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Professor Bayley Balfour F.R.S.

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SOME LATE-FLOWERING GENTIANS.

By Professor BAYLEY BALFOUR, F.R.S.

(Read 14th February 1918.)

There is a small series of Asiatic Gentians belonging to the Section named *Frigida* by Kusnezow which are the glory of the autumn garden, but which, as introductions of more or less recent years, are not yet known as they ought to be and will be. There is some confusion in their nomenclature, and I shall take the opportunity to clear this up when writing now, as I propose to do, upon the characters and distinctions of the species.

The species to which I refer are four:—

<i>G. Farreri</i> , Balf. f.	Kansu.	Discovered, Farrer and Purdon, 1914. Introduced, Farrer, 1914. First flowered, Edinburgh, 1916.
<i>G. Lawrencei</i> , Burkill.	Siberia (Baicalia).	Discovered, Bocherel. Introduced, Leichtlin, 1905. First flowered, Sir Trevor Lawrence, 1905.
<i>G. sino-ornata</i> , Balf. f.	Yunnan.	Discovered, Forrest, 1904. Introduced, Bulley, 1911. First flowered, Ness and Edinburgh, 1912.
<i>G. Veitchiorum</i> , Hemsley.	Szechwan.	Discovered, Wilson. Introduced, Veitch, 1905. First flowered, Veitch, 1905.

They are prostrate forms spreading by stolons—reaching in *G. sino-ornata* some 18–25 cm. in length—from a central rosette. Each stolon prostrate at first ascends as its vegetative growth ceases and ends in a single flower. These stolons may root, and at the point of rooting start a new rosette whence new stolons are emitted. Thus the plant may cover a considerable area in the garden. *G. Veitchiorum* seems to be the least effusive in its extension. The whole of them have paired leaves connate at the base. By this character they are at once separated from another series of the Section *Frigida*, that of *G. ternifolia*, Franch., *G. tetraphylla*, Franch., *G. hexaphylla*, Franch., and *G. Arethusa*, Burkill, in which there are always more than two leaves in the nodal whorl. In the *Ternifolia* series occur flowers no less beautiful and late flowering than those of the series of which I am writing,

but only one species—*G. hexaphylla*, Franch.—is in cultivation so far as I know. Introduced by Farrer, it flowered at Edinburgh in August 1916, in plants raised from seed presented by the late Robert Woodward, Esq., jun., of Arley Castle, Bewdley.

In the paired-leaved series of which I write, the leaves of the pair have each the potentiality to produce an axillary shoot, but as so commonly happens in such cases the bud of one of the leaves is prepotent, and the prepotent buds in successive pairs follow a $\frac{1}{4}$ spiral course round the axis which produces them. If a prepotent bud develops a shoot, its sister bud in the opposite leaf-axil is suppressed, but if from any cause the prepotent bud be arrested or destroyed, then the energies of the sister bud are called upon and it may elongate as a shoot. Thus each stolon has capacity to branch—a double chance from each node—and these branches, each of them, has, like the mother stolon, the power to root at the nodes and to end in one flower. The vegetative and reproductive capabilities of the plant are therefore great. *G. Farreri*, *G. Lawrencei*, and *G. sino-ornata* exhibit this stolon-branching to the greatest extent—*G. Veitchiorum* in my experience the least. And this seems to be constitutional. For the former are the most satisfactory of plants, and the flexibility of their parts lends them to the most ordinary of handling. On the other hand, *G. Veitchiorum* seems to be, at Edinburgh, a less adaptable plant—stiffer, less ready to respond.

In the solitary terminal flowers the calyx has an entire tube with long distinct lobes. By entire I should perhaps explain that the tube of the calyx is not split down one side as it is, for instance, in *G. decumbens*—to name a well-known garden plant. The distinction is an important one for differentiation of species of Gentian. The corolla, large and showy, some 5-6 cm. long, obconoid and funnel-shaped, sometimes slightly bulged above the calyx, is of various shades of blue, and has broad paler striped or suffused petaline bands on the outside. The folds, though toothed, are never fringed. The ovary has a long stalk, and the style is also long, with the branches recircinate at the tip.

