis 10 (5 antipetalis majoribus) luteis puberulis annulatus, lobi patuli leviter recurvi obovati aperti profunde emarginati ad 5 mm. longi. Stamina in flore brevistylo ad medium tubi corollini inserta filamentis distinctis antherarum apicibus ab ore circ. 2 mm. remotis. Ovarium globosum; stylus viridis, brevis calycis tubo brevior; stigma parvum globosum.

Microforma *P. malacoidis*, Franch. foliis minoribus haud late cordatis, scapis tenuioribus decumbentibus diversa.

Yunnan. G. Forrest.

P. malacoides, Franch. is a species with a wide distribution from the Shan States of Burma through Yunnan, both North and South. Over its wide distribution it presents a considerable range of variation, and several of its forms have already been described as distinct species. A supply of material sufficient to justify the mapping out of the microform variations of the aggregate is not yet available, but what we have seems to show that the type may be monocarpic or pluricarpic, and some of the monocarpic forms are annual. The forms range themselves in two series: one in which with generally larger leaves are associated tall scapes with many whorls of flowers—of this *P. malacoides*, Franch. is the centre; the other with smaller leaves and shorter scapes with one umbel or one or two whorls of flowers—the type of this is *P. Forbesii*, Franch.

Under the name *P. Forbesii*, Franch. a plant was introduced to cultivation in 1891 by Vilmorin. It was monocarpic annual. The *P. Forbesii*, Franch. of cultivation at the present day is pluricarpic perennial forming stout rhizomes. It may be that two different microforms have been cultivated under the name.

Plants of the larger-leaved tall-scaped type we owe in cultivation to Bees, Ltd., raised from seed collected by George Forrest. The first plants raised and flowered—see figure in *Gardeners' Chronicle*, Ser. 3, 44 (1908), 396, figs. 164, 165—belonged to the microform here described, not to the true *P. malacoides*, Franch. as that is shown in the Paris Herbarium and as it appeared later in plants raised also from Forrest's seed. A distinction between the microforms was not made by Mr. Forrest in the field—and small wonder. Their difference was first noticed in cultivation by Mr. Laurence B. Stewart, who gave the name *P. pseudomalacoides* to the microform. It is a slenderer plant than true *P. malacoides*, Franch. with leaves which remain more prostrate and have the oblong rather than the ovate form; the flowers are

smaller. As yet the thrum-eyed plant only of *P. pseudomalacoides*, L. B. Stewart has been seen, and no seed has been obtained from it except by crossing with true *P. malacoides*, Franch. It is readily propagated by division. The fact that it crosses easily with *P. malacoides*, Franch. means that already in cultivation numerous progeny exist which must be the result of such crossing, and the distinction between the forms easily made when the true forms are seen side by side may not be generally recognised.

***Primula pulchelloides*, F. K. Ward.**

Epilosa foliis floribusque coaetaneis. Folia ad 3.5 cm. longa ad 10 mm. lata lineari-lanceolata subcrassa supra smaragdina subtus dense luteo-farinosa apice obtusa margine vix revoluta subtiliter et late serrato-crenata basi longe angustata et subpetiolata. Scapus rigidus ad 18 cm. altus saepius minor farina lutea conspersus umbellam multifloram (ad 8) erectam gerens; bracteae virides plus minusve luteo-farinosae exteriores a basi lata acuminatae vel lineari-subulatae ad 1 cm. longae auriculatim vaginatae pedicellum amplexantes; pedicelli rigidi ad 2.5 cm. longi saepius breviores sparsim luteo-farinosi; anthopodium obconoideum 1 mm. longum viride ab flore subtiliter constrictum. Calyx viridis ad 8 mm. longus fere ad medium fissus, tubo angulato intus efarinoso extus luteo-farinoso costis exceptis lobis lanceolatis vel elongato-triangularibus aequalibus acutis carinatis crassis corollae tubo adpressis intus ac extus carina excepta luteo-farinosus. Corollae pallide violascentis fauce aurantiaca tubus cylindricus in flore brevistylis supra stamina ampliatus 1 cm. longus stramineus efarinosus vel farina lutea conspersus intus minutissime puberulus transverse rugosus annulatus annulo 10-lobulato, limbi patentis discus vix 1 mm. latus, lobi ad 7 mm. longi obcordati vel oblongo-obovati firmi bilobatulis segmentis integris extus plus minusve luteo-farinosi. Stamina filamentis brevissimis et antheris 2 mm. longis floris longistylis prope basin tubi corollini inserta apicibus antherarum ab annulo 6 mm. remotis, brevistylis 1 mm. ab annulo. Ovarium magnum dolioforme 2.5 mm. longum stylopodio umbraculiformi incrassatum; stylus longus fere tubum corollae aequans brevis calyce brevior; stigma discoideum umbilicatum vix crenulatum pallide viride. Capsula 8 mm. longa 1.5 mm. lata ultra calycem haud aucta extensa cylindrica pallide brunnea laevigata ab apice calyptratim incrassata valvis 5-10 ad medium dehiscens; columna placentifera angusta. Semina plana ellipsoidea 0.75 mm. longa minute tuberculata.

Ex affinitate *P. pulchellae*, Franch. sed minor foliis angustioribus et floris colore distincta.

N.W. Yunnan. A-tun-tsu. 13,000 ft. July 1911. F. Kingdon Ward. In Herb. Edin.

A plant now in cultivation from seeds sent by Ward to Bees, Ltd. It is quite a good plant, but not the equal of *P. pulchella*, Franch. in depth of colour of foliage or flower. It is a smaller species than *P. pulchella*, with which it has many points of resemblance. The narrower smaller leaves easily distinguish it.

***Primula rhodantha*, Balf. fil. et W. W. Sm.**

Efarinosa epilosa radicibus ramosissimis gracillimis foliisque petiolatis rosulatis erectis vel subpatulis sub anthesi squamis elongatis paucis alabastris cinctis. Folia floribus coaetanea ad 7 cm. longa saepe in rosulis parvulis multo minora; lamina crassiuscula elliptica vel oblongo-elliptica vel anguste obovata vel oblanceolata ad 3 cm. longa ad 1 cm. lata apice obtusa vel rotundata margine subcartilaginea plus minusve denticulata subtus pallidior utrinque minute foveolato-glandulosa et saccis tanniferis punctata basi in petiolum ad 5 cm. longum anguste alatum et longe vaginantem cuneatim breviter contracta vel in petiolum brevem vix distinctum attenuata. Scapus foliis brevior et immersus vel ea subaequans ad 6 cm. altus robustus umbellam ad 8-floram (rarius 1-) gerens; bracteae ad 3.5 mm. longae a basi lata rotundata et subinflata cucullata rugosa lanceolato-acuminatae vel caudato-acuminatae saccis tanniferis punctatae infra carinatae et sacco brevi vix 1 mm. longo rotundato appendiculatae; pedicelli stricti erecti graciles ad 1.3 cm. longi; anthopodium longum obconoideum. Calyx ad 5 mm. longus cylindrico-campanulatus sparsim punctatus et erubescens ad trientem fissus, lobis elongato-triangularibus acutis. Corollae roseae tubus infra anguste cylindricus supra stamina expansus ad 9 mm. longus extus glaber intus supra stamina puberulus obscure rugosus ad orem strumis anti-petalinis notatus limbi concavi discus ad 2 mm. latus, lobi obovati ad 5 mm. longi ad medium fissi. Stamina filamentis conspicuis et antheris 1.5 mm. longis in flore brevistylis apicem tubi corollini versus antherarum apicibus ab ore 1.5 mm. inserta, in flore longistylis in triente infimo tubi corollini calyce inclusa inserta. Ovarium oblongo-ovoideum in triente superiore incrassatum; stylus brevis tubum calycis subaequans, longus tenuis tubo corollino dimidio-brevior calyce dimidio-longior; stigma ovoideum.

P. roseae, Royle affinis, habitu, foliis petiolatis, scapo vix foliis longiore, pedicellis tenuibus et notis aliis distincta.

Afghanistan. Kurram Valley. Shéndtoi, ravine at 9000-10,000 ft. Very local. Aitchison. No. 462. 1879. In Herb. Kew. et Calc.

Afghanistan. Kurrum Valley. Harsukh. No. 14,931. In Herb. Duthie.

Aitchison says of this plant, which he places as a variety of *P. rosea*, Royle: "This variety has each flower supported on a long slender pedicel, and the tube of the corolla is longer and narrower than that of the type." This is a just diagnosis, and the plant, whilst of the *P. rosea*, Royle, aggregate, is so distinct that its specific distinction is warranted. See p. 23.

