THE GENUS OMPHALOGRAMMA

BY

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(With PLATES CCLXII–CCLXV)

In 1883–84, and subsequently in 1886 and 1887, the distinguished French missionary, Père Delavay, found in the moist alpine meadows of Tsang-chan on the Tali Range of mid-west Yunnan the plant which Franchet described in 1885 as *Primula Delavayi*.[1] To Franchet this plant was outstanding from all others in the genus by reason of the character of its seeds; they were flat with a broad wing-aril. Chiefly on the basis of this seed character, the astute French botanist assigned the Tali plant to a new *subgenus* of Primula which he called *Omphalogramma*, and which he thus characterised:—

> Semina magna e latere compressa, facie ventrali plus minus incrassata et producta affixa, stricte sessilia. Folia hysterantia. Flores solitarii, pedunculo basi ebracteato.

In his diagnosis of *P. Delavayi* Franchet compared the plant to one which King's collectors had found in the Sikkim Himalaya in 1878, and again in 1882, and to which King had given the name *P. Elwesiana*, the name under which Watt described the plant in 1882.[2] In spite of the fact that the seeds of *P. Elwesiana* had not been described and thus were quite unknown to him, Franchet recognised immediately the close kinship of the Sikkim and Yunnan plants, though he commented upon obvious differences between them ; the larger flowers and more deeply incised corolla-lobes of *P. Delavayi*, which moreover produced its flowers before the leaves, whereas the flowers and leaves of *P. Elwesiana* were more or less coetaneous. Such differences we know now are not of outstanding importance.

At Lankong, north of Tali, in 1886, Delavay discovered another solitary flowered ebracteate plant, with seeds like those of *P. Delavayi*. Because the flowers were very reminiscent of those of *Vinca major*, Franchet named it *P. vincaeflora* and described it the following year in the Gardeners' Chronicle,[3] stating that it belonged to the same group as *P. Elwesiana* and *P. Delavayi*. This fact he emphasised again in 1889[4] when he published figures of the seeds of the two Chinese species; and although he still had no knowledge of the seeds of *P. Elwesiana* it was clear to him that on vegetative and floral characters the three species formed a homogenous group. Pax was of the same opinion, and in his survey of the genus in 1889[5] upheld Franchet's group as a *section* of Primula, although he renamed it *Barbatae* for the very trivial reason that as, at that time, the seed was known for only two of the three species, the name *Omphalogramma* might not be descriptively accurate of the third species.

In 1898[6] Franchet added yet another species to the group (without having examined the seeds), a Chinese plant collected by Soulié on the Mekong-Salwin divide in 1890 or 1891, which Franchet called *Omphalo-*

gramma Souliei—NOT *Primula Souliei*—for in this paper he was no longer content to regard these plants as forming a subgenus of Primula, but definitely constituted for them the *genus Omphalogramma*. The more pertinent points in Franchet's generic diagnosis are as follows: "Calix profunde 5–8 partitus, segmentis lanceolato-linearibus; corolla magna, infundibuliformis vel hypocrateriformis, tubo superne dilatato vel e basi sensim ampliato, lobis obcordatis vel obscure emarginatis, margine integerrimis vel plus minus eroso laceris. Stamina . . . filamentis glabris vel pilosulis, . . . semina plana, latiuscule alata, subquadrata vel subtriangularia, pro majore parte mox vel demum complete anatropa; axis supra semina longe producta, xyphoidea.—Herbae terrestres, rhizomatosae, rhizomato crasso apice multisquamato; squamae membranaceae, fuscae, folia alte involventes; pedunculus uniflorus, flore ebracteato, corolla extus pubescens vel glandulosa. . . ."

When Pax published his Primula monograph in 1905[7] he reverted from his own name of *Barbatae* to Franchet's name *Omphalogramma*, but only as the name of a *section* of Primula, in spite of Franchet's advocacy seven years earlier of the claim of this small group of species to distinct generic rank. As the name *P. Souliei* was preoccupied by a Szechwan plant described by Franchet in 1895, *O. Souliei* was renamed *P. Franchetii* Pax.

Balfour, reviewing the Chinese species of Primula at the Primula Conference in 1913[8] followed Pax, and the above four species, together with another of Soulié's discoveries in the neighbourhood of Tatsienlu in 1894 which Knuth named and described in 1907 as *P. Engleri*,[9] formed section Omphalogramma. However, two years later, when describing and discussing Farrer and Purdom's Kansu discovery which they had named *P. viola-grandis*,[10] and after examining the ample herbarium material of these species collected by Forrest and by Ward in China and by Cave and by Cooper in Sikkim and the living specimens in cultivation in the Edinburgh Royal Botanic Garden, Balfour was quite convinced that Franchet was correct in treating Omphalogramma as a genus separate from Primula. And this was the procedure adopted by Smith and Forrest in their survey of the genus Primula for the Primula Conference of 1928.[11] These authors regarded Omphalogramma as quite distinct from Primula, and listed the species of Omphalogramma then known in an appendix to "The sections of the genus Primula."

There can be no question of the fact that these plants exhibit features quite alien to true Primulas and merit distinct generic rank. Due to the greater reflexing of some of the corolla-lobes as compared to others, and due to the disposition of the stamens whereof only those on the posterior side of the corolla-tube are erect, the anterior ones being bent across the tube, the flower becomes in more or less degree zygomorphous. In the genus Primula, only *P. obliqua* W. W. Sm. shows a certain obliquity of the corolla, for, although in the unfolding flower the corolla-lobes are thrown forward, in the mature flower the two posterior lobes are thrown backwards or all five lobes may be to some degree reflexed. As a rule the numerical symmetry of the perianth and androecium is characteristically different in Omphalogramma. Commonly there are six parts to each of these floral whorls, but there may be up to eight. There may also be, it is

well to remember, five parts, as in certain populations of *O. brachysiphon* W. W. Sm. seen by Ludlow, Sherriff and Taylor. But then this plant is the most "Primula-like" of all Omphalogrammas. The solitary-flowered scape is not alien to Primula—it may be thus in *P. Valentiniana* Hand.-Mzt., for instance—but no Primula has the ebracteate scape so characteristic of Omphalogramma. And as Franchet originally pointed out, the flat seeds with their broad wing-aril of the Omphalogrammas are quite unlike the seeds of any Primula, and are completely diagnostic.

A character of considerable taxonomic importance in the genus Primula is the folding of the leaves; they are either involute or revolute. The involution of the leaves is quite constant in Omphalogramma. It is also characteristic of four sections of Primula; the North American, Siberian and Japanese section Cuneifolia; the North American section Parryi; the section Floribundae with species not contiguous but widely separated in Arabia, Sinai, Abyssinia, West Persia, Baluchistan and the North-West Himalaya; and the European section Auricula. It is possible that involution of the leaves also occurs in some members of the Asiatic section Amethystina (Cooper in Gard. Chron. c. (1936), 200–201, figs. 86 and 87) although in representatives of this group which the writer has examined—*P. Valentiniana*, for instance, which in some ways is strongly reminiscent of *O. brachysiphon*—the leaves are quite obviously revolute. As all these sections are quite remote from Omphalogramma, the unfolding of the leaves would here appear to have little or no phyletic significance.

But another Primulaceous genus is characterised by an involution of its leaves, the monotypic genus *Bryocarpum*. This character very strongly further emphasises the close affinity of *Omphalogramma* with *Bryocarpum himalaicum* of Sikkim, Bhutan and south-eastern Tibet—an affinity advocated by Balfour in 1915[10]. As Balfour pointed out, the whole facies of Bryocarpum is that of Omphalogramma—the petiolate ovate leaves covered with sessile glands and arising from 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, and the calyx cut to the base into narrow segments. In Balfour's words—"Those who wish to sink Omphalogramma would place it more conveniently in Bryocarpum than in Primula." The differences between the two genera are, of course, fundamental. Instead of flat-winged seeds, Bryocarpum has oblong ellipsoid seeds with an areolate surface; and instead of the typical Omphalogramma capsule, and with its upper quarter extruding from the calyx and dehiscing from the apex nearly, or quite, to the base, Bryocarpum has its capsule slender and cylindrical, many times longer than the calyx and opening by a stylopodial lid beneath which are formed short valves.

Eleven species are enumerated by Smith and Forrest and *O. violagrandis* is regarded as synonymous with *O. Engleri*. Thus in the interval between the two Primula Conferences of 1913 and 1928, and due to the exploration of Farrer, Forrest, Rock, and Handel-Mazzetti, six new species had been discovered. Forrest had gathered *O. Forrestii* Balf. f. in the mountains of the Chungtien Plateau in north-west Yunnan in 1913. In his exploration of the Hpimaw and Chimili Alps in north-east Upper

Burma in 1919 Farrer had found *O. Farreri* Balf. f. and *O. Coxii* Balf. f. Handel-Mazzetti had gathered *O. minus* Hand.-Mzt. in Yunnan in 1915. On the Salwin-Kui-chiang divide in Tsarong, south-eastern Tibet, Forrest had discovered *O. elegans* Forrest in 1922. And the following year Rock had shown that the mountains west of the Yangtze bend at Shiku, north-west Yunnan, were the home of *O. Rockii* W. W. Sm. Since 1928 only one other new species has been recorded, the very unusual *O. brachysiphon* from south-eastern Tibet where it was first found in 1936 by Ludlow and Sherriff. During the course of this revision the writer has found it necessary to reduce *O. Engleri* and *O. Rockii* to *O. vincaeflora*, regarding this species, in nature, as a very polymorphic one. He has also had cause to describe two new species from material collected by Farrer on the Chawchi Pass, material which for nearly thirty years has been confused with *O. Coxii*. A third new species has just come to hand, a plant recently collected by Ludlow, Sherriff and Elliot in the Pome district of south-eastern Tibet.

The genus is entirely Asiatic with its main area of distribution in north-east Upper Burma, south-eastern Tibet and north-west Yunnan. All the species are centred in this area; but *O. Elwesiana* extends into Sikkim and Assam; *O. Souliei*, in the form of var. *pubescens*, *O. minus*, *O. Forrestii* and *O. vincaeflora* extend to Szechwan, the latter penetrating into Kansu, and *O. Forrestii* into Assam. *O. brachysiphon* and *O. tibeticum* Fletcher are apparently endemic to south-eastern Tibet, and *O. Farreri*, *O. Coxii*, *O. burmanicum* Fletcher and *O. pilosum* Fletcher to the N'Maikha-Salwin divide of north-east Upper Burma.

Apart from the fundamental characters of the involution of the leaves, the solitary-flowered ebracteate scape and the nature of the seeds, all the species have other common characters. The leaves of all are covered, especially on the lower surface, with round sessile amber glands. All have scapes covered, particularly at the apex, with long articulate glandular hairs, and, with the exception of *O. brachysiphon* which frequently has a glabrous corolla, the corollas are clothed on the outside with the same type of hair. Not by this character alone does *O. brachysiphon* stand apart from the other species. It is the only species in the genus which has a campanulate corolla with the tube usually shorter than the lobes and more or less as long as the calyx, and with the staminal filaments very short, not more than 1 mm. long. In all other species the corolla is infundibuliform, with the tube much longer than the calyx and longer than the corolla-lobes, whilst the filaments may be 10 mm. or more long. *O. vincaeflora* is also unique in the genus by virtue of its lacking the thick woody rhizome typical of all other species. This best-known species is held in the ground only by a few large roots. Towards the end of the growing season the leaves die away and leave a firm compact resting bud formed of thick fleshy scale-like leaves, in substance and shape strongly resembling a small loosely formed Lilium bulb. These buds are either underground or else rest practically on the surface of the soil, being held in position only by two or three roots and not by the long or short rootstock of other species. The rest of the species can be divided into two groups; those species which at flowering time have foliage with the petiole and lamina quite distinct, the latter usually round or cordate at the base and pilose in more or less degree; and

O. Elwesiana and *O. Souliei* with usually glabrous leaves tapering at the base so that petiole and lamina are not clearly differentiated from one another.

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4. Journ. de Bot. iii (1889), 49, figs. 1, 2, 3.
5. Engl. Bot. Jahrb. x (1889), 209.
6. Bull. Soc. Bot. Fr. xlv (1898), 179–180.
7. Engl. Pflanzenr. Primulaceae (1905), 108.
8. Journ. Roy. Hort. Soc. xxxix (1913), 162.
9. Bot. Jahrb. xxxviii (1907), 340.
10. Notes Roy. Bot. Gard. Edin. ix (1915), 52–56.
11. Ibid., xvi (1928), 44, and in Journ. Roy. Hort. Soc. liv (1929), 46.

Unless otherwise stated the specimens enumerated are in the Herbarium of the Royal Botanic Garden, Edinburgh. There are, however, a few collections in the Herbaria of the Royal Botanic Gardens, Kew, and of the Natural History Section of the British Museum, which are not represented in Edinburgh. Such specimens are listed separately after the citation of the Edinburgh numbers. The writer is much indebted to the Keepers of these two Herbaria for the loan of the Omphalogramma material contained therein.