These Gentians grow at Edinburgh in any good moist garden soil, either in shade or in full sun exposure—flower-

ing perhaps better under exposure. Every shoot will strike—those of the narrow-leaved species most freely.

Gentiana Farreri, Balf. f.¹

Perennial herb with thick roots and very many branching stolons freely rooting and spreading from a primary central rosette, the stolons forming many new rosettes from the leaf-axils at the rooting nodes. Stolons as much as 18 cm. long prostrate at the base, then ascending, having terete internodes about 1 cm. long and 2 mm. in diameter, generally green and without surface papillae, sometimes reddening. Leaves epetiolate thick opposite, each pair connate and forming a vaginal somewhat loose sheath as much as 5 mm. long; lamina of upper region of stolon over 2 cm. long 2 mm. broad, in the primary rosette as much as 6 cm. long 5 mm. broad (on rosettes of the stolons somewhat smaller), linear not contracted at the base, towards top narrowed into an acute or acuminate apex, margin obscurely scaberulous, on both sides whitely-papillose, concave above dark-green glossy, paler beneath, midrib slightly raised in the sinus of the longitudinal groove. Flower solitary terminal; pedicel stout as much as 1 cm. long 3 mm. in diameter often reddened. Calyx as much as 5 cm. long, slightly shorter than corolla 5-lobed; tube somewhat funnel-shaped not split, as much as 2 cm. long 5 mm. in diameter, somewhat membranous green outside sometimes reddish at the base, intracalycine membrane green truncate transversely rugose; lobes somewhat thick

¹ *Gentiana Farreri*, Balf. f.—Herba perennis stolonifera. Stolones radicanter ramosi ad 18 cm. longi a rosula centrali patentes. Folia stolonum epetiolata opposita vaginato-connata linearia acuta vel acuminate recurva 2 cm. longa vel ultra, 2 mm. lata, vel majora. Flos solitarius terminalis; pedicellus circ. 1 cm. longus. Calycis tubus infundibularis haud dimidiatus circ. 2 cm. longus; lobi duplo longiores lineares recurvi basi haud angustati. Corolla obeoideo-tubulosa ad 6 cm. longa extus vittata vittis flavido-albidis lineato-tinctis intus citrino-maculata, fauce alba; lobis ovatis circ. 8 mm. longis sub-apiculatis methylo-coeruleis nitentibus, plicis 3 mm. longis 7 mm. latis erosis. Filamenta staminum in parte libera circ. 9 mm. longa anguste alata; antherae sagittatae. Ovarium 1.5 cm. longum; stipes circ. 2.2 cm. longus; stylus ad 7 mm. longus ramis stigmatiferis 4 mm. longis recurvis.

Species Sectionis Frigidæ *G. Lawrencei*, Burkill affinis sed robustior et calycis lobis tubo triente longioribus, corollae colore facile recognoscenda.

Kansu, in alpibus Jo-Ni.

very long, 3 cm. or more long, barely 1.5 mm. broad, like the uppermost leaves linear acuminate, subequal distant recurved not contracted at the convex base. Corolla obconoid-tubular as much as 6 cm. long spreading to over 3 cm.; tube within the calyx not 5 mm. in diameter, greenish-white, expanding upwards beyond calyx and showing on outside five broad yellowish-white bands on the median of the petals (anti-petaline), each band having a central narrow greenish-blue line and a similarly coloured longitudinal ridge on each margin, inside sprinkled with small green and citron-yellow antipetaline spots, the interpetaline areas more or less pale-white and suffused with blue, throat white; lobes 5 broadly ovate or trigonous acute somewhat apiculate, about 8 mm. long and broad, recurving, outside traversed by the anti-petaline bands, on the inside shining satiny of a methyl-blue colour; plicae semi-lunate methyl-blue coloured above, underneath paler more opaque, about 3 mm. long 7 mm. broad, arose, the middle tooth longer. Filaments of the stamens free through about 9 mm. and there narrowly winged about 1 mm. broad, intensely purple on the outside, white on the inside; anthers sagittate about 3 mm. long. Ovary 1.5 cm. long; stipe about 2.2 cm. long; style as much as 7 mm. long its stigmatiferous branches about 4 mm. long, recurving.