***Primula riparia*, Balf. fil. et Farrer.**

Parva vix rhizomata foliis paucis petiolatis. Folia ad 7 cm. longa; lamina ad 2.5 cm. longa ad 2 cm. lata cordata vel late ovata vel subrotundata margine lobulato-dentata lobulis crenulatis pilis longis fimbriata sinu angusto supra albido-pilosula subtus pilis longis albis praesertim ad venas hirsuta; petiolus laminam superans vel aequans exalatus lanato-hirsutus vagina brevi. Scapus folia excedens ad 9 cm. longus viridis infra plus minusve pubescens superne glanduloso-puberulus nunquam barbatus umbellam paucifloram (ad 5) gerens; bracteae parvae ad 5 mm. longae a basi lineari-lanceolatae virides glanduloso-puberulae obtusae; pedicelli tenues erecti ad 2 cm. longi glanduloso-puberuli; anthopodium parvum discoideum. Calyx ad 6 mm. longus campanulatus extus sparsim glanduloso-puberulus tubo laete viridi venuloso ultra medium fissus lobis oblongis vel elongato-ovatis subacutis venulis conspicuis striatis ad apicem hydathodo immerso terminatis. Corollae lilacinae tubus flavescens calyce paullo longior ad 7 mm. longus membranaceus extus sparsim glanduloso-puberulus intus haud rugosus supra stamina puberulus annulatus annulo magno lobis 10 luteis antipetalis lobulis minoribus interpetalis conjunctis, limbi plani discus ad 1 mm. latus, lobi aperti obcordati ad 5 mm. longi divaricatum bifidi. Stamina filamentis latis et antheris 1.25 mm. longis supra medium tubi corollini inserta antherarum apicibus fere ad orem attingentibus. Ovarium ovoideum; stylus tubum corollae aequans; stigma parvum stylo paullo latius lobulatum.

Species a *P. neurocalyce*, Franch. scapo, bracteis, pedicellis, calyce glanduloso-puberulis nunquam lanato-hirsutis distinguenda.

Kansu. Farrer and Purdom. No. 33. 1914. *P. obconica* microform. Twice seen only: first, three clumps beside a little watercourse above the wicked and murderous village of Chago, and again, more freely, on one little shady coppiced bank below, at 7000–8000 ft. May 6, 8, 1914. In Herb. Edin.

Primula riparia, Balf. fil. et Farrer is a close ally of *P. neurocalyx*, Franch. differing chiefly in the absence of the woolly coating to the scape, bracts, pedicels, and calyx. In

P. neurocalyx, Franch. the flower at the anthopode is densely bearded. The question arises—Is *P. riparia*, Balf. fil. et Farrer to be considered as a microform of *P. neurocalyx*, Franch.? In the Obconico-Listeri series we know of such microforms, and it may be we have a like condition here. The plants are certainly much alike.

***Primula rosiflora*, Balf. fil. et W. W. Sm.**

Efarinosa epilosa rosulata foliis paucis petiolatis patulis. Folia ad 3.5 cm. longa; lamina crassiuscula elliptica vel oblonga ad 2 cm. longa ad 1 cm. lata elliptica vel oblonga obtusa margine obscure remoteque denticulata utrinque saccis tanniniferis punctata deorsum in petiolum alatum laminam subaequantem vel ea breviorē gradatim attenuata. Scapus brevissimus vix ad 3 mm. longus umbellam ad 4-floram foliis immersam gerens; bracteae ad 5 mm. longae basi latae auriculatae cucullatae sursum lanceolato-acuminatae membranaceae infra sacco gibboso brevi instructae; pedicelli ad 1.5 cm. longi tenues erecti divaricati; anthopodium longum obconoideum. Calyx anguste campanulatus viridis vel paullo erubescens ad vel ultra medium fissus, lobis oblongis vel oblongo-lanceolatis acutis. Corollae roseae tubus anguste cylindricus in flore brevistylō 1.4 cm. longus tenuiter membranaceus vix rugosus supra stamina paullo ampliatus puberulus ad orem annulatus annulo delicato 10-lobato, limbi discus 1.5 mm. latus, lobi aperti obcuneati 7 mm. longi profunde divaricatim bifidi segmentis nunc sectilibus. Stamina in flore brevistylō filamentis brevibus et antheris angustis 2 mm. longis apicem tubi corollini versus antherarum apicibus 2.5 mm. ab annulo remotis inserta. Ovarium globosum stylopodio incrassato 5-areolato coronatum; stylus brevis 2 mm. longus calyce brevior; stigma ovoideum integrum.

Species ex affinitate *P. roseae*, Royle, *P. elegantis*, Duby et *P. rhodanthae*, Balf. fil. et W. W. Sm. scapo brevissimo, pedicellis longis, et corolla lobatim annulata distinguenda.

Chitral. 4900 ft. Harriss. No. 16,334. 4th June 1895. In Herb. Kew. et Edin.

Chitral. 5200 ft. Harriss. No. 16,335. 7th June 1895. In Herb. Calc.

Chitral. 10,000 ft. Gilg. In Herb. Kew.

Duthie has labelled this plant on the herbarium sheet as a variety of *P. rosea*, Royle and it is a member of that aggregate, but it is definitely diagnosed by the extremely short scape and the well-developed annulus in the corolla. See p. 23.

***Primula rupicola*, Balf. fil. et Forrest.**

Luteo-farinosa puberula rhizomate multicipite crasso foliis plurimis siccis vetustis oblecto. Folia petiolata ad 10 cm. longa

plerumque minora; lamina membranacea oblongo-lanceolata vel anguste obovata vel anguste elliptica ad 3 cm. longa ad 1.5 cm. lata obtusa margine subsinuata grosse irregulariter dentata vel bidentata ciliata deorsum in petiolum alatum laminam aequantem vel ea breviora gradatim attenuata supra molliter puberula subtus molliter pubescens praesertim ad venas et juventute dense maturitate sparsim aureo-farinosa. Scapus ad 9 cm. altus plus minusve puberulus vel farinosus umbellam erectam ad 8-floram gerens; bracteae lineari-subulatae ad 1 cm. longae basi vaginatae subtusque paullo incrassatae extus sparse intus dense luteo-farinosae; pedicelli bracteis longiores ad 2 cm. longi graciles stricti plus minusve luteo-farinosi vel puberuli; anthopodium conspicuum obconoideum. Calyx 8–10 mm. longus globoso-campanulatus 5-costatus costis intense viridibus vel purpurascens intervallis pergamentaceis pallidioribus extus plus minusve farinosus vel puberulus intus dense luteo-farinosus ad trientem vel dimidium fissus lobis lanceolatis acutis ciliatis. Corollae roseae (Forrest) flavo-oculatae tubus albidus 1.2–1.4 cm. longus purpureo-venosus in flore brevistylis cylindricis supra stamina ampliatus in flore longistylis infundibuliformis extus sparsim farinosus intus pubescens et annulo lobato instructus, limbi discus concavus 2 mm. latus pubescens, lobi patuli obovati vel obcordati 8 mm. longi bifidi. Stamina filamentis brevissimis antheris latis 1.5 mm. longis in flore brevistylis in triente superiori tubi corollini ultra calycem inserta antherarum apicibus 3 mm. ab annulo remotis, in flore longistylis basin tubi corollini versus inserta calycis tubo inclusa. Ovarium ovoideum in triente superiore incrassatum; stylus brevis calycis tubum vix superans, longus tubo corollae quadrante brevior; stigma magnum globosum. Capsula ad 5 mm. longa cylindrica calyce membranaceo brunneo-punctato extus puberulo intus farinoso inclusa ab apice valvis 5 obtusis brunneis nitentibus dehiscens; placenta breviter stipitata oblonga. Semina vix 1 mm. longa oblonga angulata rufo-brunnea testa obscure areolata.

Species forsan *P. Souliei*, Franch. affinis.

Yunnan. Mountains in the N.E. of the Yangtze bend. Lat. 27° 45' N. Alt. 12,000 ft. Plant of 3–7 inches. Flowers rose, eye yellow. On boulders and open stony pastures. G. Forrest. No. 10,338. July 1913. In Herb. Edin.

This is one of the section of Primulas with angular ribbed calyx and non-gibbous bracts which have a hardened cushion more or less developed. It has also a well-developed annulus. For the present I put it in the Section Souliei.

Primula sciophila, Balf. fil. et Ward.

Perpusilla radicibus rubris pilosa dense caespitosa; rhizoma foliis siccis praeteritis obtectum. Folia petiolata rosulata ad 1.8 cm. longa; lamina orbicularis vel oblonga ad 7 mm. diam. petiolo duplo-brevior inciso-dentata dentibus acutis basi cuneata in petiolum longum anguste alatum attenuata, subtus luteo-farinosa. Scapus brevissimus 1-2 mm. longus uniflorus 2-bracteatus luteo-farinosus; bractee luteo-farinosae inaequales alternae inferior major ad 1 cm. longa pedicellum calycemque aequans vel brevior foliacea petiolata lamina anguste oblonga acuta gradatim in petiolum ligulatum aequilongum attenuata, superior minor nunc squamiformis nunc inferiori similis et subaequans; pedicellus foliis brevior luteo-farinosus ad 5 mm. longus; anthopodium discoideum. Calyx poculiformis nigro-costatus ad 6 mm. longus ad medium fissus extus intusque luteo-farinosus lobis oblongis acuminatis sparsim nigro-venosis. Corollae purpureo-lilacinae tubus venis nigro-purpureis striatus fauce extus minutissime puberulus intus pulvino denso pilorum alborum oclusus, in flore brevistylis 1 cm. longus angustus cylindricus sursum ampliatus infra glaber basin versus rugosus in flore longistylis 8 cm. longus latior intus plus minusve pilis ubique vestitus, limbi patuli lobi obcuneati bifidi segmentis divaricatis. Stamina antheris vix 1 mm. longis filamentis brevibus in flore brevistylis sub pulvino hirsuta, in longistylis ad basin tubi corollini supra ovarium inserta. Ovarium globosum; stylus longus exsertus, brevis calyce dimidio-brevior; stigma capitatum.