KEY TO THE SPECIES

Plants with a comparatively long thick rhizome, crowned with a resting-bud of fleshy scale leaves:

Corolla campanulate, glabrous or only faintly pubescent; corolla-tube shorter than, or at most equal to, the corolla-lobes, and more or less as long as calyx; filaments about 1 mm. long . *brachysiphon*

Corolla infundibuliform, always markedly hairy; corolla-tube longer than the corolla-lobes and longer than the calyx; filaments much longer than 1 mm.:

Leaves round or cordate at base; petiole at flowering-time abruptly distinct from lamina; leaves hairy:

Leaves hairy above and below:

Corolla-tube squat, at most twice as long as calyx and not ampliate but as wide at the base as at apex; corolla-lobes almost as broad as long . . . . . *Coxii*

Corolla-tube usually 3–4 times the calyx, or if only twice as long then the tube ampliate; corolla-lobes longer than broad:

Leaves ovate to ovate-lanceolate; flowers precocious or coetaneous with leaves:

Style or filaments or both very glandular pilose:

Style and filaments glandular-pilose; petals incised-dentate . . . . . *pilosum*

Style glandular-pilose; petals subentire or faintly emarginate and crenulate . . *tibeticum*

Style or filaments glabrous or with an occasional hair:

Corolla 4–5 cm. long; capsule where known 1·5–2 cm. long:

Corolla-lobes conspicuously incised . *burmanicum*

Corolla-lobes bilobulate and the lobules entire or slightly toothed . . . *elegans*

Corolla 3–4 cm. long; capsule 0·5–1 cm. long . . . . . *minus*

Leaves usually broadly oblong or suborbicular or rotundate; flowers, as a rule, precocious:

Lamina broadly oblong to suborbicular; style densely pilose; corolla-tube usually 2, sometimes 3, times the length of calyx; staminal filaments 5–7 mm. long, inserted 10 mm. from base of corolla-tube; calyx-lobes usually toothed . . . *Delavayi*

Lamina rotundate-cordate; style glabrous or only faintly hairy; corolla-lobes usually 3, sometimes 4, times the length of calyx; staminal filaments 10 mm. long, inserted 15 mm. from base of corolla-tube; calyx-lobes usually entire . . . . *Farreri*

Leaves glabrous above, slightly hairy below . . *Forrestii*

Leaves at flowering time tapering at base into the broad winged petiole; leaves usually glabrous but sometimes hairy:

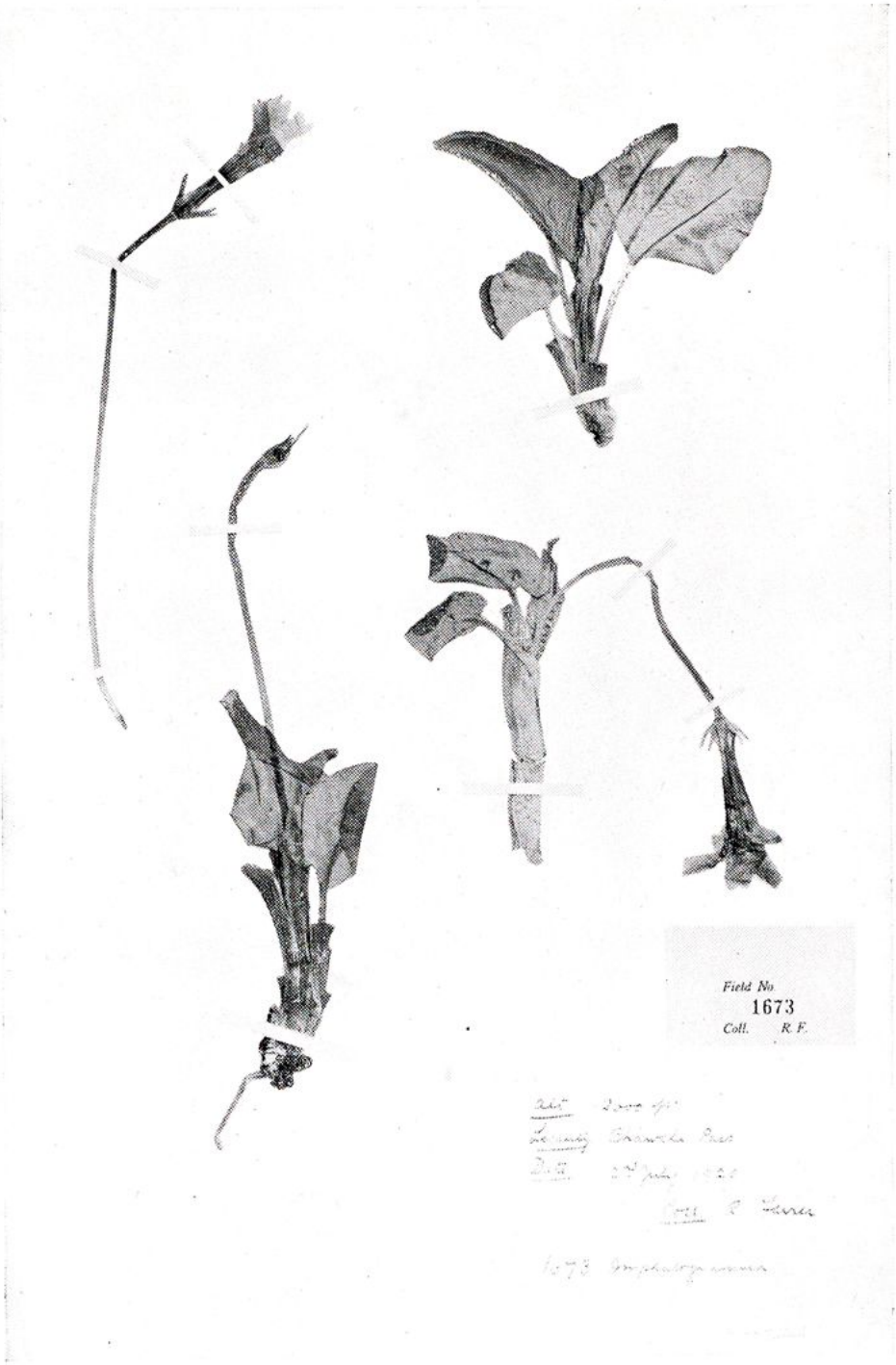
Corolla 2·5–3·5 cm. long; style not exserted and filaments not glandular; capsule 1·5–2 cm. long . . *Elwesiana*

Corolla 5–7 cm. long; style very markedly exserted and filaments glandular; capsule 2–3 cm. long . *Souliei*

Plants forming a large resting bud of thick fleshy scales, never with a woody rootstock . . . . . *vincaeflora*

Omphalogramma brachysiphon W. W. Sm. in Notes Roy. Bot. Gard. Edin. xix (1937), 219; Sherriff and Taylor in Quart. Bull. Alp. Gard. Soc. vii (1939), 242, fig. p. 244.

One of the smallest members of the section, *O. brachysiphon* is readily distinguished from all others by the character of the corolla. This is campanulate and more or less regular with the tube exceedingly short, little or no longer than the calyx in fact, and gradually ampliate from the base into the limb. So distinct an *Omphalogramma* as this, especially when the corolla-lobes are frequently 5 in number as they are here, has, superficially, the aspect of a plant of the Amethystina section of Primula such as a solitary flowered *Primula Valentiniana* Hand.-Mzt. Its history is a brief one and has been reviewed by Sherriff and Taylor (l.c.). Very circum-



[*Photo R. M. Adam.*

OMPHALOGRAMMA BURMANICUM Fletcher, sp. nov. ×½.

PLATE CCLXIII.

[*Photo R. M. Adam.*

OMPHALOGRAMMA COXII Balf. f.

Plants growing in the Rose Garden, Royal Botanic Garden, Edinburgh, 26 June 1931.

scribed in its distribution it is known to occur on but two passes on the main Himalayan range in south-eastern Tibet. Ludlow and Sherriff first met with it in 1936 in the vicinity of the Lo La, Pachakshiri, on the north side of the Pass—Singo Samba, Lo La Chu Valley, near Molo, is the exact locality given on the label of the isotype (*Ludlow and Sherriff*, 1887). It was here growing in company with *O. Elwesiana* King, at an altitude of 13,500–14,000 ft. in open damp soil. In 1938, Ludlow, Sherriff and Taylor collected it again on the Lo La, this time on the south side of the Pass growing singly or in tight clumps in very wet well-drained moss-covered rocky slopes close to running water, as well as on the Chubumbu La, near Langong, about twenty miles farther west, on wet mossy hillsides on the north side of the Pass. Recently Ludlow and Sherriff procured seeds of this species and, under the number L. & S. 14307, young plants are now in several British gardens.

A dwarf perennial with a thick fairly long rootstock, girt at the apex with brown membranous imbricate scales surrounding and almost completely concealing the petioles, and producing many stout fleshy roots. Leaves 1·5–5 cm. long, 0·3–1 cm. broad, oblanceolate, obtuse at the apex, entire or occasionally remotely denticulate at the margin, tapering at the base into the broad winged petiole subequal to the lamina, quite glabrous on both surfaces, shiny-green above, paler and matt below, narrowly margined dull dark red, mid-rib fairly conspicuous above, broad and prominent below. Scape coetaneous with the foliage, 3–9 cm. long at flowering time, up to 20 cm. at fruiting time, densely covered with reddish hairs. Calyx 4–6 mm. long, green or crimson, hairy, cut almost to the base into lanceolate acute or obtuse lobes. Corolla velvety black-purple, sometimes with two light spots at the base of each petal in newly opened flowers, 1·5–2·5 cm. long, more or less campanulate, glabrous or slightly pubescent without; tube as long as, or a little longer than, the calyx, gradually ampliate from the base into the limb, 1·5–2 cm. in diameter, usually with 5 elliptic or oblong elliptic lobes, incised dentate around the apex and sometimes pubescent at the margin. Stamens usually 5, inserted on glabrous filaments barely 1 mm. long towards the apex of the short corolla-tube; anthers 3 mm. in length, reaching the mouth of the tube or even slightly exserted. Ovary and style glabrous, stigma reaching the anthers.

The type is in the British Museum Herbarium and in Edinburgh are:

S.E. Tibet. Singo Samba, La Chu Valley, near Molo (*Ludlow and Sherriff* 1887—*isotype*); Lo La, Pachakshiri District, (*Ludlow and Sherriff and Taylor* 3762); Lo La, near Molo (*L. S. & T.* 6546), Chubumbu la, near Langong (*L. S. & T.* 3982).

Omphalogramma burmanicum Fletcher, sp. nov. Plate CCLXII.

Species valde affinis *O. piloso* Fletcher a qua filamentis stylisque glabris differt.

Planta perennis valde pilosa rhizomate crasso, squamis basalibus 2–4 cm. longis. Folia 8–10 cm. longa, petiolo incluso; lamina 4–6 cm. longa, 2–4 cm. lata, late ovata, apice rotundata vel obtusa, basi cordata

vel nunc rotundata, obscure crenulata, supra omnino pilosa infraque ad venas, costa lata, nervis 4–6-paribus supra paululo impressis; petiolus laminam subaequans, copiose pilosus, membranaceo-alatus, basi vaginatus. Flores cum foliis fere coetanei. Scapus 14–18 cm. longus, folia duplo superans, praesertim ad apicem pilosus. Calyx 10–12 mm. longus, campanulatus, pilosus, in lobos sex anguste lanceolatos acutos 3–5 nervios ad imum fissus. Corolla intense violaceo-coerulea, glanduloso-pilosa; tubus 3 cm. longus, calycem triplo superans, angustus paulo supra ampliatus; limbus diametro 3·5–4 cm. lobis sex oblongis vel obovatis emarginatis atque bene incisis. Stamina paulo supra medium tubum inserta, filamentis 7–8 mm. longis glabris, antheris 4 mm. longis. Ovarium glabrum stylo glabro vel basi pilis articulatis consperso, stigmate ad antheras attingente.

U. BURMA. Chawchi Pass (*Farrer* 1673 *pro parte—type* in Herb. Hort. Edin.).

This species is discussed fully under *O. Coxii* Balf. f. (q.v.).

Omphalogramma Coxii Balf. f. in Notes Roy. Bot. Gard. Edin. xiii (1920), 23; Cox in The Garden, lxxxviii (1924), 678–9; Ward in Journ. Roy. Hort. Soc. xlix (1924), 152; W. W. Sm. and Forrest in ibid., liv (1928), 46; W. W. Sm. and Forrest in Notes Roy. Bot. Gard. Edin. xv (1929), 257 and ibid., xvi (1928), 44; Cox in Plant Introd. Reg. Farrer (1930), 70; Clay in Present Day Rock Gard. (1937), 413. PLATE CCLXIII.

Balfour described this species from material collected by Farrer and Cox under No. 1187, in August 1919, in the Chimili Alps of north-east Upper Burma. The original note on the field ticket, written by Farrer, reads thus:

"Omphalogramma sp. I believe this to be a quite distinct species which has, by confusion, brought a bad reputation on the beautiful F. 1053 * (*O. Delavayi*—though by no means can I make out on it a scape 'squamis fuscis . . . involutus'). The two species have, however, no very obvious distinction (except in flower). But F. 1187 always has the leaves longer than broad, as in the type of *Viola hirta*, while those of F. 1053 are always rotundate, as broad or broader than their length and remarkably like those of type *Viola odorata*. Apart from floral differences F. 1187 blooms a full month later than F. 1053, which is a foot high in pod, while its successor is emitting its ugly vinous-magenta little flowers, huddled in their scale leaves. F. 1053 ranges in marshes and copses, and open alps from 11,500–12,800 ft., while F. 1187 is constant to undergrowth and marsh and woodland, at 11,500 ft."

Obviously Farrer was convinced that at least there were two distinct species of Omphalogramma in the Chimili Alps.

Balfour described both species (*O. Coxii* and *O. Farreri*) at the same time, and related both to *O. Delavayi*. The original material and description of *O. Coxii*, are equally meagre. But in 1924–25 Forrest collected ample specimens of both species from the N'Maikha-Salwin divide, and these serve to reveal the true nature of *O. Coxii*. The plant is girt at the base with a

* *Farrer* 1053, is not, of course, *O. Delavayi*. Farrer named it thus on his field ticket, but the following year, 1920, Balfour described it as a new species, *O. Farreri*.

conspicuous sheath, up to 8 cm. long, of oblong membranous overlapping scales; the leaves, up to 15 cm. long, have a well-differentiated petiole subequal to the lamina which is ovate to ovate-oblong, very deeply cordate at the base and copiously hairy on both surfaces; though Balfour described the flowers as precocious, they are actually coetaneous with the leaves, or may even develop a little later; the scape is about the same length as the leaves whilst the very characteristic flowers have a somewhat squat appearance with a short broad tube and lobes almost as long as broad; the style is glabrous, and this I take to be a character of some importance in relation to some of Farrer's later collection. All Forrest's material is in perfect harmony with *Farrer* 1187 and is in every way constant.

In 1920 Farrer made further gatherings of Omphalogramma at or near the Chawchi Pass, and it is expedient to consider these at this point.

Farrer 1697.—Collected on the Chawchi Pass on 5th July at 12,000 ft. altitude. The label reads, " . . . I believe it to be a hybrid between F. 1673 and F. 1699, though of F. 1673 I confess I see little or no trace except the shape and size of the flower and its colour, which is of a muffled mulberry tone."

This collection is *O. minus* Hand.-Mzt.

Farrer 1673. Collected on the Chawchi Pass on 2nd July, at 12,000 ft. altitude. Farrer writes in his field note: "*O. Engleri* vel proxime affinis. Only just beginning here and there on the slopes among light scrub of the dwarf Rhododendrons. Flowers intense violet blue, exactly like those of *O. viola-grandis* but the leaf seems different and the whole plant promises to be bigger and develops more into clumps. It cannot be *O. Engleri*, either, as this leaf is very definitely petiolate, as auriculate and violoid as in *O. Delavayi* and *O. viola-grandis*. The flower, too, seems different."

Under the same number he attempted to correlate a fruiting specimen gathered on 4th September on the Chawchi Pass at 12,000–12,500 ft.: "The very definitely petiolate, auriculate leaf (with the 'lobes' unevenly overlapping) finally separate this from *O. Engleri*, while their thin texture and elongate shape [which varies from a form approaching F. 1699 (always attenuate to the pedicel) to a broad violoid outline] separates it from *O. violagrandis*."

The fruiting specimens of *Farrer* 1673 are in every way indistinguishable from those collected in the same locality by Forrest in 1924–25. They are *O. Coxii*. An examination of the flowering material of F. 1673 shows that two species are represented. One of these is *O. minus* Hand.-Mzt., and the other a very different plant which Smith and Forrest (l.c. 1927) believed to be nearest to *O. Coxii*, with, however, a much better-developed flower. They were content to leave this gathering as akin to *O. Coxii* until further material were available. So far more material is not available, but even so the writer believes this plant to be something quite distinct from *O. Coxii*, which both in the wild and from what is known of it in cultivation maintains constantly the squat unprepossessing appearance of the corolla (PLATE CCLXIII). The corolla in *Farrer* 1673 (PLATE CCLXII) has a long slender corolla-tube and large lobes which are longer

than broad, emarginate and incised at the apex. Moreover, at flowering time the scape is twice as tall as the leaves. The plant is much more closely allied to *Farrer* 1699 (PLATE CCLXIV), which we must now discuss.