Kansu. Jo-Ni alps. Farrer and Purdom, 1914.¹

Specimens of this species were not brought by Farrer, and my description is based upon living plants which flowered in the Royal Botanic Garden in August 1916. They were raised from seeds presented by the late Robert Woodward, Esq., jun., of Arley Castle, Bewdley—a portion of his share in the produce of Mr. Farrer's expedition.

G. Farreri is a superb species, perhaps the finest of the series to which it belongs. The wonderful sheen of the blue of its petals and folds above the white throat is its outstanding flower-feature, and the recurving of the corolla shows off the colour to advantage. It seems to be less affected by weather conditions than is the case with other *Gentians*. Sunshine is not necessary for the flower-expansion, although in sunshine only is the full glory of its colour displayed. On dull cloudy days as in bright sunshine the plant opens flowers freely. And the flower

¹ See Farrer, *On the Eaves of the World*, ii (1917), 214, 216.

does not always close on the approach of twilight. There are better and poorer flowered individuals noticeable in the cultivated plants—some opening the trumpet widely, others keeping the corolla-lobes more erect. It begins to flower at Edinburgh in late August, and continues until winter frosts destroy its aerial shoots. Rooting as it does at every node propagation of it is easy.

When in flower there is no other species with which *G. Farreri* can be confused. The Siberian *G. Lawrencei*, Burkill, is its nearest ally, but that wants the fine flower-colour, its flowers do not open in the wide trumpet-form of *G. Farreri*, and its leaves and stem are altogether more delicate. From *G. sino-ornata*, Balf. f., and *G. Veitchiorum*, Hemsl., others of its allies, it is easily diagnosed. They have flowers of a royal blue and purple-blue colour, and the latter has shorter blunt leaves.

Gentiana Lawrencei, Burkill, in Gard. Chron., 3, xxxviii (1905), 307, fig. 119.¹

G. ornata, Bot. Mag. (1907), t. 8140.

Perennial spreading herb with thick roots and forming a compact rosette from which emerge many long leafy stolons rooting at the nodes. Stolons as much as 15 cm. long thin about 1 mm. in diameter with cylindric usually

¹ Burkill's description runs:—

Gentiana Lawrencei, Burkill.—*G. ornatae*, Wallich, valde affinis foliis autem elongatis distinguitur. Planta perennis diffuse caespitosa. Caules plures, subdecumbentes, nec angulati, ad 10 cm. longi. Folia nitentia, arcuata, per paria vaginato-connata, infima 5 mm. longa, suprema 20 mm. longa, 2 mm. lata, acutissima; vagina 3 mm. longa. Calycis tubus 12 mm. longus, margine membranaceo integer; dentes quinque foliis supremis persimiles, parum inaequales, 14–18 mm. longi. Corollae tubus 40 mm. longus, infra albidus et atro-coeruleo-striatus, faucibus coeruleo-lutescens; lobi deltoideo-ovati, acuti, laete coerulei, 5 mm. longi, 4 mm. lati; plicarum lobi late deltoidei, 2 mm. longi, 4 mm. lati, margine subintegri. Filamenta 30–32 mm. longa, ad corollam infra medium annexa, violacea. Ovarium 12 mm. longum; stipes basi mellifluus fere 20 mm. longus; stylus 1 mm. longus; stigmata 8 mm. longa.