Sectionis *Bella* species ex affinitate *P. bellae*, Franch. et *P. nanobellae*, Balf. fil. et Forrest bractearum forma et dispositione omnino differt.

Upper Burma. Ridge of Naung Chaung—Nwai divide. Growing in masses under shade of granite cliffs or in crevices of rocks with moss. Damp and dark situations, exposed ridge. Alt. 13,000 ft. Rare, only one patch seen. Flowers pale or dark purple lilac. F. Kingdon Ward. No. 1784. 15th July 1914. In Herb. Edin.

This species at a casual glance might well pass for the microform of *P. bella*, Franch. which is named *P. nanobella*, Balf. fil. et Forrest but close examination shows that, whilst it has the pompon of occluding hairs of the *Bella* type, it has an altogether different form and arrangement of the bracts. To *P. coryphaea*, Balf. fil. et Ward another Burmese plant, it is related, but that plant is much smaller, and has bracts of a different form and disposition. It is a link between the Chinese *P. bella*, Franch. and the Bhutan *P. indobella*, Balf. fil. et W. W. Sm.

***Primula seclusa*, Balf. fil. et Forrest.**

Herbacea villosa foliis petiolatis. Folia ad 25 cm. longa; lamina tenuiter membranacea rotundato-cordata ad 15 cm. diam. sinuato-lobata margine ciliata hydathodis corneis denticulata sinu basali aperto utrinque pilis mollibus longis vestita; petiolus fere lanatus laminam aequans. Scapus robustus ad 40 cm. altus villosus verticillos 2-3 distantes 6-9-floros gerens; bracteae membranaceo-foliaceae lineari-lanceolatae acutae villosae ad 1.5 cm. longae; pedicelli validi villosi bracteae longiores. Calyx campanulatus viridis ad 11 mm. longus post anthesin accrescens corollae tubum aequans molliter villosus ad medium fissus lobis inaequalibus lanceolatis acutis hydathodo terminatis pluriveniis. Corollae rubrae tubus ad 11 mm. longus obliquus tenuiter membranaceus non rugosus annulo angusto, lobi obovati fimbriati ad 2 mm. longi apice fissi. Stamina ad medium tubi corollini inserta antherarum apicibus ab annulo circ. 2 mm. remotis. Ovarium globosum; stylus calyce brevior staminibus aequilongis. Capsula calyce lignoso prominenter venuloso inclusa.

P. molli, Nutt. proxima foliorum calycisque magnitudine distinguenda.

Yunnan. Shweli-Salween divide. Alt. 10,000 ft. Lat. 25° 10' N. In shady thickets. May 1913. G. Forrest. No. 12,059.

Upper Burma. Near Feng-shui-Ling pass, divide between Irrawaddy system and head waters of Shweli. 8000 ft. In damp deeply shaded situations in the rain forest (also on a clay bank amongst undergrowth by the roadside, less heavily shaded). Flowers deep crimson in centre, fading irregularly to paler crimson on lobes. Corolla slightly oblique. Flowers June-July. F. Kingdon Ward. No. 1632. 4th June 1914.

A large coarse-leaved plant with many bright flowers.

***Primula sinomollis*, Balf. fil. et Forrest.**

Herbacea rhizomate carnosio ramoso vaginis foliorum praetectorum oblecto. Folia petiolata ad 15 cm. longa; lamina late elliptica cordata vel subrotundato-cordata ad 10 cm. diam. coriacea margine subrevoluta obscure sinuato-lobata hydathodis denticulata sinu basali aperto supra areolato-sulcata breviter pilosa subtus intricato-venulosa venis prominulis hirsutis; petiolus lamina brevior crassus erubescens dense hirsutus basi expansus. Scapi plurimi ad 30 cm. alti tenues erubescens villosi post anthesin saepe decumbentes umbellam terminalem et verticillos plurimos (ad 10) 4-6-floros inter se distantes gerens; bracteae parvae ad 8 mm. longae lineari-lanceolatae acuminatae glanduloso-pilosae; pedicelli horizontaliter patentes ad 12 mm. longi stricti filiformes glanduloso-puberuli. Flores

subobliqui. Calyx ad 6 mm. longus pilis longis glandulosis vestitus tubo obconico lineis 5 viridibus nervosis interstitiis albo-membranaceis notato ad medium fissus lobis anguste lanceolatis acuminatis patentibus pluriveniis membranaceo-alatis apice hydathodo terminatis. Corollae annulatae ore intense rubro-purpureo lobis pallidioribus linea purpurea centrali tubus calycem duplo superans tenuis 8-10 mm. longus intus sub lobis prominulis purpureis annuli viridi-lineatus, limbus fere ad basim fissus, lobis ad 9 mm. longis obcordatis integris non ciliatis profunde (ad 3.5 mm.) emarginatis. Antherae connectivo albo lobis purpureis in flore longistylis apicibus ab annulo 3 mm. remotis in brevistylis annulum attingentibus. Ovarium ovoideum viride apice conicum; stylus longus vix tubo corollino brevior, brevis vix calycem aequans; stigma discoideum flavo-viride. Capsula calycem vix auctum paullo superans stylopodio conico coronata valvis crustaceis dehiscens.

Species Sectionis Mollis a *P. cinerascens*, Franch. cui proxima est foliis majoribus rugosis, scapis longis pluri-verticillatis, calycis pilosi sinubus membranaceis differt. A *P. molli*, Hook. scapo tenuiore calyce multo minore notisque aliis distincta.

Yunnan. Western flank of the Salween Valley above Ho-mochu. Lat. 25° 5' N. Alt. 7000 ft. April 1910. G. Forrest, No. 5523. Plant of 6-15 inches. Flowers bright rose, faintly fragrant. Dry shady situations in mixed and pine forests. In Herb. Edin.

Yunnan. Hills to the east of Tengyueh. Lat. 25° N. Alt. 6000 ft. May 1912. G. Forrest. No. 7569. Plant of 6-20 inches. Flowers magenta-rose with eye greenish-white, fragrant. Pasture-land in side valleys. In Herb. Edin.

Yunnan. Shweli-Salween divide. Salween Valley. Lat. 25° 5' N. Alt. 7000-8000 ft. May 1913. G. Forrest. Nos. 9807, 9855. Plant of 12-20 inches. Flowers rose, eye yellow, faintly fragrant. Shady situations in thickets. In Herb. Edin.

Var. *alba*, Balf. fil. et Forrest.

Forma floribus albis oculo roseo.

Yunnan. Side valley on the hills to the east of Tengyueh. Lat. 25° N. Alt. 6000 ft. May 1912. G. Forrest. No. 7619. Sport of and growing with No. 7569. Plant of 18 inches. Flowers almost white with a dark rose centre. Pasture-land. In Herb. Edin.

Primula sphaerocephala, Balf. fil. et Forrest.

Primula capitata, G. Forrest in Notes R.B.G. Edin. ix (1908), 224.

Epilosa. Folia floribus coetanea petiolata ad 12 cm. longa ad 2.5 cm. lata; lamina anguste oblata vel oblanceolata mem-

branacea obtusa vel subrotundata vel subpraemorsa irregulariter eroso-denticulata in petiolum alatum alis integris lamina breviorum attenuata subtus pallidior pulverulenta plus minusve nervulosa venis primariis e costa media albida arcuatim adscendentibus. Scapus ad 30 cm. altus robustus stramineus minute puberulus apicem versus albofarinosus umbellam capituliformem sphaericam multifloram gerens; bracteae albofarinosae exteriores involucentes foliaceae ad 1.4 cm. longae subspathulatae lamina inciso-fimbriata ad 5 mm. lata in petiolum ligulatum basi vix vaginantem et haud incrassatum cuneatim attenuata, interiores ligulatae integrae acutae; pedicelli albofarinosi ad 5 mm. longi sub fructu longiores deflexi; anthopodium obconicum flore abstrictum. Calyx albofarinosus cupula intus excepta ad 4.5 mm. longus tubo vix angulato ultra medium fissus lobis lanceolatis acutis vel acuminatis adpressis aequalibus rarissime posteriori maximo denticulato et purpureo. Corollae extus supra calycem farinosae limbus concavus atropurpureus, tubus extus rufescens ad 9 mm. longus cylindricus supra stamina ampliatus intus purpureus exannulatus supra stamina transverse rugosus infra membranaceus, limbi discus 3 mm. latus, lobi ad 3 mm. longi ad 2.5 mm. lati obcuneati vel subquadrati profunde emarginati nunc sinu apiculato. Antherae angustae connectivo purpureo in flore longistylis a basi corollae 3.5 mm. insertae apicibus ab ore 3.5 mm. remotis, in brevistylis supra calycem inserta apicibus ab ore corollino 1 mm. remotis. Ovarium depressoglobosum; stylus longus calyce longior, brevis calycem subaequans; stigma capitatum lobulatum. Capsula calycis tubo paullo aucto inclusa subturbinata vertice plano operculatim incrassato valvis crustaceis 5 dehiscens. Semina minuta plana margine cellulis aeriferis minute arillata.