Farrer 1699. Collected on the Chawchi Pass on 5th July at 12,000–13,000 ft. altitude. Of it Farrer writes: "This is again what I call the false *Delavayi*. It does not quite like the same situations as F. 1673, but abounds in very large clumps and drifts in open sweeps and stretches of damp or wet slopes or flats of the high alpine region, where the flowers are sometimes of so brilliant an amethystine-red as to be quite effective. The flower develops greatly in size, as the scape in length. Is *this* the genuine *O. Delavayi* after all?"

O. Delavayi it certainly is not, though it has one or two of the outstanding characters of this species.

Under the same number he correlated a fruiting plant found on the Chawchi, Shinghong and Moku-ji Passes on the 4th September. "In fruit: small specimens. Both capsule and developed leaves may very easily be confused with F. 1673, but the plants can then at once be separated by their leaves, generally similar, but invariably attenuate to the footstalk in this sp.; invariably auriculate in F. 1673. This sp. moreover, affects much flatter, wetter places than the scrubby slopes affected by F. 1673, grows in far larger masses and in far greater profusion."

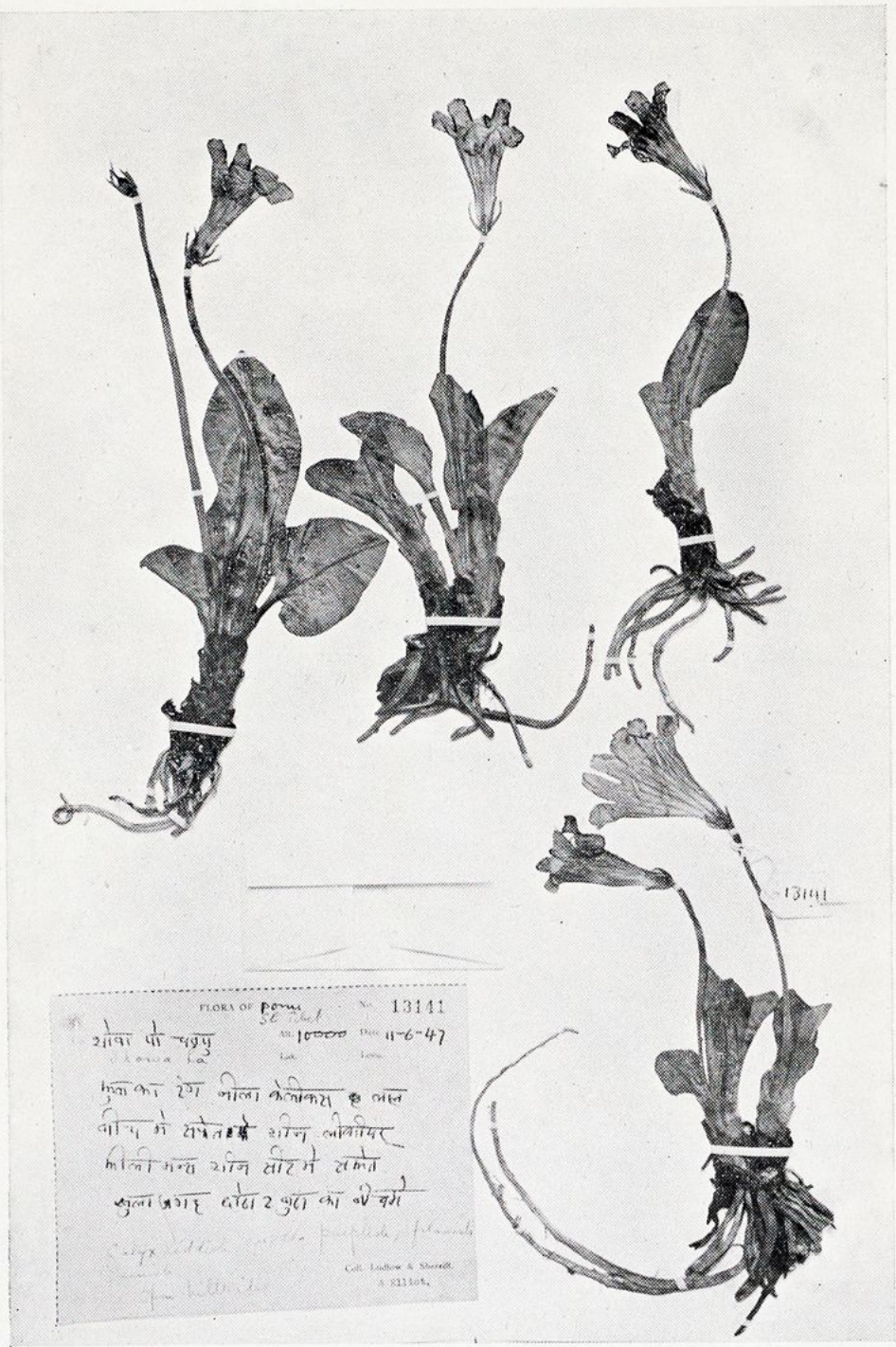
This fruiting specimen is *O. minus*—the small leaves and capsule are quite distinctive and diagnostic—a very different plant to the flowering specimens of F. 1699. What then are these flowering specimens? Discussing them Smith and Forrest (l.c. 1927), say: "Of the six flowers one is quite like that of *O. Coxii*, the others are larger with better-developed lobes. Farrer was no doubt right in regarding them as representing *O. Coxii* of the previous year." With this statement the writer does not agree. One of the six flowers is not so far developed as the rest, but it is structurally different to the flowers of *O. Coxii* in that the corolla-lobes are twice as long as broad, and in that the filaments of the stamens, as well as the style, are very copiously glandular-pilose. The same applies to the mature flowers. In all cases the flowers are carried on scapes which are at least twice as tall as the leaves, in some cases over a foot in length. The leaves, conspicuously crenately wavy at the margin, are very hairy on the upper surface, and are *sometimes* attenuate at the base into the petiole (not *always* thus, as is stated by Farrer in his field note to the fruiting specimen of F. 1673), at other times quite obviously cordate. Flowers and leaves are apparently produced simultaneously. It seems to me that Farrer was not very far from the mark when he queried "Is *this* the genuine *O. Delavayi* after all?" Superficially these flowers bear an extraordinary close resemblance to those of the original specimens of *O. Delavayi* from the Tali Range. Moreover when the structure of the two flowers is compared, these of F. 1699 agree with those of *O. Delavayi* in having a strongly bearded style—an unusual occurrence in this genus. But the filaments of F. 1699 are just as heavily bearded whereas they have but an occasional hair in *O. Delavayi*. As for the leaves no other species has so strong a covering of hairs, especially on the upper surface, save *O. Coxii* and also the flowering specimens of F. 1673. To sum up, F. 1699 is in some ways intermediate between

[*Photo R. M. Adam.*

OMPHALOGRAMMA PILOSUM Fletcher, sp. nov. Type. $\times \frac{1}{2}$.

Facing page 134]

PLATE CCLXV.



[*Photo R. M. Adam.*

OMPHALOGRAMMA TIBETICUM Fletcher sp. nov. Type. $\times \frac{1}{2}$.

O. Delavayi and *O. Coxii*, and I believe it to be a new species (see *O. pilosum*). I do not forget the possibility of a hydrid origin for this plant; *O. Coxii* and *O. Delavayi* are both present on the N'Maikha–Salwin divide!

What now of the relationship between F. 1699 and the flowering plants under F. 1673? There is certainly a close affinity, but the two are not the same. Both have remarkably pilose leaves; but those of F. 1673 are more deeply and consistently cordate, less obviously crenately wavy and less prominently nerved than those of F. 1699. The flowers of the latter have calyx lobes about 1·5 cm. long, a corolla-tube twice as long as the calyx, narrowly oblong irregularly and deeply incised lobes, and filaments and style copiously pilose. On the other hand, the flowers of F. 1673 have calyx lobes approximately 1 cm. long, a corolla-tube three times the calyx, broadly obovate lobes emarginate and rather regularly incised, and the filaments and style either glabrous or at most with an occasional hair. The whole facies of the two plants is quite distinct. (Compare PLATES CCLXII and CCLXIV.)

The kinship of F. 1673 with *O. Coxii* has already been discussed. The leaves of the two are very similar in outline, both have a deeply cordate leaf base and both have a strong pilosity. But the flowers of the two bear no resemblance. There is, however, more than a casual likeness between the flowers of F. 1673 and those of *O. Farreri* as a comparison between F. 1169 (one of the original gatherings of *O. Farreri*) with F. 1673 well shows; both have the long corolla-tube three times the length of the calyx, the same obovate incised petals, and filaments and style glabrous or faintly hairy.

F. 1673 is thus not the same plant as F. 1699, nor yet the same as *O. Coxii*. It would appear to be intermediate between *O. Coxii* and *O. Farreri*, combining the leaf characters of the former with the floral characters of the latter. All three plants grow in the same area, and it is not unlikely that F. 1673 is a hybrid of the other two species. Farrer, it is well to remember, suspected that hybridisation was actually taking place among the Omphalogrammas in north-east Upper Burma. In the absence of definite proof of hybridity I propose describing F. 1673 as a new species (see *O. burmanicum*).

Thus on the Burma-Chinese frontier the following species are present: *O. minus*, *O. Farreri*, *O. Delavayi*, *O. Coxii* and the two new species *O. burmanicum* and *O. pilosum*.

O. Coxii is a very hairy perennial with a short thick rhizome from which spring numerous fleshy roots, and which is clothed at the apex with numerous membranous overlapping oblong scales, up to 8 cm. long, which form a tight sheath around the petioles. Leaves at flowering time up to 15 cm. long including the petiole; lamina 4–7 cm. long, 2·5–4 cm. broad, broadly ovate to ovate-oblong, round or obtuse at the apex, subentire or crenate-denticulate at the margin, very deeply cordate at the base, copiously covered above and below especially along the mid-rib and the lateral veins with very long articulate hairs; mid-rib broad and conspicuous below; four to six pairs of lateral nerves quite prominent; petiole subequal to or a little longer than lamina, from which it is very clearly differentiated, vaginate at base, markedly pilose; at fruiting time leaves up to 30 cm.

long, with the lamina as much as 14 cm. long and 8 cm. broad. Flowers usually developing with the leaves, but occasionally later. Scape up to 14 cm. tall, and thus about as long as the leaves. Conspicuously pilose especially at the apex; fruiting scape as much as 40 cm. long. Calyx 12–15 mm. long, campanulate, cut to the base into six lanceolate pilose three to five-nerved lobes. Corolla vinous-magenta or deep purplish-rose with the base of the tube dull-yellow; tube 1·5–2 cm. long, uniformly cylindrical from base to apex, very glandular hairy; limb about 2 cm. in diameter with five or six ovate-rotundate lobes about 7 mm. long, denticulate around the apex. Stamens inserted near the middle of the corolla-tube; filaments 5–7 mm. long, furnished with a few scattered glandular hairs; anthers 3 mm. long. Ovary glabrous, style glabrous; stigma reaching the level of the anthers. Capsule 2 cm. long dehiscing by longitudinal prominently veined valves, the veins being slightly spirally twisted.

N.E. Burma. Chimili Alps (*Farrer* 1187—*type*), Chawchi Pass (*Farrer* 1673—*pro parte*); western flank of the N'Maikha–Salwin divide (*Forrest* 25002, 26920, 27009, 27360, 27287).

Omphalogramma Delavayi Franch. in Bull. Soc. Bot. Fr. xlv (1898), 179; Balf. f. in Notes Roy. Bot. Gard. Edin. ix (1915), 56—sub *Primula viola-grandis* Farrer et Purdom; W. W. Sm. et Forrest, ibid., xvi (1928), 44, and in Journ. Roy. Hort. Soc. liv (1929), 46; Clay, Present Day Rock Gard. (1937), 413; *Primula Delavayi* Franch. in Bull. Soc. Bot. Fr. xxxii (1885), 272; Pax in Engl. Bot. Jahrb. x (1889), 210; Delavay in Journ. de Bot. iii (1889), 49, figs. 1 and 2; Forbes et Hemsley in Journ. Linn. Soc. xxvi (1889), 38; Pax in Engl. Pflanzenr. Primulaceae (1905), 110; Watt in Journ. Roy. Hort. Soc. xxix (1904), 319 and in ibid., xxxix (1913), 213; Balf. f. ibid., xxxix (1913), 132, 162–3; Forrest, ibid., xli (1915), 203; Forrest in Notes Roy. Bot. Gard. Edin. iv (1908), 228; Balf. f. in ibid., ix (1915), 56–sub *P. viola-grandis* Farrer et Purdom; Beauverd in Bull. Soc. Bot. Genève, ix (1917), 369, fig. p. 365; Farrer in Engl. Rock Gard. ii (1919), 122.

The early history of *O. Delavayi* is closely linked with the history of the genus. As this has been described in the introduction to this paper it need not be repeated in full here. Suffice to say that Delavay's original specimens collected on the Tali Range of Western Yunnan in 1883–84, were made the type of a new *subgenus* of Primula—subgen. *Omphalogramma*—by Franchet in 1885. Thirteen years later Franchet constituted the new *genus Omphalogramma*, which at this time contained four species, *O. Delavayi*, *O. Elwesiana*, *O. vincaeflora* and *O. Souliei*, although in 1905, when monographing the genus Primula Pax included these species in his *section Omphalogramma*. Subsequent workers continued to follow Pax—though Balfour was quite clear that this treatment was not the correct one—until Smith and Forrest in 1928–29 excluded these species from their review of the sections of Primula.

Forrest was frequently on the scene of Père Delavay's labours on the Tali Range, and collected this plant on several occasions, as early as his first expedition in 1906, and as late as his last journey in 1930–31. Its nearest of kin is the Burmese *O. Farreri* which Forrest knew well on the

N'Maikha–Salwin divide. The two are extremely closely allied, and the relationship is fully discussed under the latter species. It is only necessary at this point to note that the two plants are not completely isolated geographically by the 150 miles of longitude, and by the two large intervening ranges, the Salwin–Mekong divide and the Mekong–Tali divide, which separate the Tali Range from the N'Maikha–Salwin divide. *O. Delavayi* is not confined to the Tali Range for in June, 1919, Forrest gathered the plant on the N'Maikha–Salwin divide (F. 18107). At that time not knowing *O. Farreri*, Forrest named his plant *O. Delavayi* (or rather *Primula Delavayi*). And of *O. Delavayi* it has all the characters—markedly precocious (though this is not completely diagnostic for this species), a corolla-tube only twice the length of the calyx and a very glandular-hairy style.