A handsome Gentian, brought into cultivation by Herr Max Leichtlin of Baden-Baden. The specimens from which the description is drawn flowered in the garden of Sir Trevor Lawrence at Burford, Dorking, to whom we are indebted for the specimens here illustrated. The original seeds were collected by M. Jules Bocherel on a journey into Mongolia from Lake Baikal. *Gentiana ornata*, its nearest ally, is a native of the Eastern Himalaya and South-West China. *Gentiana ternifolia*, Franchet, is another ally which comes from Yunnan; *Gentiana tetraphylla*, Kusnezow, and *G. hexaphylla* Maximowicz, are allies growing in

reddening long internodes as much as 2 cm. long in upper part, prostrate at base branching above, each branch ascending and ending in a single flower or some branches arrested and forming nodal rosettes whence new stolons arise. Leaves of the upper region of stolons linear-filiform running out to a long point, as much as 2.5 cm. long hardly 1.5 mm. broad hardly recurving not constricted at base, epetiolate, passing at once into a vagina connate with that of opposite leaf into a sheath about 3 mm. long. Flower solitary terminal; pedicel as much as 1.2 cm. long barely 2 mm. in diameter red. Calyx about 3.5 cm. long; tube funnel-shaped not split, about 1.3 cm. long 3.5 mm broad angular, shining outside very red at the base, above somewhat blistered, dark-green, inside pale-green slightly rugulose, intracalyxine membrane truncate; lobes subequal distant linear-filiform to a long point, over 2 cm. long about 1.5 mm. broad, not contracted at base, somewhat involute dark-green erect spreading not markedly recurved. Corolla obconoid-tubular about 5.5 cm. long spreading to about 2 cm.; tube within the calyx pale-green about 3 mm. in diameter, above that with 5 antipetaline bands greenish-white not spotted but with a central narrow faint purple line and two lateral broader purple boundary ridges, interpetaline areas white tinted pale sky-blue, inside unspotted white rugulose on antipetaline areas, throat striped pale blue and white; lobes 5 broadly ovate or trigonous obtuse and slightly apiculate pale sky-blue about 6 cm. long and broad half patent; folds paler than lobes, about 3 mm. long and 7 mm. wide, broadly triangular erose with a longer often aristate tooth about the middle. Staminal filaments free through 1.2 cm. tinted pale blue, inserted about 2.1 cm. above base of corolla, narrowly winged; anthers sagittate 4 mm. long. Ovary about 1.4 cm. long; stipe 2.5 cm. long; style 6 mm. long its stigmatiferous branches about 1.5 mm.

Siberia. About Lake Baikal. Bocherel.

This species was described and figured by Burkill from

Szechuan. The whole group consists of plants with showy flowers, but *G. ornata* is the only one which has been in cultivation prior to the introduction of *G. Lawrencei*.

The flowers of *G. Lawrencei* are $1\frac{3}{4}$ inch long, upright, and blue above, the lower part of the tube being pale, with dark blue lines. They stand solitary on the ends of ascending narrow-leaved branches.

plants which flowered with Sir Trevor Lawrence in 1905. The plant came from Max Leichtlin, who raised it from seed collected by M. Jules Bocherel about Lake Baikal, as Burkill informs us. A plant from the same source was received at the same date at, and its progeny still flourishes in, the Royal Botanic Garden, Edinburgh. The history of the plant figured in the Botanical Magazine (1907),¹ t. 8140, under the name *G. ornata*, Wall., is that of Sir Trevor Lawrence's and of the Edinburgh plant, and the figure is that of *G. Lawrencei*. It is not *G. ornata*, Wall. I do not understand the reference under the figure to Walton's specimens. These were described by Burkill under the name of *G. Waltoni*²—a species with a dimidiate-spathaceous calyx altogether different from the type of *G. ornata*.

G. Lawrencei is a pretty species, most like *G. Farreri* of those I speak of here. It is, however, a more slender plant, with thinner stolons and much narrower leaves—they are almost thread-like at times—and they do not recurve in the manner of those of *G. Farreri*. It is very sensitive to atmospheric states, and is therefore at a disadvantage with *G. Farreri*. The flowers are only open in brightest sunshine and in a warm dry atmosphere. The flower has always a purple-red thin stalk, about a centimeter or more in length and little over a millimeter in diameter, and it gives the impression of being scarcely strong enough to support erect the large flower. The calyx-tube is shorter than in *G. Farreri*, as are also the thin almost filiform lobes which remain erect and do not recurve. The expanded mouth of the corolla-tube is only about 2 centimeters across—in *G. Farreri* it is 3 cm.—and the lobes and folds do not reflex to the extent they do in *G. Farreri*, so that the mouth has not the broad trumpet-form of that species. The throat is not pure white as there but lined with blue, and the blunt lobes with the folds, which are somewhat erose, are of a paler sky-blue tint. If it would only open its flowers, which are profusely produced,—as freely as in *G. Farreri*—it would more closely rival that species for favour. *G. Lawrencei* is like *G. Farreri* a long flowerer—opening

¹ See also Gard. Chron., 3, xl (1906), 182.