Species ex affinitate *P. capitata*, Hook. bracteis petiolatis fimbriatis, corolla exannulata intus purpurea dignoscenda; a *P. pseudocapitata*, Ward (ined.) bracteis incisofimbriatis diversa.

Yunnan. Open marshy places in pine woods on the ascent to Kari Pass between Pung-tzu-la and Shi-zo. Alt. 10,000–14,000 ft. Perfumed. G. Forrest. No. 46. September 1904. In Herb. Edin.

Yunnan. Western slopes of Kari Pass leading into the Chun pa Valley between Pung-tzu-la and Shi-zo. Alt. about 13,000–14,000 ft. Flowers most delicately perfumed. G. Forrest. No. 303. September 1904. In Herb. Edin.

One of the Chinese forms of the Himalayan aggregate *P. capitata*, Hook. One other Chinese form is known up to this time in *P. pseudocapitata*, Ward. Both of them, though easily recognised as nearly allied to the Himalayan forms, can

be readily distinguished by the much smaller corolla limb and the more globular head of flowers.

Primula stolonifera, Balf. fil.

P. farinosa, Linn. ex G. Forrest in Notes Roy. Bot. Gard. Edin. iv (1908) 231.

P. pseudodenticulata, Pax ex Pl. Chinenses Forrestianae, Notes Roy. Bot. Gard. Edin. vii (1912), 84, 91.

Multiceps stolonifera epilosa. Stolones basi nudi ad 6 cm. excurrentes robusti decumbentes in axillis foliorum rosulatum orientes. Folia floribus coetanea ad 8 cm. longa ad 1.5 cm. lata oblanceolata vel anguste obovato-oblonga obtusa tenuiter membranacea efarinosa margine crenato-denticulata vel dentato-serrata vel subserrata deorsum in petiolum lamina brevior alatum alis integris sensim attenuata utrinque laevis costa media subtus albida prominula. Scapus sub anthesi tenuis sub fructu auctus robustus glaber apicem versus plus minusve farinosus umbellam parvam gerens; bracteae minutae exteriores 3 mm. longae elongato-triangulares obtusae subcrassae basi plus minusve farinosae membranaceo-auriculatae infra nec incrassatae nec gibbosae, interiores minores; pedicelli 2-4 mm. longi validi plus minusve farinosi anthopodio turbinato ad 2 mm. longo flore abstricto terminati. Calyx campanulatus plus minusve farinosus 5 mm. longus ad medium fissus lobis oblongis obtusis apice saepe purpurascens. Corollae purpureae tubus 5 mm. longus extus plus minusve farinosus supra stamina ampliatus intus annulo luteo conspicuo instructus et transverse rugosus infra membranaceus, limbi discus 0.5 mm. latus, lobi obovati 4 mm. longi plani profunde bipartiti. Stamina filamenta brevissima antheris ovoideis 1 mm. longis in flore brevistylis prope orem tubi corollini inserta apicibus antherarum anulum attingentibus longistylis ad medium inserta apicibus antherarum ab annulo 2 mm. remotis. Ovarium globosum superne crustaceum; stylus ruber, longus staminibus vix longior, brevis calycis tubo paullo longior; stigma capitatum. Capsula calyce inclusa valvis 5-10 crustaceis dehiscens.

Species aggregatae *P. denticulatae*, Sm. stolonibus esquamatis notata.

Yunnan. Delavay. 1883-1885. In Herb. Paris.

Yunnan. Moist, open situations along the base of the eastern flank of the Tali Range. Lat. 25° 40' N. Alt. 8000-9000 ft. Plant of 4 to 12 inches. Flowers pale rose, eye orange. G. Forrest. No. 1818. April-May 1906. In Herb. Edin.

Yunnan. Moist, boggy situations by sides of streams in the Lichiing Valley, south of the city. Lat. 26° 50' N. Alt.

8200 ft. Plant of 6 to 9 inches. Flowers pale rose-lilac, eye orange, fragrant. G. Forrest. No. 2037. May 1906. In Herb. Edin.

Yunnan. Marshy ground on the hills of La-Mey. Alt. 7350 ft. Flowers violet. E. E. Maire. March. In Herb. Edin.

No other species of the aggregate *S. denticulata*, Sm. shows the robust naked stolons of this plant.

***Primula tanupoda*, Balf. fil. et W. W. Sm.**

Parva farinosa pulverulenta foliis petiolatis. Folia ad 2 cm. longa; lamina subcrassiuscula anguste ovata ad 1 cm. longa ad 7 mm. lata obtusa margine subcartilaginea eroso-crenulata utrinque pulverulenta infra in petiolum laminam subaequantem attenuata. Scapus brevissimus circ. 5 mm. longus validus umbellam 4-floram gerens; bracteae ad 1 cm. longae membranaceae vaginantes rufo-glanduloso-punctatae cucullatae acuminatae basi saccato-gibbosae; pedicelli longissimi 5 cm. longi rigidi; anthopodium discoideum. Calyx ad 8 mm. longus tubulosus 5-costatus intervallis pergamentaceis subpuberulus in trientem fissus lobis elongatis triangularibus minutissime ciliatis. Corollae tubus in flore longistylus cylindricus exannulatus intus sparsim puberulus, limbi discus 2 mm. latus, lobi obovati 7 mm. longi profunde emarginati segmentis divaricatis. Stamina filamentis brevissimis antheris 2 mm. longis ad medium tubi corollini inserta calyce inclusa. Ovarium oblongum; stylus longus validus exsertus; stigma capitatum.

Ex affinitate *P. involucratae*, Wall. et *P. tibeticae*, Watt ab hac foliis, floribus majoribus, et annuli inopia, ab illa foliis pulverulentis crenulatis, scapo foliis breviori differt.

W. Himalaya, Kumaon. Ralam Valley. Inayat. No. 24,647/b. 18th August 1900. In Herb. Kew.

A single specimen in Mr. Duthie's herbarium now at Kew is so different from all other Indian *Primulas* that it is described here as a new species. At first sight it looks something like *P. involucrata*, Wall. but its leaves are farinose and are distinctly cut on the edge. The aspect of the flower is quite that of *P. involucrata*, Wall. but there is no annulus in the corolla tube. It resembles *P. sibirica*, Jacq. in the shortness of the basal sac to the bracts, which is quite unlike that of *P. involucrata*, Wall. From both of these species it is separated by the long flower pedicels arising from a scape so short as to be included in the leaf sheaths. By this it recalls *P. tibetica*, Watt and like that species it is farinose (the books erroneously refer to *P. tibetica*, Watt, as "not

mealy"). Its larger size, want of an annulus, petals not reflexing readily, distinguish it however from *P. tibetica*, Watt. It might be regarded as a North-West Himalayan representative of *P. tibetica*, Watt. On the single specimen available for examination the long pedicels of one of the flowers bears at a short distance below the flower a pair of bracts. This suggested that the specimen might be throughout abnormal and only a short-scaped variation of *P. involucreata*, Wall. or a long-pedicelled and large-flowered *P. tibetica*, Watt or even a *P. sibirica*, Jacq. modified. The chain of characters in the plant is such however that one cannot regard the suggestion as valid. One must hope for more specimens.

***Primula taraxacoides*, Balf. fil.**

Herba glabra aspectu *Taraxaci* collo squamis membranaceis plus minusve farinosis persistentibus alabastri hiemalis vestita foliis floribusque coetaneis. Folia ad 8 cm. longa ad 3 cm. lata membranacea lyrata pinnatifido-runcinata lobis triangularibus inciso-dentatis apice acutis basi in petiolum alatum attenuata. Scapus robustus foliis brevior sub fructu haud auctus superne saepe sparsim farinosus umbellam 8-12-floram gerens; bracteae triangulares acutae basi subgibbosae subfarinosae ad 5 mm. longae pedicellis multo breviores; pedicelli ad 1.4 cm. longi sparsim farinosi vel efarinosi. Calyx ad 5 mm. longus subpoculiformis sparsim glandulosus accrescens lobis ad 1.5 mm. longis triangularibus vel ovatis vel subrotundatis apiculatis. Corollae violaceae tubus 1 cm. longus annulatus, lobi 7 mm. longi late obovati vel rotundati retusi margine breviter dentati. Capsula globosa calyce inclusa.