Apparently *O. Delavayi* has never been in British gardens. The figure published on page 333 of the Gardeners' Chronicle for 1923 and reputed to represent this species is an error. The plant has all the facies of *O. Farreri*, and moreover is stated to have been raised from seeds of *Farrer* 1053 —the type of *O. Farreri*. Likewise an error is the plant figured on page 270 of volume IV of the Alpine Garden Society Bulletin. This plant gained an Award of Merit for Lord Aberconway at the Alpine Plant Conference in May, 1936, under the name of *O. Delavayi*. This it certainly is not for the leaves are totally unlike those of Franchet's plant.

A hairy perennial with a long thick occasionally branching rhizome from which spring numerous fleshy roots, and which is girt at the apex with membranous imbricate scales; these form a collar sometimes as much as 10 cm. in length first around the scape and later the foliage. Leaves usually only appearing when the flowering scape is more or less fully developed, at flowering time 8–10 cm. long with the lamina 3–7 cm. long, 2·5–5 cm. broad, broadly ovate to oblong or suborbicular, obtuse or round at the apex, slightly or deeply cordate at the base, faintly repand-denticulate or crenulate at the margin, glabrous above except for a few hairs along the mid-rib, covered below especially on the veins, and along the margin with long tawny septate hairs; nerves slightly impressed above; mid-rib broad and prominent below; four to five pairs of lateral nerves conspicuous below; reticulation of nervules poorly developed though hardly obscured; petiole pubescent and subequal to lamina; at fruiting time lamina up to 10 cm. long and 7 cm. broad and petiole about three times the length of lamina. Flowers usually precocious. Scape 6–15 cm. long, markedly hairy especially towards the apex; fruiting scape 20–30 cm. long. Calyx 12–15 mm. long, broadly campanulate, cut to the base into oblong to lanceolate hairy lobes, acute or obtuse or even lobed at the apex, usually with a few prominent teeth at the margin, with three, or occasionally five, prominulent and parallel veins. Corolla deep or pale rose-purple, yellowish at the base of the tube, 4–5 cm. long, infundibuliform, covered without with articulate hairs; tube as a rule twice the length of the calyx, sometimes three times the calyx, gradually ampliate from the base upwards; limb 3–3·5 cm. in diameter, with five to six ovate or oblong-ovate, deeply incised lobes. Stamens inserted about 1 cm. from the base of the corolla-tube; filaments 5–7 mm. long, furnished with an occasional long hair; anthers 5 mm. long. Ovary glabrous; style covered on the lower half with long articulate barb-like hairs; stigma reaching the anthers.

Capsule 2–2·5 cm. long, dehiscing by longitudinal prominently veined valves, the veins being slightly spirally twisted.

YUNNAN. On Tsang-chan, above Tali (*Delavay* in 1886 and 1887); eastern flank of the Tali Range (*Forrest* 1800, 4097, 6800, 11572, 15486, 28209, 29127, 30332); Tali, on top of Yin Yo Mt. (*McLaren's Native Collector* No. 61—April 1934); Tali, on top of Wang Mt. of Chao Chou (*McLaren's Native Collector* No. 32—1934).

N.E. UPPER BURMA. N'Maikha–Salwin divide (*Forrest* 18107).

Omphalogramma elegans Forrest in Notes Roy. Bot. Gard. Edin. xiv (1923), 55; Forrest in Journ. Roy. Hort. Soc. xlix (1924), 34; Ward in Gard. Chron. lxxxi (1927), fig. 126 on p. 250—sub *O. Souliei*; ibid., lxxxiv (1928), 274, fig. 125, on p. 267; W. W. Sm. et Forrest in Notes Roy. Bot. Gard. Edin. xvi (1928), 44; W. W. Sm. et Forrest in Journ. Roy. Hort. Soc. liv (1929), 46; ibid., liv (1929), proc. p. cxii; Ward in Plant Hunting on the Edge of the World (1930), 300—sub. *O. Souliei*; Harley in New Flora and Silva, v (1933), 204, fig. lxxiii; Hand.-Mzt. in Sym. Sin. vii (1936), 751; Clay, Present Day Rock Gard. (1937), 413, pl. 31.

Forrest first met with *O. elegans* on the Kui-Chiang–Salwin divide in south-eastern Tibet in 1921, growing in peaty bogs and in alpine pastures on the margins of scrub at 14,000 ft. altitude. He took flowering specimens in July and fruiting ones in October. He found it again the following year, on the same divide, west of Chamatong, in similar habitats, but at a lower altitude of 12,000 ft. Still on the same divide, but this time in north-western Yunnan, Forrest again gathered it in 1924. Subsequently Rock collected *O. elegans* both in Yunnan and in south-eastern Tibet, and Kingdon Ward in the Seinghku Valley in Upper Burma. Ward's specimens were named *O. Souliei*, and when so excellently describing the habit and habitat of the plant in "Plant Hunting on the edge of the World" (l.c.), Ward naturally calls his plant *O. Souliei*. In the following abstract from Ward's book, *O. Souliei* should in all cases, read *O. elegans*:

"On grassy windswept lawns there are sure to be large colonies of that strange and beautiful flower, *O. Souliei*. Unlike other species of this remarkable genus, *O. Souliei* bursts out of the sodden earth in consolidated clumps, and no sooner does the first red spearpoint push through the soil, than it unfolds an enormous flower, of an intense violet colour, white-banded inside the furry throat, whose heavy chin almost rests on the ground. The portly shape and size, and audacious colour of the flower suggest some tropical Bignonia rather than a lady of the snow! At this time the plant is about three inches high, and the whole slope is hackled over with its sheaves, all the flowers gaping in the same direction. After the flowers are over, the heart-shaped leaves unfold, and stem and leaves continue to grow for weeks, the acorn-shaped capsule, which finally opens like a Grecian urn, being hoisted up to a height of two feet. Most Omphalogrammas grow widely scattered in meadow or turf, and are not particularly abundant, though *O. Delavayi* sometimes occurs in great numbers. But for stark reckless profusion, *O. Souliei* in the Seinghku valley beats them all." In all probability Ward is referring to *O. Farreri* when he

speaks of *O. Delavayi*. Ward's figure of these plants growing in the Sienghku valley (l.c. 1927) also refers not to *O. Souliei* but to *O. elegans*.

That these two plants should have been confused is understandable for unquestionably they are closely allied and have in large measure the same geographical range. But the two can be separated readily on foliage characters, the tapering leaf base of *O. Souliei* and the round or cordate base of *O. elegans* are quite constant. The leaves of the latter are always conspicuously hairy; those of *O. Souliei* (excluding var. *pubescens*) quite glabrous.

Even closer is the relationship of *O. elegans* and *O. minus* Hand.-Mzt. These two species have, apparently, almost an identical distribution. Both are to be found in Eastern Tibet on the mountains of the Salwin–Kui-Chiang divide, of the Salwin–Irrawaddy divide and of the Upper Salwin River; in Yunnan, on the Fuchuan Range west of the Mekong–Salwin divide; in Upper Burma in the Seinghku valley; and in the Adung valley on the Burma–Tibet frontier. Rock gathered *O. minus* on Mount Siga in Szechwan where so far *O. elegans* has not been recorded. These collectors, familiar with both in the field pronounced them different, though closely akin. The few who have grown them together in British gardens are of the same opinion. The fruit of *O. minus* is completely diagnostic. It is smaller than that of any other species, being only half the size of *O. elegans*.

Forrest collected seeds in 1921–22 by means of which *O. elegans* was introduced into cultivation in British gardens. In 1928 it received an Award of Merit from the Royal Horticultural Society when shown by Messrs. Oliver and Hunter, Moniaive. However, it has never been anything but a rare plant in culture though the few who have grown it successfully have pronounced it a very free flowerer.

A hairy perennial with a long or short fairly stout rhizome from which spring many fleshy roots and which is girt at the apex by membranous scales; these are usually much fewer in number than in other species, and do not form a long cylindrical collar surrounding the petiole as in such species as *O. Delavayi* and *O. Souliei*. Leaves mostly developing later than the flowers, though sometimes along with the flowers; at flowering time up to 10 cm. long with the lamina up to 6 cm. long and 3 cm. broad, ovate to ovate-lanceolate, obtuse at the apex, cuneate to round or even cordulate at the base, mostly entire but sometimes minutely and remotely hydathode-denticulate at the margin, covered above with long white articulate hairs, much less hairy below, the hairs being confined to the mid-rib and the lateral nerves; mid-rib prominent below; four to six pairs of lateral nerves slightly impressed above and reticulation quite obscured; petiole subequal to and clearly differentiated from lamina, pubescent, sheathing at the base; at fruiting-time lamina up to 10 cm. long and 4 cm. broad with petiole two to three times that length. Flowers mostly precocious, already carried well above the ground when the leaves begin to unfold, though at times the flowers and leaves are coetaneous. Flowering scape up to 15 cm. tall, densely pilose, at first throughout the length of the scape, later especially at the apex; fruiting scape as much as 75 cm. tall. Calyx 10 mm. long, cut almost to the base into six or seven narrowly lanceolate or sublinear acute reddish usually three-nerved hairy lobes which closely clasp the slightly

inflated lower portion of the corolla-tube. Corolla varying in colour from deep violet to ultra-marine with the tube colourless or creamy at the base, and with six or seven cream bands running into the upper portion corresponding to the position of the six or seven stamens; tube 3–3·5 cm. long, downy on the outside, slightly inflated at the base and then gradually ampliate upwards; limb 4–6 cm. in diameter, almost regular or slightly two-lipped with three petals forming the upper lip, and three or four the lower lip, either all lobes slightly reflexed or the lower lobes produced forward; lobes 1·5–2·5 cm. long, 1–1·5 cm. broad, oblong to broadly obovate to elliptic, bilobulate, the lobules entire or slightly toothed. Stamens six or seven, inserted about the middle of the corolla-tube, with filaments, when mature, nearly 10 mm. long and anthers 5 or 6 mm. long; all stamens save one bend their filaments and press the anthers closely round the stigma, the other stamen lying along the middle of the lower half of the tube. Ovary glabrous; style glabrous, slightly curved, stigma reaching the anthers or slightly projecting beyond them. Capsule 2 cm. long, 1 cm. broad, cylindrical, dehiscing by longitudinal valves.

S.E. Tibet. Tsarong; Kui-Chiang–Salwin divide (*Forrest* 19979—*type*, 20857, 21793, 22812); Salwin and Irrawaddy divide, Mt. Kenichunpo, eastern and western slopes (*Rock* 21961); Upper Salwin River, Mt. Kenichunpo, north of Sikitung (*Rock* 22178).

N.W. Yunnan. Salwin–Kui-Chiang divide (*Forrest* 25868); Mekong–Salwin divide, Mount Fuchuan, west of Wei-Hsi (*Rock* 18360, 18362).

Upper Burma. Seinghku Wang (*Kingdon Ward* 6821).

In Herb. Kew:

S.E. Tibet. Salwin and Irrawaddy watershed, Mt. Kenichunpo and region of Champutong (*Rock* 10182).

In Herb. Brit. Mus.:

Burma–Tibet Frontier. Adung Valley (*Kingdon Ward* 9521, 9698).

Omphalogramma Elwesiana (King) Franch. in Bull. Soc. Bot. France, xlv (1898), 179; Balf. f. in Notes Roy. Bot. Gard. Edin. ix (1915), 56—sub *Primula viola-grandis* Farrer et Purdom; McCutcheon in Gard. Chron. lxxxiii (1928), 373; W. W. Sm. et Forrest in Notes Roy. Bot. Gard. Edin. xvi (1928), 44 and in Journ. Roy. Hort. Soc. liv (1929), 46; Bruun, Cytol. Studies in Primula in Sym. Bot. Upsal. i (1932), 125; Harley in New Fl. and Silva, v (1933), 205; Clay in Present Day Rock Garden (1937) 413. *Primula Elwesiana* King ex Watt in Journ. Linn. Soc. xx (1882), 13, t. 12A; Hook, f. in Fl. Brit. Ind. iii (1882), 492; Gard. Chron. xxi (1884), 541, fig. 106; Delavay in Journ. de Bot. iii (1889), 50; Pax in Engl. Bot. Jahrb. x (1889), 210 and in Engl. Pflanzenr. Primulaceae (1905), 110, fig. 31B; Watt in Journ. Roy. Hort. Soc. xxix (1904), 319 and in ibid., xxxix (1913), 201, 203, 210, 213; Balf. f. ibid., xxxix (1913), 162; W. W. Sm. in Rec. Bot. Surv. India, iv (1913), 328, 334, 393; Balf. f. in Notes Roy. Bot. Gard. Edin. ix (1915), 56—sub *P. viola-grandis* Farrer et Purdom; Farrer in Engl. Rock Gard. ii (1919), 126.

Dr. King's collectors discovered this plant at Gnatong in the Sikkim Himalaya in 1878, and four years later at Chom-na-goo a little below the

Cho La but still on the Sikkim side of the Pass. Watt, describing it as *Primula Elwesiana* (l.c. 1882) deemed it "A very remarkable and beautiful species, quite unlike any other."

Since 1882 every serious collector in Sikkim has recorded the plant, mostly in the neighbourhood of Changu and between 12,000–13,000 feet altitude. Cave and his native collectors have gathered it on several occasions; Wright Smith found it in plenty in 1910; Cooper met with it in 1913 when collecting for Messrs. Bees Ltd., gathering flowering specimens at Changu and fruiting specimens in the region of Sheraothang; from Cooper's seeds plants flowered in Edinburgh in 1915; Major Bailey collected it in 1924 and Colonel Lowndes in 1943. *O. Elwesiana*, however, is not confined to Sikkim for King's collectors recorded it from the Chumbi Valley as long ago as 1884, and Ludlow, Sherriff and Taylor have made a notable extension of its range into south-eastern Tibet, having gathered it on both the Lo La and Tum La. These gatherings were at first diagnosed as *O. minus* Hand.-Mzt. The leaves, however, are oblanceolate, completely glabrous and taper strongly at the base, quite unlike the hairy ovate cordulate distinctly petiolate leaves of *O. minus*.