² Burkill in Journ. Proc. Asiat. Soc. Beng., n.s. ii (1906), 310.

at Edinburgh in late July and continuing during the autumn—and it is as easily propagated.

Gentiana sino-ornata, Balf. f.¹

G. ornata, Forrest (not of Wallich), in Notes Roy.
Bot. Gard. Edin., iv (1907), 71.

G. ornata, Hort. (not of Wallich).

Perennial herb with thick roots producing many spreading rooting stolons from a primary central rosette, and forming new axillary rosettes at the rooting nodes. Stolons 18 cm. or more long, prostrate at the base ascending towards the apex composed of short terete more or less papillate reddish internodes. Leaves epetiolate thick somewhat fleshy opposite connate each pair forming a short vaginal sheath about 2·5 mm. long; lamina in the primary rosette linear-lanceolate from the base as much as 1·5 cm. long 3 mm. or more broad not narrowed at the base, margin in the young leaves whitely cartilaginous subsequently scaberulous and at the base minutely ciliate, whitely papillate on both surfaces, concave dark-green glossy above, paler beneath, midrib slightly elevated at bottom of longitudinal groove; lamina of lower leaves of stolon small often 5 mm. long 1 mm. broad lanceolate or linear-lanceolate longly acute, of upper leaves as much as 3·5 cm. long 5 mm. broad somewhat cucullate strict not recurving minutely ciliate at base. Flower solitary terminal; pedicels about 5 mm. long. Calyx about 3·5 cm. long much shorter than corolla, 5-lobed;

¹ *Gentiana sino-ornata*, Balf. f.—Herba perennis diffusa stolonifera. Stolones radicales ramosi ad 18 cm. longi vel ultra a rosula centrali patentes. Folia stolonum epetiolata opposita vaginato-connata lineari-lanceolata vel a basi lanceolata longe acuta ad 3·5 cm. longa 5 mm. lata sursum concava. Flos solitarius terminalis; pedicellus brevis vix 5 mm. longus. Calycis tubus infundibularis haud dimidiatus circ. 1 cm. longus; lobi circ. 2 cm. longi lineari-acuminati erecti basi haud angustati. Corolla oboeonoideo-tubulosa ad 6 cm. longa vittata vittis flavido-albidis purpureo-suffusis et lineato-tinctis, intus emaculatis, fauce coerulea; lobis late ovatis acutis circ. 8 mm. longis intense coeruleis nitentibus; plicis circ. 3 mm. longis 8 mm. latis subcrenulatis vel dentatis. Filamenta staminum in parte libera circ. 1 cm. longa anguste alata coerulea; antherae sagittatae. Ovarium circ. 1·4 cm. longum; stipes circ. 2·2 cm. longus; stylus ad 7 mm. longus ramis stigmatiferis circ. 6 mm. longis recurvis.

Species Sectionis Frigidae a *G. Farreri*, Balf. f. et *G. Lawrencei*, Burkill foliis lineari-lanceolatis vel lanceolatis sursum concavis, florum colore intense coeruleo facile recognoscenda; a *G. Veitchiorum*, Hemsl. habitu diffuso foliisque sursum concavis recedens.