A *P. sonchifolia*, Franch. ambitu foliorum, scapo foliis breviori, corolla minore differt.

Yunnan. Rocks of Ma long. Alt. 9000 ft. Leaves of *Leontodon*. Flowers violet. Coll. E. E. Maire. In Herb. Edin.

We have yet to learn much of the forms of and allied to *P. sonchifolia*, Franch. This plant seems to have well-marked characteristics within an aggregate of which Franchet's plant is the type.

***Primula Traillii*, Watt, in Journ. R.H.S. xxix (1904), p. 299.**

Epilosa; rhizoma breve crassum alabastro magno albo-farinoso coronatum folia magna vaginantia petiolata gerens et vestigiis foliorum anni praeteriti obtectum. Folia ad 25 cm. longa; lamina membranacea elliptica vel oblonga vel obovato-oblonga 8-14 cm. longa 3-6 cm. lata apice rotundata margine plus minusve denticulata basi gradatim in petiolum crassum laminam aequantem vel ea longiorem basi vagina longa

amplexicauli instructum attenuata, subtus dense albo-farinosa costa mediâ prominula percursa. Scapus robustus ad 25 cm. altus plus minusve albo-farinosus umbellam pauci- vel pluri-floram solitariam gerens nunc florum verticellis 1-2 inferioribus praeditus; bracteae inaequales exteriores ad 1.5 cm. longae lineari-lanceolatae; pedicelli inaequales validi erecti sub anthesi ad 5 cm. longi sub fructu longiores; anthopodium turbinatum. Calyx ad 8 mm. longus campanulatus membranaceus venulosus ultra medium fissus lobis lanceolato-acuminatis margine intusque albo-farinosus. Corollae pallide coeruleae tubus cylindricus membranaceus in flore longistylis ad 1.2 cm. longus intus puberulus annulo 10-lobato prominulo instructus, limbi discus angustus, lobi obovati integri ad 7 mm. longi. Stamina filamentis conspicuis 0.75 mm. longis antherisque 2 mm. longis in flore longistylis infra medium tubi corollini inserta ultra calycem prolongata. Ovarium pyriforme; stylus longus exsertus; stigma ovoideum. Capsula cylindrica rufo-brunnea crustacea 1 cm. longa calyci aucto tamen membranaceo aequilonga et eo inclusa valvis 10 ab apice deorsum plus minusve dehiscens; placenta subcolumnaris stipitata.

Species distincta a *Cl. Watt P. sikkimensi*, Hook. collocata.

N.W. Himalaya. Kangra, Kulu. Sharran Glaciers. Alt. 16,000 ft. Watt. No. 13,495. 18th Oct. 1894. A large, handsome *Primula* growing in the deep shade of large rocks in rich black soil,—dry. Seedlings with rotund leaves. Adult plants about 15-20 inches in height. All the under surfaces densely coated with white farina. It appears to flower in spring and again in autumn. Inflorescence with two or three whorls of flowers borne on long pedicels. Involucre of bracts not spurred linear-lanceolate. Calyx linear-lanceolate acuminate. In Herb. Edin.

This species, named by Sir George Watt in honour of the Rev. J. Traill of Jaipur, is briefly diagnosed by him in the Journal of the Royal Horticultural Society, xxix (1904). A figure and description of *P. involucrata*, Wall. are given under the name *P. Traillii* in the Gardeners' Chronicle, xxii (1897), 263, from plants grown by Mr. George Wilson. The origin of the confusion Sir George Watt thus explains:—"The seed I collected of it [*P. Traillii*] was mixed with the only other *Primula* found in Kulu during that expedition, namely, *P. involucrata*, Wall. on account of the necessity that existed to economise my collecting materials. On the mixed seed reaching Europe it was found that only *P. involucrata*, Wall. germinated, and thus got talked of as *P. Traillii*, Watt." *P. Traillii*, Watt has not yet come into cultivation. The dried specimens promise a good garden plant when it does come.

Sir George Watt finds the affinity of his species in *P. sikkimensis*.

ensis, Hook, in the group of forms within his Section *Purpurea*, which have petals entire or partly emarginate and the throat of the corolla exannulate. In ascribing to *P. Traillii*, Watt an exannulate corolla Sir George Watt's recollection of the plant as he found it ten years previously has not served him well or perhaps he was misled by a somewhat faulty drawing by a native artist of dissected flowers attached to his herbarium sheets. No annulus is shown in these. But I find a conspicuous ten-lobed annulus in the flowers of the dried specimens. It may be that the affinity suggested is correct, but I am not satisfied about it. The form of calyx and corolla seems different—there is the annulus—and then the placental column tends to the globular. Unfortunately the critical seeds are wanting in all the specimens.

Primula Umbrella, Forrest.

Herba parva luteo-farinosa. Folia oblonga ad 3.5 cm. longa 1.5 cm. lata in petiolum brevem latum planum cuneatim attenuata margine infra medium integra supra medium recurvata sursum eximie dentato-serrata dentibus corneo-apiculatis, subtus dense supra sparsim luteo-farinosa. Scapus 5 cm. altus folia longe superans plus minusve luteo-farinosis umbellam 6-8-floram gerens; bracteae 5 mm. longae lanceolatae obtusae margine subinvolutae luteo-farinosae cucullatae pedicellos amplexantes; pedicelli circa 10 cm. longi ab umbone umbellae perinde ac costae umbraculi radiatim subdependentes. Calyx 5-7 mm. longus campanulatus intus viridis dense luteo-farinosis vix ad medium fissus tubo a basi prominenter 5-costato, lobis obtusis corollae adpressis. Corollae lilacinae tubus 10 cm. longus extus farinosus albus vel lilacino-striatus calycem duplo superans, fauce albido-farinosa; limbus ad 2 cm. diametens, lobis latis obcordatis.

P. kialensis Franch. affinis bracteis cucullatis farinosis calyce costato distinguenda.

N.W. Yunnan. 1910. G. Forrest. Collected with *P. membranifolia*.

A species which appears to be a near neighbour of *P. kialensis*, Franch. *P. Umbrella*, Forrest differs from *P. kialensis*, Franch. as described in the much longer scape, obtuse bracts sheathing the pedicels, densely farinose bracts, pedicels, and calyx, costate calyx tube. This dainty species is in cultivation, but is not a rapid grower. The abundance of golden meal all over the plant is characteristic, but the most differentiating mark is found in the inflorescence. The bracts radiate from the top of the scape, each one forming a channel in which a pedicel, twice the length of the bract, lies. The calyx too is

characteristic, with its ridged short sepals. Mealiness extends to the corolla, which is dusted with it outside and at the throat.

Primula Viola-grandis, Farrer et Purdom.

Efarinosa glanduloso-hirsuta foliis longe-petiolatis rosulatis paucis primo erectis demum patulis floribus coaetaneis sub anthesi squamis erectis albidis alabastri basi cinctis. Folia ad 5 cm. longa post anthesin accrescentia; lamina sub anthesi ad 2.5 cm. longa ad 1.5 cm. lata ovato-cordata opaca crassa pallide venulosa obtusa margine integra vel obscure et late crenulata glanduloso-ciliata utrinque pilis albidis mollibus glandulosis vestita et glandulis plurimis capitatis rubris (in fol. sicc.) oblecta; petiolus lamina duplo vel triplo longior validus succulentus glanduloso-hirsutus infra in vaginam elongatam intra alabastri squamas expansus in foliis adultis vix alatus. Scapus ad 12 cm. longus foliis multo longior dense glanduloso-hirsutus infra albidus superne nigro-purpureus ebracteatus uniflorus. Flos magnus subzygomorphus. Calyx breviter cupuliformis ad 6 mm. longus fere ad basin fissus lobis ovato-lanceolatis plerumque nigro-purpureus pilisque glandulosis obsitus. Corollae violaceo-coeruleae tubus cylindricus ultra 3.5 cm. longus pallide purpureus strictus angustus orem versus gradatim expansus extus glanduloso-hirtus intus ubique glaber ad faucem ampliatum albidus, limbi plani obliqui discus purpureus ad 2 mm. latus glanduloso-puberulus, lobi plerumque 6 nunc 5 vel 7 ad 1.4 cm. longi ad 7 mm. lati aperti subspathulati vel obcuneati vel anguste oblongo-obovati basi glanduloso-ciliati emarginati segmentis integris. Stamina ut in *Omphalogramma* sectione filamentis purpureis longis ad 5 mm. longis robustis orem tubi corollini versus convergentibus supra medium inserta; antherae ovoideae subexsertae. Ovarium ovoideum superne conoideum stylo longo filiformi glabro albido paullo exserto terminatum; stigma parvum lobulatum.

Species *P. Engleri*, Knuth similis foliis minoribus crassiusculis longe petiolatis squamis alabastri sub anthesi cinctis, glandulis capitatis foliorum, scapo folia excedente, calyce cupuliformi, corollae fauce albida glabra lobisque angustis emarginatis haud incisus bene distincta.

Kansu. Farrer and Purdom. No. 74. 1914. In Herb. Edin.