With *O. Elwesiana* I am also inclined to place a most interesting collection of Kingdon Ward's (K.W. 13951) taken from the Poshing La in Assam in 1938. Little or nothing seems to be known of the Omphalogrammas of Assam for there is only one other gathering known to me, another Ward specimen (K.W. 8234) found in 1928 and dubiously named *O. Forrestii*. I have seen only one Herbarium sheet of K.W. 13951, and this is in the Herbarium of the British Museum. Ward, in his field note, allied it to the Chinese species, especially to *O. Delavayi* Franch. and not to *O. Elwesiana*. The relationship with *O. Delavayi* however, is very remote; if kinship is to be sought with any of the Chinese species, it is with *O. minus* to certain forms of which variable species the Ward plant has a strong resemblance. There is little or no difference in the structure of the flowers, but whereas the leaves of *O. minus* are very hairy on both surfaces and cordulate at the base, those of the Assam plant are glabrous above and taper at the base. Moreover an immature capsule of K.W. 13951 is 1·5 cm. long, rather large even for a fully matured capsule of *O. minus*. On the other hand, whereas the leaves of *O. Elwesiana* in Sikkim and in south-eastern Tibet are always glabrous, those of the gathering from the Poshing La are quite obviously hairy on the lower surface. Apart from this question of pilosity the flowering specimens on the British Museum sheet bear a most striking resemblance to plants of *O. Elwesiana* taken from the classic locality in the neighbourhood of Changu. The relationship with Ward's other Assam gathering, K.W. 8234 from the Delei valley, is, on the whole, more distant. The leaves of the two plants at fruiting time are not unlike, though those of K.W. 8234 are quite glabrous. But whereas the Delei valley plant is obviously precocious, K.W. 1395 is just as obviously coetaneous. Moreover the shape of the flowers is very different. On the whole, therefore, it would seem that until further collections are made in Assam, K.W. 13951 is best regarded as a hairy leaved variety of *O. Elwesiana* which I designate as

O. Elwesiana var. assamicum Fletcher varietas nova; a typo foliis subtus pubescentibus differt.

Assam. Poshing La (*Kingdon Ward* 13951—*type* of *var.* in Herb. Brit. Mus.).

Apart from *O. Farreri*, *O. Elwesiana* is the only species of which anything is known cytologically; doubtfully the somatic number of chromosomes is 96 (Bruun l.c.).

From the time of its first flowering in Edinburgh it has been in cultivation intermittently. In some gardens—Mr. Harley's Perthshire garden for instance—it has grown vigorously and formed large clumps. But always has it been shy to flower.

A perennial plant with a long or short stout rhizome from which spring numerous thick fleshy roots and which is crowned at the apex with membranous imbricate scales which embrace the petioles. Leaves 2–10 cm. long, in fruit up to 20 cm. long, 1–2·5 cm. broad, oblanceolate, round or obtuse at the apex, entire or obscurely denticulate and faintly cartilaginous at the margin, tapering at the base into the broad winged petiole, shorter than or subequal to the lamina, glabrous on both surfaces; mid-rib conspicuous above, very broad and prominent below; four to five pairs of lateral nerves and the reticulation obscure and poorly developed. Scape coetaneous with the foliage, 4–12 cm. long at flowering time, up to 40 cm. long at fruiting time, green at the apex, and there covered with crimson hairs, tinged with red towards the base and there covered with white hairs. Calyx 7–8 mm. long, green, hairy, cut to the base into five to six lanceolate lobes. Corolla purple, the inside of the tube pale lemon, 3–3·5 cm. long, infundibuliform; tube three times the length of the calyx, gradually ampliate from the base, covered on the outside with crimson hairs; limb 2–3 cm. in diameter with five to six oblong to obovate emarginate and slightly incised-dentate lobes hairy at the margin, at first semi-erect later quite patent. Stamens, five or six, inserted in the middle of the corolla-tube; filaments 5 mm. long, glabrous; anthers 3 mm. long. Ovary and style glabrous, the stigma reaching the anthers. Capsule 1·5–2 cm. long, dehiscing by longitudinal valves.

Sikkim Himalaya. Gnatong, 23rd June 1878 (*Dongboo*); Chom-na-goo, a little below Cho-La, on the Sikkim side, 1st July 1882 (*King's collector*); Changu, Kapup (*Cooper* 60); below Sheraothang (*Cooper* 805); Changu (*Nat. Coll.* 1814); Changu (*Bailey* in 1924); 2 m. above Changu (*Lowndes* 744).

S.E. Tibet. Tum La, Nayu (*Ludlow, Sherriff and Taylor* 5786, 5774); Lo La, Singo Sambo, Lo Chu valley, nr. Molo (*L. and S.* 1891).

In Herb. Kew:

Sikkim Himalaya. Changu to Kapup (*B. J. Gould* 2012).

In Herb. Brit. Mus.:

Sikkim Himalaya. Changu, Gangton, Yatung (*Ludlow and Sherriff* 10106); 2 miles above Changu, Yatung Rd. (*L. and S.* 10088); 4 miles east of Changu (*L. and S.* 11151).

S.E. TIBET. Lo La (*L. and S.* 2668); Kongbo Province, Dryang La (*L., S. and Elliot* 14307); Chumbi, Gy-ak-ring-boo (*King's collector* in 1884).

Omphalogramma Farreri Balf. f. in Notes Roy. Bot. Gard. Edin. xiii (1920), 23; Farrer in Gard. Chron. lxx (1921), 161; McDouall, ibid., lxxiii (1923), 331, fig. 159—sub *O. Delavayi*; McCutcheon, ibid., lxxxiii (1928) 373; Cox in The Garden, lxxxviii (1924), 678–9, with figs.; W. W. Sm. and Forrest in Notes Roy. Bot. Gard. Edin. xv (1927), 255 and ibid., xvi (1928), 44, and in Journ. Roy. Hort. Soc. liv (1929), 46; Cox, Plant Introd. Reg. Farrer (1930), 71; Bruun, Cytological Studies in Primula in Sym. Bot. Upsal. i (1932), 135; Harley in New Flora and Silva, v (1933), 204; Clay Present Day Rock Gard. (1937), 413; Wilkie in Gard. Ill. lvi (1934), 177, with figs., and in Journ. Roy. Hort. Soc. lxx (1945), 288, figs. 93, 94; Kingdon Ward in Journ. Roy. Hort. Soc. lxxi (1946), 325—sub *O. Delavayi.*

Balfour's diagnosis of *O. Farreri* is based on two of Farrer's collections from the Hpimaw and Chimili High Alps in north-east Upper Burma on 24th June 1919—*Farrer* 1053 and 1169. Farrer did not know the Tali *O. Delavayi*; but he had Franchet's original diagnosis of this species, and on the ticket of F. 1053, he wrote: "I cannot . . . separate the plant from *O. Delavayi* as I should like." Consequently Farrer named both gatherings *O. Delavayi.* When, the following year, Balfour described them under the name of their collector, he related them to *O. Delavayi*, but did not comment on any differences of any kind between the two species. Differences there certainly are if one compares the original material of the two. *O. Delavayi* is girt at the base by numerous overlapping membranous scales which form a collar some 5 cm. long surrounding the scape and the very young leaves which are just starting to develop; such scales as there are in F. 1053 are at most 1 cm. long, whereas those of F. 1169, even though some of them reach 4 cm. in length are much narrower and much less conspicuous than those of the other species. The corolla-tube of *O. Delavayi* is about twice as long as the calyx, the lobes of which are sometimes quite markedly toothed; Farrer's two gatherings have corolla-tubes about three times the length of the calyx, which has entire lobes. Towards the base of the style in the Tali plant, there is an abundance of tawny articulate hairs; just a few such hairs are present in the same position in Farrer's plant. There seems to be little in the outline of the leaves of the two—both are broadly ovate to suborbicular—though *O. Farreri* has an obviously much more cordate leaf-base. There is also a geographical distinction, *O. Delavayi* at that time being known only from the Tali Range. On the evidence available Balfour was no doubt justified in not equating the Farrer and Delavay specimens.

Since that time ample material has been collected of the two plants, Forrest on several of his expeditions gathering *O. Delavayi* from the Tali Range and *O. Farreri* from the western flank of the N'Maikha–Salwin divide in 1924–25, the two localities being separated by some 150 miles of longitude, and by the two large ranges of the Salwin–Mekong divide and the Mekong–Tali divide. The geographical separation, however, is not clear-cut, for Forrest also found *O. Delavayi* (F. 18107) on the N'Maikha–Salwin divide in June 1919—by a strange chance in the very same month

that Farrer had made his two gatherings of *O. Farreri*. On his field note Forrest then called F. 18107 *O. Delavayi*, though later he changed his mind and named it *O. Farreri*. The writer believes that Forrest's original naming of this gathering was correct, for it has the two main characters which seem to be diagnostic for *O. Delavayi* and which serve to separate the two species, if distinct species they really are.

Forrest, being thus familiar with the two plants, gave it as his opinion that though closely related, the two were yet distinct, and he and Wright Smith discuss this point in some detail in Notes from the Royal Botanic Garden, Edinburgh, vol. xv, p. 255 (1927). They give four points of difference which they feel may be of service in distinguishing the two, differences which may be due to climatic conditions as the Tali Range is drier and colder than the frontier range.

1. "The sheathing basal scales are much more in evidence in *O. Delavayi*, as noted also by Farrer." On the whole, this is so; the scales of *O. Farreri* usually are neither so large nor so numerous as those of *O. Delavayi*.

2. "The flowers of *O. Delavayi* are most often precocious; it is only seldom that the young leaves appear with the flower; in *O. Farreri* the leaves are generally coetaneous." This is not the case; in every collection of *O. Farreri* in the Edinburgh Herbarium, the flowers are precocious though sometimes the leaves develop very rapidly in the wake of the flowers. In culture, *O. Farreri* commences to flower as early as January, and is in full bloom when the leaves are still in young development.

3. "The leaves of *O. Farreri* are usually orbicular, often broader than long, with a very pronounced cordate base. As Farrer, says, the appearance is violoid." To some extent this is true, but it is not a sound distinction; *Forrest* 27014 (in young fruit) from Upper Burma, and *Forrest* 28209 (also in fruit) from the Tali Range, are indistinguishable in every way on leaf characters. (But there is a character by which these fruiting specimens *can* be separated—see below.)

4. "The incisions in the corolla-lobes of *O. Delavayi* are usually more regular." This character again appears to be far too variable to be in any way satisfactory.

After a careful examination of all the material of these two plants in the Edinburgh Herbarium it seems to the writer that the two characters which best served to separate the original collections apply consistently and most satisfactorily with all subsequent gatherings; the length of the corolla-tube especially in respect to the calyx, and the pilosity of the style. The corolla-tube is usually twice the length of the calyx (occasionally three times) in *O. Delavayi*, and usually three times the length of the calyx (occasionally four times) in *O. Farreri*. As a corollary to this difference in length of the corolla there is a difference in the lengths of the filaments and the point of their attachment to the corolla-tube, in the two plants. In the former species the filaments are 5–7 mm. long and inserted 10 mm. from the base of the tube; in the latter species 10 mm. long and inserted 15 mm. from the base. As for the hairs on the style the lower half of the style in *O. Delavayi* is very markedly pilose, whereas it is glabrous or carries

a few hairs in *O. Farreri*. This applies to specimens in young fruit which still retain the style, and is the character by which *Forrest* 27014 can well be distinguished from *Forrest* 28209, even if one did not know where the two had been gathered (see above).

O. Farreri was introduced into European culture through seeds of *Farrer* 1053. Sown in 1920, plants flowered in Edinburgh in August 1921—somewhat out of season. Usually it blooms in the earlier months of the year, as early as January sometimes, and is, in fact, the first species to flower. Plants flourished in Edinburgh for many years, but seed was seldom set. It is now no longer in cultivation in Edinburgh, and is doubtfully so in any garden.

A hairy perennial with a long stout rootstock bearing many thick fleshy roots and girt at the apex with membranous imbricate scales (neither so large nor so many as those in *O. Delavayi*) which surround first the scape and later the petioles. Leaves usually appearing when the flowering scape is more or less fully developed; at flowering-time up to 10 cm. long, with the lamina 3–4 cm. long and broad, rotundate-cordate, "violoid"—ex Farrer, round obtuse or even acute at the apex, very deeply cordate at the base, slightly crenulate at the margin, covered above and below with long rufous articulate hairs; mid-rib and five to six pairs of lateral nerves impressed above, prominent below; petiole subequal to lamina or nearly twice as long, conspicuously articulate-hairy; at fruiting time lamina 5–10 cm. long and broad, with the margins distinctly waved; petiole two to three times the length of lamina. Flower precocious, scape 10–12 cm. long, thickly coated with hairs especially at the apex; fruiting scape up to 40 cm. long. Calyx 8–20 mm. long, broadly campanulate, cut nearly to the base into six to seven lanceolate lobes, acute at the apex, usually entire though occasionally toothed, pubescent, green tinged with red, with three or occasionally five prominent parallel veins. Corolla deep rose-purple or violet, yellowish at the base of the tube, 4–6 cm. long, infundibuliform, covered on the outside with the characteristic articulate hairs; tube usually three, sometimes four, times the length of the calyx, gradually ampliate from the base upwards; limb 2·5–4·5 cm. in diameter, with six to seven oblong or ovate irregularly incised-dentate lobes, when fully mature the upper three lobes reflexing backwards along the tube, the lower lobes projecting slightly forward. Stamens inserted 1·5 cm. above the base of the corolla-tube; filaments 10 mm. long; anthers 5 mm. long. Ovary glabrous; style glabrous, or with an occasional long hair; stigma reaching the anthers. Capsule 2·5 cm. long, dehiscing by longitudinal prominently veined valves, the veins slightly spirally twisted.

N.E. Upper Burma. Hpawshi Bum (*Farrer* 1053—*type*); Hpimaw and Chimili High Alps (*Farrer* 1169); western flank of the Chimili, N'Maikha–Salwin divide (*Forrest* 24651, 26860, 27014, 27280, 27294); M'Maikha–Salwin divide N.E. of Hpimaw (*Forrest* 29646); sine loc. (F. 29879); Valley of the Chawng-Maw-Lka, Imaw Bum ridge, E. flank (*Kingdon Ward* 3186).

Omphalogramma Forrestii Balf. f. in Notes Roy. Bot. Gard. Edin. xiii (1920), 23; W. W. Sm. et Forrest, ibid., xvi (1928), 44; and in Journ. Roy. Hort. Soc. liv (1929), 46; Clay, Present Day Rock Gard. (1937), 414.

O. Forrestii was discovered by Forrest on the Chungtien plateau of north-western Yunnan in 1913, growing in open stony pastures at 13,000 ft. altitude. Forrest collected both flowering and fruiting specimens in 1913 and further flowering plants the following year a few miles to the south. In 1918 Forrest again met with it, this time in the moist open alpine pastures of the Muli mountains of south-west Szechwan. These few gatherings are quite constant—luscious plants with long-petioled leaves up to 20 cm. long, the blades of which are ovate to ovate-oblong, round or cordulate at the base, undulate or dentate-crenate at the margin, glabrous above and pubescent along the main veins below, and with great ruddy-purple flowers carried on sturdy scapes up to 20 cm. tall. As such it can readily be separated from all other members of the genus. However, there is some doubt as to its exact taxonomic status. Although Smith and Forrest (l.c.) listed it as a species they were inclined to the belief that it was but a subspecies of *O. Souliei* Franch. This may be so. Certainly there is much similarity between the flowers of *O. Souliei* and *O. Forrestii* both possessing a stigma which as a rule projects well ahead of the anthers and may even be exserted beyond the mouth of the corolla. But whereas the filaments of the stamens of *O. Forrestii* are quite glabrous those of *O. Souliei* are glandular, often very markedly so. Vegetatively the two are very distinct, *O. Souliei* always producing leaves which gradually taper at the base into the broadly winged petiole which, at flowering-time at any rate, can scarcely be differentiated from the lamina. Among the very ample representation of this species in the Edinburgh Herbarium there is not one single leaf at all comparable with the leaves of *O. Forrestii*. Moreover the leaves of the latter plant are pubescent on the lower surface, whereas those of typical *O. Souliei* are quite glabrous on both surfaces. No comparison can be made with the hairy-leaved variety of *O. Souliei* (var. *pubescens*) for here again the tapering leaf base clearly separates it from *O. Forrestii*. It seems to the writer that there is as close, or even closer a relationship with *O. elegans* Forrest, as a comparison of the Muli mountain gathering of *O. Forrestii* with the type of *O. elegans* from the Salwin–Kui-chiang divide in Eastern Tibet well shows. Though the flowers of the Muli plant are of greater magnitude, the leaf shape is the same in the two. But whereas the leaves of *O. elegans* at flowering time are always hairy on both surfaces, those of *O. Forrestii* are quite glabrous above.