N.W. Yunnan.

tube funnel-shaped not split somewhat coriaceous about 1 cm. long or more 4 mm. in diameter reddened at the base outside; intracalycine membrane greenish-white truncate plane glossy; lobes subequal scarcely distant linear-acuminate hardly 2 cm. long 2 mm. broad flat not recurved not contracted at base green sometimes purpling at the tip. Corolla obconoid-tubular as much as 6 cm. long, spreading to about 3 cm.; tube within the calyx narrow yellowish-white, expanding upwards beyond calyx and showing on outside 5 broad bands (yellowish-white and suffused irregularly with purple) on the median of the petals (antipetaline), each band traversed by a central purple-blue line and having on each margin a dark-purple longitudinal ridge, inside transversely rugose without citron-yellow antipetaline spots, the interpetaline areas of a deep blue colour, glossy, throat blue; lobes broadly ovate acute apiculate about 8 mm. long and broad, half-spreading, outside traversed by the antipetaline bands, inside royal-blue-coloured glossy; folds slightly paler more or less oblique broadly triangular obtuse entire or somewhat crenulate or toothed about 3 mm. long 8 mm. broad. Free part of filaments of stamens about 1 cm. long tinted blue narrowly winged; stamens inserted about 2.5 cm. above base of corolla; anthers about 2.5 mm. long sagittate. Ovary about 1.4 cm. long; stipe about 2.2 cm. long; style as much as 7 mm. long its stigmatiferous branches about 6 mm. long recurving.

E.N.W. Yunnan:—Summit of Mi Chang pass between River Yangtze and Chungtien plateau. Alt. 14,000–15,000 ft. Flowers deep blue. G. Forrest. No. 408. Sept. 1904.

E.N.W. Yunnan:—Lichiang Range. Eastern flank. Open mountain meadows. Alt. 11,000–12,000 ft. Lat. 27° 30' N. Plant of 5–8 ins. Flowers bright blue, plicae green. G. Forrest. No. 6728. Sept. 1910.

E.N.W. Yunnan:—Summit of the Sungkwei pass. Stony open pasture. Alt. 12,000 ft. Lat. 26° 12' N. Plant of 2–4 ins. Flowers deep clear blue, plicae yellowish-blue, striped and spotted. G. Forrest. No. 7374. Nov. 1910.

W.N.W. Yunnan:—Mekong-Salween divide. Alt. 12,000 ft. Lat. 28° 10' N. Moist pasture. G. Forrest. No. 13,549. Oct. 1914.

The differentiation of closely allied species of *Gentian* from dried specimens is a task of some difficulty, and following the lead of Franchet,¹ who had described two *Gentians* collected by Soulié at and about Tungnglo in W. Szechwan as varieties of the Himalayan *G. ornata*, Wall. under the names *obtusifolia* and *acutifolia*, Forrest's dried earlier Yunnan specimens (under No. 408) of this plant were referred to *G. ornata*. Cultivation of plants (raised from seeds of later specimens under No. 6728) which flowered with Mr. Bulley at Ness and also at Edinburgh in 1912 showed that Forrest's plant was not the true *G. ornata*, and we named our plant a Chinese form of *G. ornata*. Under this designation Forrest's plant has passed out of the Royal Botanic Garden, Edinburgh, dropping sometimes in its spread the qualification "Chinese form," and appearing as *G. ornata*. Under the name *G. ornata* it received an Award of Merit at the Royal Horticultural Society when exhibited on October 12, 1915, by Mr. Amos Perry, who had obtained the plant from Edinburgh. It is not the Wallichian species, which is not now in cultivation, and perhaps never has been. I have not the material by which to form an opinion upon whether Forrest's plant is the same as Soulié's Szechwan plants.

¹ Franchet in Bull. Soc. Bot. Fr., xliii (1896), 493, where he says :—*Gentiana ornata*, Wall., Cat. 4386 ; C. B. Clarke, in Hook., Fl. of Brit. Ind., iv, 116 ; Bot. Mag., t. 6514 (forma micrantha).

Species in Se tchuen occidentali variabilis.

a *Obtusifolia*.—Folia inferiora et media oblonga, superiora lanceolato-linearia, omnia obtusa ; flores 4-5 cent. longi, caerulei cum vittis fuscis ; plicae ovatae, obtusae.

Les prairies humides, les pelouses fraîches à Tongolo, Tizou, etc. (R. P. Soulié). En thibétain : Aou meto (fleur du frère aîné).