The following is Mr. Reginald Farrer's description of the plant as he found it in Kansu:—

"Primula No. 6 *P. Viola-grandis*: Sect. *Omphalogramma*).

"Whole plant clothed in whitish glandular hairs. Leaves appearing with the flowers, and developing further afterwards,

springing in a tuft, about $2\frac{1}{2}$ –5 cm. in length, ovate-cordate, dark green, thick and flannelly, borne on stout petioles as long as the blade, and often twice as long; the lowest diminishing till they are but small oval-rounded pale tabs. Scape $3\frac{1}{2}$ –5 inches, greatly exceeding the leaves, each carrying one very large flower. Calyx a cup, cloven to the base in ovate-lanceolate lobes. Flower rich light violet-blue, of luminous effect, the straight tube more than $3\frac{1}{2}$ cm. in length, glandular, pale-purple, slightly and gradually swelling at base and throat. Lobes of the corolla and calyx usually 6, sometimes 5 or 7: those of the corolla open at first in a small regular star of deep violet, but soon lighten, the three upper lobes now lying stiffly back along the tube, and the three lower standing as stiffly outward, so as to make a strangely Gesneraceous effect. Corolla lobes obovate, usually emarginate. Stamens all gathered at the roof of the tube, over the pistil. Capsule globular (?).

"Distributed locally at high elevations, Siku, Satanee, 9000–10,000, *only* in steep banks of turf-shelves sloping W. or N.W. in soil of red limy loam, rich friable forest compost, or black vegetable mould, sharply drained and loose, getting no moisture but that belonging to the high altitude, and cool exposure that it unalterably affects, haunting the under-side of tussocks, but occasionally spreading even into the fine light scrub of little gale and rhododendron. May and June."

And later he says:—"This noble *Omphalogramma* expands fully in late summer; *very* thick and flannelly leaves of deep dusty opaque green with lighter veins remarkably suggesting those of some fat *Viola* of the 'hirta-group,' but lying out on the ground, too heavy for their flushed fleshy and stalwart peduncles. The capsule is apparently round, the calyx fringed with many teeth; the sp. with its absurd throat, is not at all a free seeder. One rocky shelf, that had been blue with blossom, yielded only some 7–8 seed-stems. Flowers May; seed nearly all gone, Sept. 3."

Photographs of the species, with brief comment upon its beauties, have appeared in the *Gardeners' Chronicle*, lvi (1914), 347.

The plant is an interesting addition to the *Omphalogramma* series. Its nearest ally is *P. Engleri*, Knuth a species collected by Soulié at Tatsienlu. I have not seen specimens of *P. Engleri*, Knuth, and rely entirely upon the technical description as a basis for the differentiation from it of *P. Viola-grandis*, Farrer et Purdom. For purposes of comparison a transcription of Knuth's description of *P. Engleri*, Knuth is given

below.* The diagnostic characters are these:—*P. Engleri*, Knuth has thin papyraceous leaves which are rarely petiolate. Farrer and Purdom say of *P. Viola-grandis*, Farrer et Purdom that the leaves are very thick and flannelly and have fleshy stalwart stalks. The interpretation of Knuth's statement that in his plant the scape is destitute of basal scales is not quite clear. No *Omphalogramma* has scales on the scape, and I must assume that Knuth refers to the bud scales around the foliage leaf tuft. Such scales are distinctly present in *P. Viola-grandis*, Farrer et Purdom. Then Knuth says nothing about any capitate glands interspersed amongst the long white hairs on the leaves of his plant. In *P. Viola-grandis* Farrer et Purdom these are abundant and so evident that no careful describer could miss seeing them. In the dried specimens they are bright red; whether that is the colour in the living leaf I do not know. The scape of *P. Viola-grandis*, Farrer et Purdom is much longer than the leaves. In Knuth's plant the scape is described as only slightly longer than the leaves. Knuth says of *P. Engleri*, Knuth that the calyx is widely campanulate. That hardly fits *P. Viola-grandis*, Farrer et Purdom where the calyx tube is a shallow cup. Lastly, in the corolla—the throat in *P. Engleri*, Knuth is said to be densely puberulous with short hairs—its colour is not mentioned; in *P. Viola-grandis*, Farrer et Purdom the throat is hairless and is whitish. The corolla lobes of *P. Engleri*, Knuth are broadly obovate and retuse slightly incised. In *P. Viola-grandis*, Farrer et Purdom they are narrowly obovate or spatulate and are emarginate with entire segments. The sum of characters suffices to justify the naming of Mr. Farrer's plant as a new species, and its area, it will be noted, is some distance from that of *P. Engleri*, Knuth.

Mr. W. W. Smith, who has a first-hand knowledge of the

* "*Primula Engleri*, R. Knuth, in *Botanische Jahrbücher*, xxxviii, (1907) 340.

"Parce pubescens pilis mollibus hyalinis, albidis vel lutescenti-albidis. Foliorum lamina 3-5 cm. longa, usque 2 cm. lata, oblongo-ovata, basi rotundata, rarius in petiolum $\pm$ abrupte attenuata, tenuiter papyracea, apice rotundata, integra; petiolus quam lamina 2-3-plo longior, alatus, 6-9 cm. longus, in sicco, 2-4 mm. latus, pilis articulatis pubescens. Scapus cum foliis coaetaneus, ebracteatus, uniflorus, pubescens, squamis basilibus plane destitutus, cum flore folia paullo superans, non raro aequans. Calycis late campanulati, profunde partiti laciniae 5 mm. longae, oblongo-lanceolatae, obtusiusculae, integrae, glandulis stipitatis satis dense obsitae. Corollae tubus extus pilosulus, intus glaber, 25 mm. longus, quam calyx circ. 5-plo longior, infundibuliformis, partibus inferiore et media aequilatus, parte summa satis abrupte in limbum ampliatus; faux pilis brevibus dense puberula; lobi purpurei, late obovati, apice retusa leviter incisi. Stylus filiformis, corollae tubum vix superans, glaber.

"Ost-Tibet: Ta-tsien-lu (Soulié a. 1894, n. 2237). Typus in Herb. Berol.!

"Species certe ad sectionem *Omphalogramma* pertinens, differt scapo squamis destituto a *P. vinciflora* et *P. Elwesiana* et *P. Delavayi*. Corollae longitudine et latitudine autem facile distinguitur a *P. Franchetii*."

Omphalogrammas in *P. Elwesiana*, King, in Sikkim, to whom I have shown the specimens, concurs in the view expressed of the relationship of *P. Viola-grandis*, Farrer et Purdom and *P. Engleri*, Knuth.

Farrer and Purdom's plant has some resemblance to *P. vincaeflora*, Franch. but is altogether less robust, and the long petioled leaves separate them at sight.

Franchet first pointed out the distinctness of these forms from *Primula*, and definitely in 1898* he constituted the genus *Omphalogramma* for them, having previously in 1885† been content to place them as a section under *Primula*. Pax in 1889‡ kept up Franchet's group as a section of *Primula*, renaming it *Barbatae* on the trivial ground that, as seed was known in only one of the three species recognised at the time, the name might not be descriptively accurate of the others. In his monograph of 1905§ Pax reverts to Franchet's name *Omphalogramma*, but keeps the group as a section of *Primula* notwithstanding Franchet's advocacy in his paper of 1898 of its claim to generic rank.

I have had opportunity to examine specimens of all of the known species excepting *P. Engleri*, Knuth. The labours of Forrest and Ward in China and of Cave and Cooper in Sikkim have furnished an ample supply of dried specimens, and through Forrest and Cave we have now living plants in the Royal Botanic Garden, Edinburgh, of *P. Delavayi*, Franch., *P. Elwesiana*, King, *P. Franchetii*, Pax, and *P. vincaeflora*, Franch. *P. Franchetii*, Pax in fruit is still unknown in Europe. The more I examine the plants, the more convinced I am that Franchet is right in treating *Omphalogramma* as a genus separate from *Primula*. I do not lay stress upon vegetative features—their general characters occur in true *Primulas*, for instance, in *P. Gammieana*, King, in *P. Gambeliana*, Watt and others of the so-called *Cordifolia* section. The flower and seed characters give quite definite diagnostic marks of generic value, and these are:—

- (a) The flower is zygomorphous.
- (b) The numerical symmetry of perianth and androecium—the whorls have commonly six parts, but may be up to eight, and occasionally five.
- (c) The stamens have long stout filaments with the anterior ones bending across the corolla tube to complete the cone of anthers at the corolla mouth.
- (d) Seeds flat with a broad wing-aril.

* Franchet in Bull. Soc. Bot. Fr. xlv (1898), 179.

† Ibid., xxxii (1885), 272.

‡ Pax in Engl. Jahrb. x (1889), 209.

§ Pax, *Primul* in Engler's *Pflanzenr.* (1905), 109.

The differences from *Primula* are much greater than some of those which separate other genera from it—take, for instance, *Androsace* or *Cortusa*.