Thus *O. Forrestii* is most closely allied to *O. elegans* and *O. Souliei*. But because it cannot be reduced satisfactorily to either species, even as a subspecies or a variety, and because there are characters which readily serve to separate it from either of these species, and from every other species in the genus, one can but allow it, meantime, specific rank.

Reference must be made to a plant gathered by Kingdon Ward in the Delei valley of Assam in 1928 (*Ward* 8234) which possibly represents this species even though it deviates to some extent from the typical plant. The most obvious difference is that whereas the leaves and flowers of *O. Forrestii* from the Chungtien and from Muli are coetaneous, Ward's plant is markedly precocious. It must be remembered, however, that an apparent difference in the respective times of flower and leaf production in this genus is not a fundamental distinction; *O. elegans* and *O. minus*, for instance, may produce their flowers either before the leaves, or at the same

time; the type of *O. Delavayi* is quite obviously precocious, whereas some of Forrest's plants of this species from near the type locality have quite well-developed leaves at early flowering time.

From seeds collected by Forrest in 1913 Messrs. Bees endeavoured to introduce *O. Forrestii* into cultivation. But though plants were raised they were never brought to the flowering stage and did not long remain in culture.

A perennial with a long stout rootstock from which arise many thick fleshy roots and which is girt at the apex at flowering time by a sheath of imbricate membranous reddish-brown oblong scale-leaves of the bulb-like resting-bud. Leaves coetaneous with the flowers, up to 20 cm. long at flowering-time, increasing in size after flowering; lamina 4–10 cm. long, 2·5–5 cm. broad, oblong-ovate or ovate or oblong-elliptic, obtuse, margin obscurely undulate or widely dentate-crenate and sparsely glandular-ciliate, base cuneate rounded or shallowly cordate, upper surface glabrous, lower surface pubescent especially along the main veins; mid-rib broad and conspicuous; five to six pairs of lateral veins slightly impressed above, prominent below; reticulation poorly developed and more or less obscured; petiole subequal to or nearly twice the length of lamina from which it is abruptly distinct, glabrous or sparingly gland-hairy, membranously winged, vaginate at base. Scape up to 25 cm. tall at flowering-time, and up to 65 cm. at fruiting time, densely hairy beneath the calyx with a few scattered hairs elsewhere. Calyx usually 1 cm. long, sometimes up to 1·3 cm., campanulate, densely clad with short hairs on the outside, cut to the base or nearly so into six lanceolate, obtuse, three-nerved, gland-ciliate lobes. Corolla wine-purple with a yellow tube, 5–7 cm. long, infundibuliform, outside and inside slightly gland-hairy; tube about four times the length of the calyx, ampliate upwards from just above the base and often abruptly expanding above the middle into the wide throat; limb more or less 5 cm. in diameter, of six slightly unequal broadly ovate or elliptic or nearly rounded lobes, bifid obscurely crenulate and sparingly ciliate. Stamens six, inserted just above middle of corolla-tube; filaments broad, about 7 mm. long, glabrous; anthers 5 mm. long. Ovary glabrous, tapering into the long glabrous style; stigma reaching the stamens or projecting a little way beyond. Capsule 2 cm. long, strongly ribbed, splitting by longitudinal valves.

YUNNAN. Mountains of the Chungtien plateau (*Forrest* 10666—*type*, 11285, 12703).

S.W. SZECHWAN. Muli Mountains (*Forrest* 16857).

?ASSAM. Delei Valley (*Kingdon Ward* 8234).

In Herb. Brit. Mus.:

YUNNAN. Mountains west of Hsiao Chungtien (*Rock* 24841).

Omphalogramma minus Hand.-Mzt. in Anz. Akad. Wiss. Wien. Math.-Nat. lix (1922), 248; W. W. Sm. et Forrest in Notes Roy. Bot. Gard. Edin. xiv (1923), 56; Forrest in Journ. Roy. Hort. Soc. xlix (1924), 34; W. W. Sm. et Forrest in ibid., liv (1929), 46; and in Notes Roy. Bot.

Gard. Edin. xvi (1928), 44; Harley in New Fl. and Silva, v (1933), 205; Hand.-Mzt. in Sym. Sin. vii (1936), 751; W. W. Sm. in Notes Roy. Bot. Gard. Edin. xix (1937), 220; Clay, Present Day Rock Gard. (1937), 414.

The distribution of *O. minus* is in large measure that of the closely allied *O. elegans*. First collected by Dr. Handel-Mazzetti in 1916 in Yunnan on the mountains between the Salwin and Irrawaddy Rivers, it was found five years later by Forrest in eastern Tibet on the Salwin–Kui-Chiang divide. Since that time several gatherings have been made both in Yunnan and Tibet, by Forrest, Rock and McLaren's native collectors on the Fuchuan Range, by Rock on the mountains of the Salwin and Irrawaddy divide and by Ludlow, Sherriff and Taylor on the Chubumbu La, the Lo La and the Tamnyen La. In Upper Burma it is a member of the Omphalogramma population of the Chawchi Pass, for there Farrer gathered it. Ward also found it in the Seinghku Valley where *O. elegans* has not as yet been recorded. Neither has *O. elegans* been recorded for Szechwan; but a fruiting plant, taken by Rock on Mount Siga, north-east of Kulu, is almost certainly *O. minus*.

Handel-Mazzetti's original diagnosis related it to *O. Coxii* and to *O. Souliei*, from both of which it is very distinct. Much more closely allied is *O. elegans*. As a rule the two plants can be separated readily, for *O. minus* is smaller in all its parts, especially the leaves and the flowers. Usually the calyx is only half the size of that of *O. elegans* whilst the corolla-tube is very slender, uniformly and narrowly cylindrical, and is in no wise ampliate towards the apex. But sometimes, as on the Fuchuan Range, *O. minus* increases in stature, and then it is by no means easy to draw the line between it and its ally, at any rate, when the two are in flower. In fruit, however, there is no mistaking them. Even the most elegant plants of *O. minus* from the Fuchuan Range produce capsules which are smaller than any other in the genus, usually at most 1 cm. long and thus half the size of those of *O. elegans*. The small capsule of *O. minus* is, in fact, completely diagnostic.

Likewise closely akin is *O. Elwesiana* the Sikkim representative of the genus which also extends into south-eastern Tibet. Floristically the two are almost identical, and at early flowering-time, before the leaves fully emerge from the sheathing basal scales, the two plants are extraordinary alike, so much so that Ludlow, Sherriff and Taylor's specimens (*L., S. and T.* 5786) of *O. Elwesiana* from the Tum La, S.E. Tibet, were named *O. minus*. Foliage characters, however, serve to distinguish the two plants, the glabrous oblanceolate leaves of *O. Elwesiana*, strongly tapering at the base, being very different from the hairy cordulate leaves of *O. minus* with their distinct petioles.

Seeds of this species have been collected on several occasions—by Farrer in 1920, Forrest in 1921–22, Rock in 1929 and 1932, and by Ludlow, Sherriff and Taylor in 1938—so that it has been intermittently in cultivation for nearly thirty years. Those who have grown it successfully find that it flowers more or less at the same time as *O. vincaeflora* but is not nearly so attractive.

A hairy perennial with a stout and frequently much branched rhizome from which spring many fleshy roots; the rhizome is crowned at the apex

by numerous membranous ovate to oblong overlapping scales, 1–4 cm. long, which form a conspicuous sheath round the developing foliage; this sheath is much more prominent than in *O. elegans*. Leaves developing either at the same time as the flower, or a little later; at flowering-time usually up to 5 cm. long, though sometimes up to 15 cm. long, with the lamina 2–3 cm. long and 1–2 cm. broad, or in the larger leaved specimens up to 6 cm. long and 3 cm. broad, broadly ovate, round or obtuse at the apex, subtruncate or slightly cordate at the base, conspicuously ciliate and frequently wavy at the margin, covered above with long reddish articulate hairs, the hairs below mostly confined to the mid-rib and the lateral nerves; mid-rib broad and conspicuous below; five to six pairs of lateral nerves slightly impressed above and reticulation more or less obscured; petiole at first subequal to but later nearly twice as long as lamina from which it is well differentiated, pilose, broad and sheathing at the base; at fruiting time leaves hardly increasing in size. Flowers developing with the leaves or slightly precocious; flowering scape as a rule 5–10 cm. long, sometimes up to 15 cm., markedly pilose especially at the apex; fruiting scape often between 10–20 cm. long, sometimes up to 50 cm. or even 75 cm. long. Calyx most often 5–7 mm. long, occasionally 10 or even 12 mm. long, campanulate, cut nearly to the base into five or six linear-lanceolate acute three-nerved pilose teeth. Corolla deep indigo-purple or rose-purple, the tube and eye darker or sometimes the eye greenish-yellow; tube 2–2·5 cm. long, uniformly and narrowly cylindrical and not ampliate from the base upwards; limb 2–3 cm. in diameter, of five or six patent lobes, 7–10 mm. long, 3–6 mm. broad, broadly ovate to oblong, shortly bilobed or irregularly incised at the apex. Stamens five or six, inserted just above the middle of the corolla-tube; filaments 4–6 mm. long; anthers 3 mm. long, their tips reaching the mouth of the corolla or even slightly exserted. Ovary glabrous; style glabrous; stigma on a level with the anthers. Capsule most frequently 5–10 mm. long, occasionally up to 15 mm. long, broadly cylindrical, dehiscing by longitudinal valves.

Eastern Tibet. Tsarong, Salwin–Kui-Chiang divide (*Forrest* 20047, 29341, 20846, 21795, 22864); Salwin and Irrawaddy divide, eastern and western slopes of Mt. Kenichunpo (*Rock* 21941); Upper Salwin River, Mt. Kenichunpo; mountains west of Champutong (*Rock* 22512, 22527); Upper Salwin River, northern slopes of Mt. Kenichunpo, north of Sikitung (*Rock* 22544); Takpo province, Chubumbu La, nr. Langong (*Ludlow, Sherriff and Taylor* 3970); Tamnyen La, Kongo Province (*L., S. and T.* 4923, 4923a).

Szechwan. Mount Siga, north-east of Kulu (*Rock* 18134).

Yunnan. Mekong–Salwin divide, Mt. Fuchuan, south-west of Wei-Hsi (*Rock* 16994, 17045); Fuchuan range, west of the Mekong–Salwin divide and west of Wei-Hsi (*Rock* 22742, 23263); Fuchuan Shan (*Forrest* 30338, 30341, 30343); Fuchuan Mt. (*McLaren's Native Collector* 70, 90); Mak'a Ho, Wei-Hsi (*McLaren's Native Collector* 205).

Burma. Seinghku Wang (*Kingdon Ward* 7004); Chawchi Pass (*Farrer* 1697, 1673—*pro parte*, 1699—*pro parte*).

In Herb. Kew:

Eastern Tibet. Salwin–Irrawaddy watershed, Mount Kenichunpo and region of Champutong (*Rock* 10185).

In Herb. Brit. Mus.:

Burma–Tibet Frontier. Adung Valley (*Kingdon Ward* 9731).

Omphalogramma pilosum Fletcher, sp. nov. Plate CCLXIV.

Species affinis *O. Coxii* Balf. f. a qua scapis folia longe excedentibus, filamentis stylisque valde pilosis recedit.

Planta perennis pilosa rhizomate satis crasso squamis ovatis vel oblongis 4–6 cm. longis apice bene obtecto. Folia sub anthesin 10–20 cm. longa petiolo incluso; lamina 4–9 cm. longa, 3–5 cm. lata, late ovata vel ovato-oblonga, apice rotundata vel obtusa, margine undulata atque hydathodis conspicuis crenulata, basi alte cordata vel nunc cuneata, supra pilis articulatis undique bene munita infraque ad venas, costa latissima, nervis 6–8-paribus; petiolus laminam subaequans vel duplo superans, bene discretus, basi vaginatus, pilosus. Flores una cum foliis enascentes vel paulo serius. Scapus 20–35 cm. altus, undique pilosus. Calyx 1·5–1·7 cm. longus, campanulatus, in lobos anguste lanceolatos pilosos 3–5 nervios ad imum fissus. Corolla clare amethystino-rubra valde glanduloso-pilosa; tubus 2·5–3 cm. longus, calycem plerumque duplo superans, pilosus, basi latiusculus, supra leviter dilatatus; limbus 3–3·5 cm. diametro, lobis sex ovato-oblongis vel oblongis circ. 1·5 cm. longis 1 cm. latis alte et crebre incisis. Stamina ad medium tubum inserta, filamentis 7 mm. longis conspicue glanduloso-pilosis, antheris 5 mm. longis. Ovarium pilos articulatos paucos apice exhibens, stylo dense glanduloso-piloso, stigmate ab antheras attingente vel paulo superante.

U. Burma. Chawchi Pass (*Farrer* 1699, *pro parte—type* in Herb. Edin.).

For a discussion on this species see *O. Coxii* Balf. f.

Omphalogramma Souliei Franch. in Bull. Soc. Bot. Fr. xlv (1898), 180; Balf. f. in Notes Roy. Bot. Gard. Edin. ix (1915), 56—sub *Primula viola-grandis* Farrer et Purdom; Forrest in Journ. Roy. Hort. Soc. xlix (1924), fig. 8; W. W. Sm. et Forrest in Notes Roy. Bot. Gard. Edin. xvi (1928), 44; W. W. Sm. et Forrest in Journ. Roy. Hort. Soc. liv (1929), 46; ibid., lv (1930), proc. p. cxlvi; Hand.-Mzt. in Sym. Sin. vii (1936), 751; Clay, Present Day Rock Gard. (1937), 414; Fletcher in Gard. Illust. lxiii (1941), 555, with fig. *O. Franchetii* Harley in New Fl. and Silva, v (1933), 205. *Primula Franchetii* Pax in Engl. Pflanzenr. Primulaceae (1905), 108; Gard. Chron. xlvi (1909), 344; Balf. f. in Journ. Roy. Hort. Soc. xxxix (1913), 133; Farrer, Engl. Rock Gard. ii (1919), 132; Gard. Chron. lxxx (1926), 386, fig. 177 on p. 385.