β *Acutifolia*.—Folia media et superiora linearia, acuta vel acuminata ; flores 6-8 cent. longi, anguste tubulosi, lobis margine intense violaceo-caeruleis, tubo cum vittis longitudinalibus atro-violaceis. Flores *Gentianae striatae* Maxim.

Depuis Tongolo jusqu'au village de Té la to, dans les bois et les lieux secs.

Je n'ai pas vu de la Chine la variété *meiantha*, Clarke, à petites fleurs et à feuilles courtes, récurvées.

Le végétation du *G. ornata* est la même que celle du *G. ternifolia*, Franch. ; les stolons épigés ou hypogés s'enracinent à leur sommet d'où procède un bourgeon feuille qui continuera la plante. Autour de ce bourgeon se développent deux ou plusieurs rameaux ascendants portant chacun une fleur. Dans toutes les formes de la plante la capsule est toujours très longuement stipitée, lancéolée, brièvement atténuée en style court.

The latter are certainly not *G. ornata*, Wall. I shall at the end of this communication deal with the question of the identity of *G. ornata*, Wall., and will add therefore nothing more here on the subject.

Until *G. Farreri* came, I gave the palm to *G. sino-ornata* amongst late-flowering Gentians. Nor do I admit that *G. Farreri* surpasses it at all points. The one is a pale the other a dark flowered species, and both should have a place in every garden.

G. sino-ornata is a late flowerer. The first flowers open usually at Edinburgh in the last days of September, and flowering continues until winter rigours send the plant to rest. It appears to be the most free in growth of the four species referred to here. A small plant from a cutting will increase to a patch a foot or more in diameter within a year. There is no mistaking it for any other species. Its half lanceolate pointed leaves, not narrowed at the base, which may be 5 millimeters broad, are stiff and spreading on the stolons and do not recurve as in *G. Farreri* and *G. Laurencei*, and though they may approach the length of the leaves in those species, they look much shorter owing to their greater breadth. The pedicel above the uppermost leaves hardly exists, so that the flower looks as if it were sessile on the end of the stolon and not stalked as in *G. Farreri* and *G. Laurencei*. Then the calyx is much shorter than the corolla, its inner lining has a whitish vesicular appearance, and the calyx-lobes are erect—each of them is flat, tapering from a non-contracted base about 3 millimeters broad to a sharp point. The corolla has a limb about 3 centimeters across when expanded, the throat is blotched inside and not bright white. The apiculate lobes do not reflex to the extent of those of *G. Farreri*, and the folds remain somewhat erect—the whole effect is that of a narrower and more funnel-like not trumpet-shaped mouth. The general colour of the corolla-limb is a rich royal-blue, in marked contrast to the satiny methyl-blue in *G. Farreri* and *G. Laurencei*. The flowers show all the sensitiveness to light and moisture of most Gentians, only expanding fully under bright sunshine and in a dry atmosphere.

G. Veitchiorum is an altogether different plant in its

compact habit with blunter leaves. Its flowers are of a dark blue as in *G. sino-ornata*, but of a deeper blacker tint.

Gentiana Veitchiorum, Hemsl.¹ in Gard. Chron., 3, xlvii (1909), 178, fig. 74.

G. ornata, Hort. (not of Wallich).

G. ornata, var. *obtusifolia*, Franch. in Bull. Soc. Bot. France, xliii (1896), 493 (acc. to Hemsl.).

G. ornata, var. *Veitchii*, W. Irving in Gard. Chron., 3, lviii (1915), 288, fig. 100.

Perennial herb with thick roots and forming a central rosette from which spread many leafy stolons. Stolons

¹ Hemslay's description runs:—

Gentiana Veitchiorum, Hemsl.—Nova species ex affinitate *G. ornatae*, Wall. a qua differt foliis latioribus obtusis, calycis lobis subfoliaceis vix acutis, corollae amplioris lobis latis obtusiusculis et plicis inter lobos latis denticulatis. *G. ornata*, var. *obtusata*, Franch. :—Sinæ occidentalis incola, legit. E. H. Wilson.