The genus of *Primulaceae* to which *Omphalogramma* shows most resemblance is the monotypic *Bryocarpum* which in its species, the yellow-flowered *B. himalaicum*, Hook. f. et Thoms. is a well known Sikkim plant and is now in cultivation. The whole facies of *Bryocarpum* is that of *Omphalogramma*—the petiolate ovate leaves arising within a sheath of scales, the long ebracteate scape with one large terminal oblique flower, the numerical symmetry of the flower, 5-8 parts in the whorls, the calyx cut into narrow segments to the base, the long corolla tube and lobes. Its differences are the less hirsute covering, the stamens with short filaments and longer acuminate anthers, the long cylindric capsule many times the length of the calyx and opening by a stylopodial lid beneath which are found some short valves—in *Omphalogramma* it is always short ovoid with the upper quarter extruding from the calyx and dehiscing from the style base right down often to the base,—lastly, the oblong ellipsoid seeds with areolate surface. A subordinate character: the ovary of *Bryocarpum himalaicum*, Hook. f. et Thoms. has a sparse coating of red capitate glands. I have seen nothing of this in *Omphalogramma*. Those who wish to sink *Omphalogramma* would place it more conveniently in *Bryocarpum* than in *Primula*.

Were I to write a monograph of *Primula* I should exclude *Omphalogramma*. As I am not doing so, I add here the names of the plants that are involved in this *Primula*-*Omphalogramma* discussion, giving them their specific designation under both genera:—

- Primula Elwesiana*, King (1882) = *Omphalogramma Elwesiana* (King), Franch. (1898).
- Primula Delavayi*, Franch. (1885) = *Omphalogramma Delavayi*, Franch. (1898).
- Primula vincaeflora*, Franch. (1887) = *Omphalogramma vincaeflora*, Franch. (1898).
- Primula Franchetii*, Pax (1905) = *Omphalogramma Souliei*, Franch. (1898).
- Primula Engleri*, Knuth (1907) = *Omphalogramma Engleri* (Knuth), Balf. fil. (1915).
- Primula Viola-grandis*, Farrer et Purdom (1915) = *Omphalogramma Viola-grandis*, Farrer et Purdom (1915).

***Primula Waddellii*, Balf. fil. et W. W. Sm.**

Pusilla caespitosa efarinosa epilosa. Folia circa 1 cm. longa spathulata crassa; lamina ad 3 mm. lata apice rotundata margine

crenulata nunc denticulata. Scapus brevissimus 1.5 mm. longus puberulus uniflorus; bractea singula minuta subulata subcalycina; pedicellus sub-nullus. Calyx 5 mm. longus anguste poculiformis puberulus lobis a basi lanceolatis acutis. Corollae tubus 1 cm. longus fauce exannulata granulosa, lobi obovati 6 mm. longi subcrassiusculi profunde bifidi. Stamina floris longistyli ad medium tubi corollini inserta. Stylus brevis vix 1 mm. longus.

Ex affinitate *P. Stirtonianae*, Watt foliis spathulatis crassis crenulatis nonnunquam dentatis apice rotundatis, flore solitario sessili, scapo puberulo brevissimo 1.5 mm. longo bracteam parvam unam subulatam subcalycinam gerente, calyce puberulo 5 mm. longo fere ad basin fissio divergens.

Tibetan Plateau, N.W. of Tangla. Alt. 15,000 ft. Waddell. No. 34. June 1891. In Herb. Calc.

Tibet, N.W. Chumbi below Ghora La. Alt. 15,000 ft. Waddell. No. 78. June 1891. In Herb. Calc.

The material of this plant in the Calcutta Herbarium is scanty, but suffices to indicate that the plant has not yet been described.

The plant has in some ways a resemblance with *P. Stirtoniana*, Watt but its foliage is not the same. The leaves are truly spathulate, and have a crenulate margin which is, however, sometimes dentate, but the leaf has never the obcuneate form and somewhat truncate apex of that of *P. Stirtoniana*, Watt. The nearly sessile flower and small subulate bract just below the calyx are also different from what is found in *P. Stirtoniana*, Watt and the calyx is much smaller, as is the whole flower. It may be, however, that this is a microform of *P. Stirtoniana*, Watt.

Primula Waltoni, Watt ex scheda in Herb. Calc.

Elata luteo-farinosa epilosa foliis paucis petiolatis. Folia ad 30 cm. longa; lamina oblonga ad 20 cm. longa ad 7 cm. lata membranacea rugosa obtusa margine sinuata eroso-dentata basi petiolo vix alato ad 6 cm. longo instructa costa media prominula venis primariis patulis percursa venuloso-reticulata subtus plus minusve luteo-farinosa utrinque glanduloso-foveolata. Scapus ad 7 dm. altus sub fructu altior robustus plus minusve luteo-farinosus umbellam magnam plurifloram gerens; bractee inaequales exteriores ad 1.5 cm. longae a basi 3 mm. lata sursum in setam terminalem attenuatae luteo-farinosae basi subtus plus minusve pulvinatim incrassatae; pedicelli inaequales ad 10 cm. longi validi flexiles plus minusve luteo-farinosi; anthopodium obconoideum conspicuum. Calyx ad 7 mm. longus poculiformis 5-costatus extus dense luteo-farinosus ad trientem fissus lobis elongato-triangularibus acutis basi

subinflatis apice reflexis intus dense luteo-farinosis. Corollae violaceae tubus in flore brevistylis ad 1 cm. longus cylindricus supra stamina ampliatus in longistylis brevior intus paullo transverse rugosus exannulatus fauce puberulus, limbi discus concavus 3 mm. latus, lobi breves ad 4 mm. longi obcordati leviter emarginati. Stamina filamentis brevibus antherisque 2 mm. longis in flore longistylis basin tubi corollini versus ovarium juxta inserta calycis tubo inclusa, in flore brevistylis fere exserta. Ovarium oblongum in dimidio superiore incrassatum; stylus longus exsertus, brevis calycis tubum vix superans; stigma globosum. Capsula cylindrica ad 1 cm. longa ultra calycem auctum crustaceum quadrante projecta ab vertice valvis 5 crustaceis brevibus brunneis ad apicem sepalorum dehiscens; placenta cylindrica; semina nigro-brunnea saponis aspectu oblonga ad 1.5 mm. longa angulata; testa fere laevis.

Species foliorum inflorescentiae seminisque aspectu *P. sikkimensis*, Hook. persimilis sed corollae calycisque forma longe recedit.

Tibet. Hills above Lhasa. Walton. Aug. 1904. In Herb. Calc.

A fine species, to which Sir George Watt has attached this name in the Calcutta Herbarium, but without publishing a description, and it is not mentioned in his Observations on Indian Primulas in the Journal of the Royal Horticultural Society, xxix (1904), 295. Its position is, I think, in the Sikkimensis series, where it is one of the exceptional lilac-flowered Indian species. There are two sheets of it only in the Calcutta Herbarium. Collectors should search for it.

Primula Wardii, Balf. fil.

P. sibirica, Jacq. var. *chinensis*, Hort. Veitch.

Paludicola caespitosa efarinosa epilosa. Folia petiolata ad 4 cm. longa; lamina oblonga ad 1-4 cm. longa (rarissime 6) ad 1.5 cm. lata obtusa integerrima vel obscure denticulata basi in petiolum anguste alatum longe vaginantem laminam aequantem vel ea duplo-longiorem breviter attenuata subcrassiuscula glaberrima. Scapus validus ad 25 cm. altus glaber umbellam 2-10-floram gerens; bractee foliaceae involucrantes cucullatae ad 1.5 cm. longae ad 5 mm. latae plurinerviae costa media prominula hydathodo immerso conspicuo terminatae basi in appendiculam oblongam bractee ipsi fere aequilatae et ea dimidio brevioribus obtusam rotundatam vel truncatam adpressam vel leviter divaricatam; pedicelli ad 2 cm. longi obscure glandulosi plus minusve nutantes; anthopodium discoideum 5-lobatum. Calyx ad 1 cm. longus corollae tubo brevior tubulosus 5-angulatus intervallis per-

gamentaceis obscure glanduloso-punctatus ad trientem fissus lobis triangularibus obtusis margine ciliatis. Corollae roseae vel violaceae tubus cylindricus supra stamina ampliatus in flore brevistylis ad 1.4 cm. longus in flore longistylis brevior membranaceus leviter rugosus luteo-annulatus annulo 10-lobato lobis per paria antipetalis, limbi plani discus 1.5 mm. latus, lobi obovati profunde et late bifidi subcrenulati. Stamina filamentis brevissimis et antheris magnis ad 3 mm. longis in flore brevistylis ad orem tubi corollini antheris semiexsertis in flore longistylis infra medium antheris calyce inclusis inserta. Ovarium ovoideum dimidio supremo incrassato; stylus brevis robustus tubo calycis brevior, longus vix exsertus; stigma discoideum.

Species *P. sibiricae*, Jacq. et *P. involucratae*, Wall. affinis ab illa umbella pluriflora bractearum appendice longa, ab hac floribus roseis vel violaceis distincta.