Franchet described this species in 1898 at the same time as he constituted his new genus *Omphalogramma*. But Pax in his monograph of the Primulaceae seven years later, did not regard the four plants in *Omphalogramma* as generically distinct from Primula and had perforce to find a new name for the plant which Franchet had described as *O. Souliei* for there was already a *Primula Souliei* named and described by Franchet and based on a collection of Soulié's from Tatsienlu (S. 382). *P. Franchetii* was the name

Pax chose, a name which was to cling to the plant for at least the next twenty years, for we find it illustrated thus in the Gardeners' Chronicle for 1926.

Franchet's diagnosis of *O. Souliei* states that Soulié gathered it "ad flumen Mekong prope Sela, haud procul ab Yerkalo; fl. 15 Jul." There is no information as to the year of collection, but this must have been 1890–91. Round about that time Soulié also gathered the plant in the neighbourhood of Tsekou, for one such gathering is in the Edinburgh Herbarium. And it was behind the Tsekou mission that Forrest gathered it on his first expedition in 1904 (F. 685). On subsequent journeys Forrest frequently collected it in Yunnan on the mountain ranges of the Mekong–Salwin divide, the Yangtze–Mekong divide, as well as on the Salwin–Kui-Chiang divide of south-eastern Tibet. Rock also, on many occasions, has met with the plant in the mountains of south-eastern Tibet. It is a denizen of moist shady and stony alpine pastures, frequently on the margin of pine forest, at elevations of from 12,000–14,000 ft. and throughout its range shows certain variability in respect to size of flower and of leaf. But no matter what be the size of flower, the stigma is always markedly exserted, more so than in any other species; and no matter what be the size of the leaf, it always tapers at the base into the broadly winged petiole. In spite of Franchet's statement concerning the leaves, ". . . ad marginem et ad nervos praecipue parce pilosula . . ." the Soulié specimen in the Edinburgh Herbarium has leaves which are quite glabrous and this character is perfectly consistent for the great majority of the gatherings.

However, in 1911, Kingdon Ward found on the Salwin–Mekong divide a plant (K.W. 98) which differs only in having pubescent foliage. Forrest gathered the same plant in 1917, also on the Mekong–Salwin divide, growing among typical *O. Souliei*, and both glabrous and pubescent specimens are represented under *Forrest* 14065 and F. 16347, the latter gathered in 1918. In this year Forrest collected magnificent examples of the hairy-leaved plant in south-west Szechwan, in the mountains around Muli. Since then Rock has recorded it from the Tsarung Border of Yunnan and south-east Tibet. I interpret these gatherings as a hairy-leaved variety of *O. Souliei* (var. *pubescens*) which is to be found throughout the range of the species but which extends into S.W. Szechwan where *O. Souliei* has not yet been recorded.

The relationship of *O. Souliei* to *O. Forrestii* is discussed under the latter species. There is also strong kinship between *O. Souliei* and *O. elegans* and to some extent the geographical range of the two is coincident, both having been recorded, for instance, from the Kui-Chiang–Salwin divide in south-eastern Tibet and from Mount Fuchuan in N.W. Yunnan. Forrest, familiar with both in the field, expressed the opinion when he described *O. elegans* that it was perhaps only a variety of *O. Souliei*. This latter plant has far larger flowers; even when particularly handsome flowers of *O. elegans* approach in size those of *O. Souliei*, the much further exserted stigma of the latter is still diagnostic. Moreover, at flowering-time the leaves of *O. Souliei* are always conspicuously tapering at the base, and this applies both to the glabrous species and the pubescent variety. On the other hand *O. elegans*, always markedly hairy, has the leaf-blade round or even cordulate at the base and carried on a distinct petiole.

Since Forrest first collected seed in 1914 *O. Souliei* has been in cultivation intermittently. But it has always been a rare plant, and as a rule has not produced the splendid blossoms of native specimens. It is still to be found in a few gardens, notably in the Perthshire garden of Mr. A. Harley who reports that the species is not so free flowering as either *O. elegans* or *O. vincaeflora*.

A perennial with a long or short stout rhizome producing numerous thick fleshy roots and girt at the apex with a collar of oblong membranous overlapping scales, up to nearly 10 cm. long, which sheath the developing foliage and later the petioles of the mature leaves. Leaves developing at the same time as or a little later than the flowers; at the time of flowering up to 20 cm. long including the petiole and 5 cm. broad with the lamina ovate to elliptic to oblong, acute or obtuse at apex, entire or remotely hydathode-denticulate at the margin, gradually tapering at the base into the broadly winged petiole which is subequal to though hardly separable from the lamina, glabrous on both surfaces, rather fleshy in texture, much paler on the lower surface than on the upper; mid-rib and five to six pairs of lateral nerves more or less impressed on the upper surface, prominent below; at fruiting time leaves up to 30 cm. long, with the petiole subequal to or half as long again as the lamina from which it is quite distinct. Flowers either precocious or developing with the leaves; flowering scape up to 35 cm. tall, thickly covered towards the apex with red septate glandular hairs; fruiting scape up to 60 cm. tall, very stiff and erect. Calyx 5–12 mm. long, campanulate, glandular-pilose, cut practically to the base into five to seven ovate-lanceolate acute or obtuse teeth which closely clasp the slightly swollen base of the corolla-tube. Corolla deep ruddy- or bluish-purple with the base of the tube pale yellow and with yellowish bands inside the tube; tube 2–4 cm. long, glandular-pilose without, gradually ampliate from just above the base upwards; limb 4–6 cm. in diameter, slightly irregular with five to seven spreading lobes, broadly obovate or oblong, deeply or slightly bilobed, entire or irregularly incised. Stamens inserted near the middle of the corolla-tube with the glandular filaments 10 mm. long and anthers 5 mm. long. Ovary glabrous; style glabrous, slightly curved; stigma reaching beyond the level of the anthers and exserted out of the mouth of the corolla. Capsule 2–3 cm. long, broadly cylindrical, dehiscing by longitudinal valves.

N.W. Yunnan. Tsekou (*Soulié*); Mekong–Salwin divide behind Tsekou mission (*Forrest* 685); Mekong–Salwin divide (*Forrest* 13249, 14704, 14065—*pro parte*, 16347—*pro parte*); Litiping, Yangtze–Mekong divide (*Forrest* 16330, 19572, 20988, 30340); Fuchuan Shan (*Forrest* 30342, 30344; *McLaren's Native Collector* 92; *Rock* 17004); Wei Hsi Mt. (*McLaren's Native Collector* 61).

S.E. Tibet. Tsarong: Salwin–Kui-Chiang divide (*Forrest* 19131); Solo-La Range (*Rock* 22257, 22685, 22686); Tsarong Border; Mountains west of the Kaakerpo, Dokerla and Yundshi (*Rock* 23207); Yundshi Mountain (*Rock* 23572, 23618).

In Herb. Kew:

N.W. Yunnan. Mekong–Yangtze divide, Litiping Range, east of

Wei Hsi (*Rock* 8964, 9169); Mountain of Londjre, Mekong–Salwin watershed, adjoining south-eastern Tibet (*R.* 8904).

Omphalogramma Souliei var. **pubescens** Fletcher varietas nova; a typo foliis pubescentibus differt.

S.W. SZECHWAN. Mountains around Muli (*Forrest* 16327—*type* of *var.*).

S.E. TIBET. Western Range of Mekong on Kaakerpo, Dokerla and Tsarung (*Rock* 22971); Forest and alpine region of the Solo-la (*Rock* 22258).

YUNNAN. Mekong–Salwin divide (*Kingdon Ward* 98; *Forrest* 14065—*pro parte*, 16347—*pro parte*); on Sie-la, Mekong–Salwin divide (*Forrest* 20772).

Omphalogramma tibeticum Fletcher, sp. nov. PLATE CCLXV.

Species ex affinitate *O. elegantis* Forrest a qua lobis corollinis oblongis vix vel obscure incisis, stylo valde piloso inter alia divergit.

Planta perennis pilosa, rhizomate crasso sublignoso apice squamis ovatis vel oblongis imbricatis 1–4 cm. longis obsesso. Folia ut videtur una cum floribus nascentia vel paulo serius, adulta petiolo incluso 6–12 cm. longa; lamina ad 7 cm. longa, 4 cm. lata, late ovata vel elliptica, apice rotundata vel obtusa, basi paulo attenuata vel nunc manifestim cordata, integra vel subintegra, supra sparsim pilosa infraque similiter ad venas, costa lata conspicua, nervis lateralibus 4–6 paribus. Scapus 10–18 cm. altus, apice praesertim pilosus. Calyx 1–1·3 cm. longus, campanulatus, pilosus rubellus, in lobos sex lanceolatos vel lineari-lanceolatos acutos vel obtusos plerumque trinervios fere ad imum fissus.. Corolla purpurea, glanduloso-pilosa; tubus 3–4 cm. longus, supra medium valde ampliatus; lobi oblongi vel paulo obovati, obscure emarginati, nunc apiculati vel leviter crenulati. Stamina ad medium tubum inserta, filamentis 10–12 mm. longis glabris, antheris 6–7 mm. longis. Ovarium glabrum pilis perpaucis apice exceptis; stylus apice curvatus, omnino pilosus, stigmate ad stamina pertinente vel paulo superante.

S.E. TIBET. Pome, Showa La; alt. 10,000 ft. 11.6.47 (*Ludlow, Sherriff and Elliot* 13141-*type* in Herb. Brit. Mus.).

Known only by this one collection, the general aspect of *O. tibeticum* is strongly reminiscent of that of *O. elegans* Forrest with which it might well be confused. There is little difference in the foliage save that *O. elegans* has leaves of a greater pilosity. But there are obvious floral contrasts. The lobes of the corolla are as a rule of oblong proportions in the Pome plant and lack the deep emargination so characteristic of the lobes of so many gatherings of *O. elegans*, which moreover has corolla-lobes usually of obovate proportions. Most important of all, whereas the style is quite glabrous in *O. elegans*, it is conspicuously pilose throughout its entire length in *O. tibeticum*. The pilosity of the style invites comparison between this plant and the other species in the genus which exhibit the same character, *O. Delavayi* and *O. pilosum*. From these it is readily distinguished by the shape of the foliage and the lack of a deep incision to the petals.

Omphalogramma vincaeflora Franch. in Bull. Soc. Bot. Fr. xlv (1898), 180; Balf. f. in Notes Roy. Bot. Gard. Edin. ix (1915), 56; Cox in The Garden, lxxxviii (1924), 678, with fig.; McCutcheon in Gard. Chron. lxxxiii (1928), 373, fig. 174; W. W. Sm. et Forrest in Notes Roy. Bot. Gard. Edin. xvi (1928), 44 and in Journ. Roy. Hort. Soc. liv (1929), 46, fig. 56; Wilkie in Gard. Chron. xci (1932), 276, fig. 115 on p. 273; Harley in New Fl. and Silva, v (1933), 204–5 and in Quart. Bull. Alp. Gard. Soc. ii (1933), 57, fig. opposite p. 61; R. B. Cooke in ibid, ii (1933), 104, with fig. opposite; Hand.-Mzt. in Sym. Sin. vii (1936), 751; Clay, Present Day Rock Gard. (1937), 413–4; Arnold in Gard. Chron. cv (1939), 388; Cox, Plant Hunting in China (1945), 179. *O. Engleri* (Knuth) Balf. f. in Notes Roy. Bot. Gard. Edin. ix (1915), 56; W. W. Sm. et Forrest, ibid., xvi (1928), 44, and in Journ. Roy. Hort. Soc. liv (1929), 46; Clay, Present Day Rock Gard. (1937), 413. *O. viola-grandis* (Farrer et Purdom) Balf. f. in Notes Roy. Bot. Gard. Edin. ix (1915), 56; W. W. Sm. et Forrest in ibid., xvi (1928), 44, and in Journ. Roy. Hort. Soc. liv (1929), 46. *O. Rockii* W. W. Sm. in Notes Roy. Bot. Gard. Edin. xv (1926), 97; W. W. Sm. et Forrest in ibid. xvi (1928), 44, and in Journ. Roy. Hort. Soc. liv (1929), 46; McCutcheon in Gard. Chron. lxxxiii (1928), 373; Journ. Roy. Hort. Soc. lxi (1936), 294; Quart. Bull. Alp. Gard. Soc. iv (1936), 277, fig. p. 269; Gard. Chron. cii (1937), 165; Clay, Present Day Rock Gard. (1937), 414. *P. vincaeflora* Franch, in Gard. Chron. 3rd Series, i (1887), 574–5, fig. 108; Forbes et Hemsl. in Journ. Linn. Soc. xxvi (1889), 43; Pax in Engl. Bot. Jahrb. x (1889), 210, and in Engl. Pflanzenr. Primulaceae (1905), 108, fig. 31A; Forrest in Notes Roy. Bot. Gard. Edin. iv (1908), 228, fig. 30A; Gard. Chron. xl (1906), 230, fig. 95; ibid. (1909), 344, with fig.; Forrest, ibid. li (1912), 320 with fig.; Balfour, ibid., liv (1913), 198, fig. 72; Wilson, Veg. West. China (Publ. Arn. Arb. No. 2), (1911), t. 407; The Garden, lxxvii (1913), 500, fig. p. 497; ibid. lxxix (1915), 241, fig. p. 242; Balf. f. in Journ. Roy. Hort. Soc. xxxix (1913), 138, 162, 163, proc. pp. ccxxii, ccxl; Watt, ibid. xxxix (1913), 213; Bot. Mag. (1914), t. 8564; Beauverd in Bull. Soc. Bot. Genève, Ser. II. ix (1917), fig. p. 365; Farrer, Engl. Rock Gard. ii (1919), 194, plate 25. *P. Engleri* R. Knuth in Bot. Jahrb. xxxviii (1907), 340; Balf. f. in Journ. Roy. Hort. Soc. xxxix (1913), 133, 162–3. *P. viola-grandis* Farrer et Purdom ex Balf. f. in Notes Roy. Bot. Gard. Edin. ix (1915), 52; Farrer in Gard. Chron. lvi (1914), 347, fig. 133 and in Eaves of the World, i (1917), 223, fig. facing p. 224, and ibid. ii (1917), 212–13, and in Engl. Rock Gard. ii (1919), 513, fig. facing p. 196.