Szechwan. Tatsienlu. 9500–11,000 ft. Pratt. No. 657. In Herb. Brit. Mus.

W. China. 11,000–12,500 ft. Marshes. Wilson. No. 4032. July 1903. In Herb. Brit. Mus.

N.W. Yunnan. A-tun-tsu. 12,000 ft. F. Kingdon Ward. No. 96. July 1911. Though growing amongst two species badly attacked by fungus, this *Primula* (with mauve flowers) is not attacked. Grows in damp meadow land. Only found in one locality. In Herb. Edin.

Central Szechwan. Tungngolo. Soulié. No. 1120. 1893. In Herb. Kew.

N.W. Yunnan. Marsh near A-tun-tsu. 13,000 ft. F. Kingdon Ward. No. 777. 12th July 1913. In Herb. Edin.

Yunnan. Mountains in the N.E. of the Yangtze bend. Lat. 27° 45' N. 12,000 ft. G. Forrest. No. 10,344. July 1913. Plant of 6–15 inches. Flowers blue-eye greenish-yellow. Fragrant. Stony moist pastures. In Herb. Edin.

Pratt appears to have been the first collector to send home specimens of this plant. It was found later by Wilson and raised from the seed he collected by Veitch, who introduced it to horticulture under the name *P. sibirica*, Jacq. var. *chinensis*. It is a great acquisition, one of the freest of growers and seeders, and it is most floriferous.

Its nearest ally is the widespread Himalayan *P. involucrata*, Wall. which has, however, white flowers, and is thus easily diagnosed. From true *P. sibirica*, Jacq. both *P. Wardii*, Balf. fil. and *P. involucrata*, Wall. are readily distinguished by the long appendages to the bracts—these may be almost as long as the bracts. Were we to accept the most recent technical description of *P. sibirica*, Jacq. as given by Pax, we should find a diagnostic character from *P. sibirica*, Jacq. in the large 10-lobed

annulus of *P. Wardii*, Balf. fil. *P. sibirica*, Jacq. is said to be exannulate. But I do not assent to this statement. I am not yet prepared to deal with *P. sibirica*, Jacq. as an aggregate type, because I have not yet had opportunity of seeing the Petrograd collection in which it must be particularly well represented. But I have dissected the flower of the true *P. sibirica*, Jacq. in such representative specimens as a Dahurian specimen collected by Losnin and in No. 883 of Roskevitz presented to Edinburgh by the Petrograd Herbarium, as well as in Karo's No. 54 from Dahuria (one of the types of *P. sibirica*, Jacq. var. *brevicalyx*, Trautv. cited by Pax). In all of them I find an excellent annulus. I also find the annulus in European specimens—in that, for instance, collected by Hojman and included in Baenitz Herb. Europ., and also in Magnier's No. 2558 from Uleaborg, which Pax cites as his var. *integrifolia*, Pax of *P. sibirica*, Jacq. In Sir Joseph Hooker's plant from West Tibet, now in Kew Herbarium, the annulus is beautifully developed, although the Flora of Brit. India, iii (1882), 487, says the corolla is "not annulate." All this shows that a critical study of the micro-forms of the aggregate *P. sibirica*, Jacq. has yet to be undertaken.

P. Wardii, Balf. fil. is the West Chinese form of the aggregate, and is altogether a different plant from the Himalayan *P. involu-crata*, Wall. These two in turn are not the same as the *P. sibirica*, Jacq., of the Flora of Brit. Ind., whatever that may be—it is not the North Siberian form of the species. True *P. sibirica*, Jacq. does not occur in the Himalayas, and the Himalayan plants so named will have to be described under a definite name.

I may add also that a number of Tibetan plants have been wrongly assigned to *P. sibirica*, Jacq. and another series of Tibetan forms has been named in herbaria *P. tibetica*, Watt, var. *intermedia*—being regarded as a passage between *P. tibetica*, Watt and *P. sibirica*, Jacq. But *P. tibetica*, Watt does not run into *P. sibirica*, Jacq. The former is not a dwarf state of the latter. *P. tibetica*, Watt is apparently a widely distributed plant in Tibet, and shows remarkable variations in stature, umbels, calyx, and corolla. Some of these are so marked in the dried specimens that it appears to be probable that more knowledge of the living plants and their relations will warrant segregation of forms within the type. As we know it at the present moment *P. tibetica*, Watt—if phyletically more nearly associated with the aggregate *P. sibirica*, Jacq. than with other species,—is a species easily diagnosed from *P. sibirica*, Jacq. by obvious characters, of which I have found the following never to fail, whether in herbarium specimens or living plants:—As anthesis proceeds the petals gradually reflex and become finally adpressed to the

side of the calyx, the consequence being that the long style, projected here far beyond the mouth of the corolla tube, stands up like a pin rising from the calyx, and in the short-styled flower the half-exserted anthers form a projecting fringe around the corolla tube mouth. This is most characteristic. In *P. sibirica*, Jacq. so far as I have seen it, the corolla lobes crumple up at the end of the tube without reflexing, and there is but slight protrusion of the style. There are other features of the bracts and the inflorescence which I think will prove to be additionally diagnostic, but it is too soon to write of them with conviction.

Primula Woodwardii, Balf. fil.

Efarinosa minutissime glanduloso-puberula rhizomate brevi. Folia at 8 cm. longa ad 1.5 cm. lata crassiuscula subtaeniaeformia obtusa vel subacuta margine subrevoluta subintegra vel irregulariter crenulata ciliata supra pallide viridia puberula subtus albida cellulis aeriferis oblecta costa media prominula percursa deorsum in petiolum alatum rubrum basi vaginantem paullo attenuata. Scapus robustus ad 20 cm. altus superne dense minute glanduloso-puberulus umbellam ad 10-floram gerens; bracteae breves ad 6 mm. longae lineari-lanceolatae acutae vel acuminatae extus glabrae virides vel purpureo-punctatae intus virides dense puberulae in pulvinum circularem involucrantem ad basin con crescentes; pedicelli validi ad 2 cm. longi bracteis multo longiores erecti virides dense glanduloso-puberuli; anthopodium obconoideum conspicuum. Calyx nigro-purpureus breviter tubulosus ad 8 mm. longus ultra medium fissus tubo extus glabro obscure angulato lobis oblongis obtusis vel subacutis adpressis ciliatis extus glabris vel sparsim puberulis intus viridibus. Corollae tubus in flore brevistylus ad 1.4 cm. longus calycem duplo superans infra cylindricus et grosse transverse rugosus ibique extus erubescens glaber supra ampliatus nigro-purpureus et glanduloso-puberulus intus infra stamina nitidus glaber viridis supra stamina nigro-purpureus glanduloso-puberulus, faux annulo puberulo viridi conspicuo 10-lobato lobis deltoideis antipetalis majoribus constricta, limbi plani discus circ. 1 mm. latus pallidus, lobi oblongo-ovati integri ad 1 cm. longi ad 8 mm. lati intense cyaneo-purpurei ubique glanduloso-puberuli subreflexi. Stamina in flore brevistylus medium tubi corollini versus et supra calycem inserta filamentis viridibus conspicuis deorsum expansis connectivo stramineo antherarum apicibus ab annulo circ. 4 mm. remotis. Ovarium ovoideum; stylus brevis viridis calyce brevior; stigma magnum depressum viride lobulato-capitatum.

Species sectionis *Nivalis* *P. purpureae*, Royle, subsimilis sed efarinosa et glanduloso-puberula.

N.W. China. Kansu, in Northern Peling. Alt. 10,000–12,000 ft. Fenwick Owen. Raised from seed in April 1914 by R. W. Woodward, jun., Esq., of Arley Castle.

Mr. Woodward has been so kind as to present a living seedling plant of this species to the Royal Botanic Garden, Edinburgh. It has lived through the critical seasonal period of *Primula* life, and we may hope therefore to learn more of it when it flowers in another season.

At the *Primula* Conference in 1913 I gave some rough statistics for the purpose of showing the rapid increase during preceding years in the number of known species of *Primula*, and I predicted even more rapid addition in the near future. The fifty new species described in these pages fulfil the prediction, and I may add that descriptions of as many more will appear in early forthcoming numbers of these "Notes." Most of the species here published we owe to recent exploration of N.W. China by Forrest, Kingdon Ward, Farrer, and Purdom, and of Eastern Himalaya by Cooper; but a considerable number are an outcome of revision of the rich material gathered by previous collectors and now preserved in the public Herbaria at Kew, Calcutta, and Edinburgh. I have to thank the Director of Kew for the facilities I have had for examining the Kew collections. To Major Gage, Director of the Royal Botanic Garden, Calcutta, I am particularly indebted for his kindness in lending me for examination the unique series of specimens of Indian species belonging to the Calcutta Herbarium. Mr. W. W. Smith's co-operation has brought to the diagnosis of Indian species his great knowledge of Indian *Primulas* derived from observation of the species in the field, and to Mr. W. G. Craib of Kew I am no less indebted for help and criticism.