On the 25th of May 1886 Père Delavay discovered this beautiful plant in Yunnan, on the dividing range between the Langkong and Hoching Valleys, at an elevation of 9,000 to 10,000 ft., "in pratis Lopin-chan, prope Lankong." The following year Franchet named, described and figured it in the Gardeners' Chronicle, under the number *Delavay* 2070, as a new species of Primula. The name testifies to the strong resemblance of the flowers to those of *Vinca major*. Franchet notes its obvious kinship with *Omphalogramma Elwesiana* and *O. Delavayi* (though he called these *Primulas*) and comments on the character which still distinguishes it from all other members of the genus—the absence of a considerable rootstock; there is little or no rhizome and the plant is held in the ground only by a few large

root-fibres. Delavay did not find the plant in any large quantity. Forrest, on the other hand, twenty years later, discovered it in much greater abundance on parts of the eastern flank of the Lichiang Range, and at much higher altitudes of 11,000–12,000 ft. There it formed clumps of from twenty to thirty specimens, growing in sheltered grassy openings in pine forests, especially in situations having a northern exposure. In subsequent years both Forrest and Rock met with it frequently on several of the mountain ranges of Yunnan and Szechwan, sometimes at altitudes of up to 15,000 ft., so that there is abundance of material of it in herbaria, as is evidenced below from the citation of the specimens in Edinburgh.

Throughout its range in Yunnan and Szechwan the plant is subject to considerable variation. Frequently it is perfectly consistent with the plant which Delavay collected; frequently it is of far greater vigour and stature than the plants the French missionary found in the neighbourhood of Lankong. Though usually the leaves are oblong in outline, entire at the margin, and taper at the base into a broadly-winged petiole which can hardly be differentiated from the lamina, it is not infrequent to find leaves with petiole and lamina quite distinct and the latter round or even cordulate at the base and very distinctly crenate at the margin. Typically the lobes of the corolla are broadly obcordate with a shallow but wide and regular emargination, as in the plant which Franchet originally figured. But deviations from this norm are considerable; there may be no emargination of the lobes or they may be crenate or even quite markedly toothed; in addition to which they may vary greatly in length and in breadth. Thus when a combination of many of these variations occurs in any one plant it has the facies of an entirely distinct entity. Such a plant is that which Rock collected in Yunnan in 1923, on the mountain of Labako, west of the Yangtze bend at Shiku (*Rock* 9529), and which Wright Smith named and described as *O. Rockii*. The type has leaves with the petiole clearly differentiated from the lamina which is oblong, round at the apex, regularly sinuate-crenulate at the margin and subrotundate at the base; the corolla-lobes are obcuneate or narrowly obovate and irregularly erose around the apex. Thus this plant has the facies of one clearly removed from the typical *O. vincaeflora*. But in this same year of 1923 Forrest collected further specimens of *O. Rockii* (*Forrest* 23418) in Rock's type locality on the Chienchuan–Mekong divide. Though these have the same type of corolla-lobe as those of *Rock* 9529, yet they have the characteristic leaves of *O. vincaeflora*—oblong to broadly oblanceolate or obovate and usually tapering at the base—with an occasional leaf in no wise different from the leaves of the type of *O. Rockii*. Similarly with plants Forrest collected on the Shui-lu Shan, west of Wei Hsi (plants which Forrest named *O. vincaeflora* in the field) and on the Litiping Range, and which McLaren's native collectors took on Hung Ai Mountain. Obviously foliage characters cannot place *O. Rockii* outwith the orbit of *O. vincaeflora*.

What, then, of the structure of the corolla-lobes? In describing *O. Rockii*, Wright Smith regarded as conspecific two further gatherings of Rock, one on the Litiping Range in the Mekong–Yangtze divide in Yunnan (*Rock* 9180); the other on Wa-erh-dja, in the Muli Kingdom of south-west Szechwan (*Rock* 6465). The former (which has leaves identical in size, shape and every other character, with those of Delavay's original

plants of *O. vincaeflora*) has corolla-lobes varying from narrowly to broadly obovote and slightly crenate or entire around the apex. There is no sign of the conspicuous teeth characteristic of the type of *O. Rockii* and of Forrest's plants from the type locality, from the Litiping Range and from the Shui-lu Shan. Neither is there any sign of the regular and wide emargination of the corolla-lobes of typical *O. vincaeflora*. But such an emargination *is* present in some specimens of *Rock* 6465. In all the corollas of this gathering the lobes are broadly obovate; though some are subentire at the apex, others are as distinctly and deeply emarginate as they are in *Delavay* 2070. Thus there can be no question but that the range of variation within *O. vincaeflora* is wide enough to embrace the type, as well as the two collections regarded as conspecific with the type, of *O. Rockii*.

Rock 6465 further raises the challenge as to the validity or otherwise of *O. Engleri* and *O. viola-grandis*. Knuth named and described the former species (as a *Primula*) from specimens collected by Soulié in 1894 near Tatsienlu in Szechwan, under the number *Soulié* 2237. *O. viola-grandis*, specifically so named by Farrar and Purdom who discovered it in the Siku Alps of Kansu in 1914 (*Farrer and Purdom* 74) received its description in 1915 from Balfour, who discussed both species in some detail.* Though he had not seen specimens of Soulié's material, Balfour was quite convinced of the specific distinctness, as well as of the close kinship, of the Szechwan and Kansu plants. He based his arguments on a comparison of Farrer and Purdom's specimens with Knuth's description. Though he made several points of distinction, none are conclusive and one is quite invalid due to a misreading of Knuth's diagnosis. Balfour credits Knuth with stating that *O. Engleri* has leaves which are rarely petiolate (whereas the leaves of *O. viola-grandis* have fleshy stalwart stalks). What Knuth actually wrote of *O. Engleri* was this:

> "Foliorum lamina 3–5 cm. longa, usque 2 cm. lata, oblongo-ovata, basi rotundata, rarius in petiolum ± abrupte attenuata . . .; petiolus quam lamina 2–3–plo longior, alatus, 6–9 cm. longus, in sicc. 2–4 mm. latus. . . ."

The type of *O. Engleri* (*Soulié* 2237) is (or was) in the Berlin Herbarium, and has not been seen by the writer. However, it was examined by Smith and Forrest in Edinburgh during the course of their revision of the sections of Primula in 1928. They concluded that *O. viola-grandis* was only a form of *O. Engleri* and reduced the name to a synonym of the latter plant. They also equated with *O. Engleri*, a plant in the Edinburgh Herbarium collected by Wilson in 1908 in Szechwan on the uplands of Pan-lan Shan, west of Kuan Hsien and north-east of Tatsienlu (*Wilson* 3150). There is a photograph of *Soulié* 2237 in the Edinburgh Herbarium, and this writer is completely in accord with the findings of Smith and Forrest both as regards the status of *O. viola-grandis* and of the identity of *Wilson* 3150. Farrer and Purdom's plant is nothing more than a starved dwarfed form of *O. Engleri* such as might be expected to occur in the more arid province of Kansu, with flowers, incidentally, exactly matching those produced by *O. vincaeflora* when this plant flowered for the first time in cultivation in Edinburgh from Forrest's seed in 1913 [see Gard. Chron. liv

* Notes Roy. Bot. Gard. Edin. ix (1915), 52.

(1913), fig. 72]; and *Wilson* 3150 is undoubtedly the same as Soulié's Tatsienlu plant. But *Wilson* 3150 is in every way indistinguishable from *Rock* 6465. This latter gathering, as we have seen, must be regarded as conspecific with *O. Rockii* which plant must now be equated with *O. vincaeflora*. It is of interest to note that the plant which, subject to confirmation of name, received an Award of Merit at the Alpine Plant Conference in May 1936, when shown by J. T. Renton, Esq., and which was figured on page 269 in the Alpine Garden Society Bulletin of that year, is identical with both *Wilson* 3150 and *Rock* 6465.*

This, then, is the writer's interpretation of *O. vincaeflora*. Throughout its wide range in Yunnan and Szechwan and its limited distribution in Kansu, it is subject to much variation, chiefly in the size and shape of the leaves and of the corolla-lobes. Occasionally a combination of these leaf and corolla variations produces plants with a facies so different from that of typical *O. vincaeflora* as to merit, to some observers, distinct specific rank, as in the case of *O. Rockii*, *O. Engleri* and *O. viola-grandis*. But because such plants can be related to typical *O. vincaeflora* by an unmistakable chain of intermediate forms, it is obvious that clear-cut entities are not involved, and that we are, in fact, dealing with one very polymorphic species.

O. vincaeflora has proved to be more amenable in culture than any other species of the genus, and has always been in cultivation since Messrs. Bees Ltd. introduced it from Forrest's seed collected on the Lichiang Range in 1908. Flowering for the first time, in Edinburgh, in 1913, it gained an Award of Merit when shown at the Royal Horticultural Society by Professor Balfour. Small as these first flowers were, they were a foretaste of the superb blooms which in the course of a few years were to be seen in British gardens. [See the photographs in volume II of the Alpine Garden Society Bulletin of plants as fine as any native specimens, grown in the Perthshire gardens of Mr. A. Harley (phot. opp. p. 61) and of Mr. J. T. Renton (photo. opp. p. 104).] Under the name *O. Rockii*, and subject to confirmation of that name, plants shown by Mr. Renton received a further Award of Merit from the Royal Horticultural Society in 1936.

A hairy perennial with little or no woody rootstock, but with a large resting bud, sometimes 3 cm. in diameter, anchored into the ground by a few fleshy roots; the base of the plant surrounded by subrotundate, broadly ovate to oblong overlapping brown membranous scales, 1–4 cm. long, which gradually pass into the foliage leaves. Leaves developing later than the flowers, or more or less at the same time; at flowering time 4–20 cm. long, including the petiole, occasionally up to 30 cm. long, 1–5 cm. broad; lamina either hardly separable from petiole and then oblong to broadly oblanceolate or obovate, or clearly differentiated from petiole and then ovate or ovate-oblong to oblong, round at the apex, entire to quite obviously crenulate at the margin, gradually tapering at the base into the

* Recent collections by Ludlow, Sherriff and Elliot show that this dwarf form of *O. vincaeflora* is not confined to Kansu, for in 1947 in the Kongbo province of Southeastern Tibet they gathered plants (*L., S. and E.* 13976) which are indistinguishable in every way from the type of *O. viola-grandis*. Moreover from the Pome district of southeastern Tibet, in the same year, these collectors took plants (*L., S. and E.* 13785) which appear to match exactly those represented in the photograph of Knuth's type of *O. Engleri*.

broadly winged petiole or abruptly cuneate, round or even cordulate at the base, covered on both surfaces with long septate gland-tipped hairs; mid-rib very broad and conspicuous above, prominent below; four to six pairs of lateral nerves clearly visible or obscured, the lowermost main pair entering the blade from the petiole where they run parallel with the veins of the petiole which form the mid-rib of the lamina; petiole always winged but sometimes very broad and hardly to be differentiated from the lamina, at other times very obviously distinct and subequal to, or twice as long as, the blade. Flowers precocious or coetaneous with the leaves, often recalling those of *Vinca major*. Flowering scape 5–20 cm. long, occasionally up to 40 cm. long, green but tinged with purple at the upper end, clothed with spreading hairs which are whitish below, reddish above and all tipped with red glands, fruiting scape up to 80 cm. long. Calyx 3–10 mm. long, campanulate, cut practically to the base into six linear-oblong glandular-pilose lobes each with a fairly prominent mid-rib and a very poorly developed parallel pair of lateral nerves; the lobes either closely clasp the base of the corolla-tube or are somewhat spreading. Corolla deep indigo-blue or purple, 2–3·5 cm. long, five to seven times as long as the calyx, almost uniformly cylindrical from the base to just below the mouth where it is slightly ampliate, clothed outside with gland-tipped hairs; limb 3–5 cm. in diameter of six, sometimes eight, lobes, the upper ones pointing backwards, the lower ones forward; lobes very variable in shape and size, narrowly or broadly obovate, entire, faintly or deeply emarginate, crenate or toothed at the apex and 1 cm. long and broad, 2 cm. long and broad, 1·5 cm. long and 0·5 cm. broad, 2·5 cm. long and 1 cm. broad. Stamens inserted just below the apex of the corolla-tube, the upper ones erect, the lower ones bent backwards so that the whole of the anthers come together in a cone just behind the style; filaments 5 cm. long, glabrous; anthers 1·5–2 mm. long, reaching the mouth of the tube or with the tips protruding from the tube. Ovary glabrous; style glabrous; stigma projecting just beyond the anthers. Capsule up to 2 cm. long, dehiscing by longitudinal valves.

YUNNAN. Lopin-chan, near Lankong (*Delavay* 2070—*isotype*); Yen-tzé-hay, Lankong (*Delavay* in 1887); Lichiang Range (*Forrest* 2234, 5668, 10137, 30333); Mt. Satseto, eastern slopes of Lichiang snow range (*Rock* 24856); Haba Shan, third peak of Lichiang snow range (*Rock* 24746); Bei-ma shan (*Forrest* 13817); Chienchuan–Mekong divide (*Forrest* 23041, 23418); Shui Mun Kai (*Forrest* 30345); Chungtien plateau (*Forrest* 12576); Mts. east of Hsiao Chungtien (*Rock* 24617, 25242); Mt. Gyi-na lo-ko, second peak of Yu-lung shan (*Rock* 25006); Litiping Range, Mekong–Yangtze divide, east of Wei Hsi (*Rock* 9180); Litiping (*Forrest* 30339); Lotueshan, Mts. of Labako, west of the Yangtze bend at Shiku (*Rock* 9529—*type* of *O. Rockii*); on the Shui-lu Shan, west of Wei Hsi (*Forrest* 25452, 25894); Yung Ling (*Forrest* 30337); Hung Ai Mountain (*McLaren's Native Collector* 119).

SZECHUAN. Mountains east of Yung-ning (*Forrest* 21254); mountains around Muli (*Forrest* 16605, 28391); Muli (*Rock* 6465); Yen Ching, six days north of Muli (*Forrest* 30334); Mount Gibboh, mountains south of Muli (*Rock* 16012); Kaushu Shan on trail to Leirong, south-west of Muli (*Rock* 24069); Mount Mitzuga, west of Muli Gomba (*Rock* 16087); Mount

Konka, Risonquemba, Konkaling (*Rock* 16296); mountains of Kulu (*Rock* 18000, 23952); mountains of Yetsi, north of Kulu (*Rock* 23881, 23893, 24441); North of Chui-Lung-Hsien, south-west of Tatsienlu (*Rock* 17458); Pan-Lan Shan, north-east of Tatsienlu (*Wilson* 3150); Pa-lang Shan (*Wang* 21179); west of Wenchuan Hsien (*Wang* 20937).

KANSU. Siku Alps, Satanee (*Farrer et Purdom* 74—*type* of *O. viola-grandis*).

In Herb. Kew.:

YUNNAN. Yangtze watershed, district of Lichiang, eastern slope of Lichiang snow range (*Rock* 3485, 3573, 3779, 8349); Mt. Haba Shan, north of Ndaku, north of Lichiang snow range (*R.* 9706); near Lichiang (*Schneider* 2332).

S.W. SZECHWAN. Muli (*Rock* 5583).

In Herb. Brit. Mus.:

S.E. TIBET. Pome, Nunkhu Phu Chu Valley, near Tongyuh (*Ludlow, Sherriff and Elliot* 13785); Kongbo, Pasam Chu (*L., S. and E.* 13976).