At least three different species of *Gentiana* have been, and perhaps are still, in cultivation under the name *ornata*, originally given by Wallich to a Himalayan species, which reaches almost to the upper limits of phanerogamic vegetation in that region. About the year 1880 a *Gentiana* was cultivated in the Edinburgh Botanic Garden bearing this name, and was figured in the Botanical Magazine, pl. 6514, as such; but, as was pointed out by W. I. (Walter Irving) in the Gardeners' Chronicle, 1906, xl, p. 182, the plant represented is not the true *G. ornata* of Wallich. What it really is, is uncertain, and the history of its introduction into cultivation is apparently not on record. In 1883, the Gardeners' Chronicle published (ii, p. 396, fig. 60) an excellent illustration, reproduced in fig. 75, of the genuine *G. ornata* of Wallich, from specimens grown in the Wisley garden of the late Mr. Wilson. Turning to that, I find that it is a slender trailing plant with narrow, very acute leaves and very acute corolla-lobes, with narrow folds between. A coloured figure of the same species was given in the Botanical Magazine for 1907, pl. 8140. Comparing the flowers actually figured in the Magazine with the type of Wallich's species in the Kew Herbarium, I think there is no doubt that it was correctly identified. Mr. J. Hutchinson, who contributed the description of that figure, suggests that the plant figured in the Botanical Magazine, pl. 6514, is *G. nipponica*, but I have not time to follow up this suggestion.

Now comes a third *Gentiana*, to which the name *ornata* has been attached. The species in question was exhibited by Messrs. James Veitch & Sons at the meeting of the Royal Horticultural Society on August 31, and received an Award of Merit. The history of it is as follows:—In August 1906 Messrs. Veitch sent a plant of it to Kew for name, with the information that it was raised from seed collected by Mr. E. H. Wilson near Tatienlu, West China, at an elevation of 12,000 feet. It was identified with dried specimens collected by Père Soulié in the same region and described by Franchet (Bull. Soc. Bot. France, vol. xliii, p. 493), and named *Gentiana ornata*, var. *obtusifolia*. With all the material before me, I have no hesitation in accepting the identification; but I cannot agree in leaving it as a variety of *G. ornata*.

as much as 10 cm. long 2 mm. in diameter with cylindric internodes reddened more or less as much as 1.5 cm. long sometimes puberulous, prostrate at base ascending towards summit and ending in one flower or becoming arrested and forming a rooting rosette from which new stolons emerge. Leaves of upper part of stolon very shortly petiolate, opposite, thick somewhat fleshy, recurving about 2 cm. long 6 mm. broad above the connate vaginae of the nodal pairs, vaginal sheath about 4 mm. long or less adpressed to stem at mouth; lamina linear-oblong narrowed to the apex obtuse or acutish shortly mucronulate, margin finely scaberulous, contracted at the base into a very short petiole with somewhat membranous margins which are somewhat ciliate, upper surface dark-green somewhat glossy, on both surfaces minutely whitely papillate, lower surface paler with a slightly raised midrib; leaves of lower part of stolon ovate or elliptic or oblong always obtuse. Solitary terminal flower with a pedicel at most about 2 mm. long, reddened. Calyx about 3.3 cm. long much shorter than corolla, 5-lobed; tube funnel-shaped not split about 1.5 cm. long 4.5 mm. in diameter reddish at base outside, thin, intracalyxine membrane yellow-green truncate somewhat vesicular white and membranous at the sinuses; lobes nearly equal about 1 cm. long 2 mm. broad linear-lanceolate acute and apiculate or mucronulate, in colour like the foliage-leaves, not recurved, at base contracted and there vesicular on upper surface. Corolla obconoid-tubular 5-6 cm. long; tube within the calyx greenish-white not tinted, expanded upwards showing outside 5 broad greenish-yellow bands (suffused faintly with purple) on median of petals (antipetaline), each band with a central keeled purple line and on each margin a broader similar ridge, the interpetaline areas deep purple, inside smooth with some purple antipetaline spots, throat black purple; lobes 5 broadly triangular or rather

Considering the large number of described Chinese species of which I have seen no authenticated specimens, there is some risk of duplication in proposing another, but that is the only course open under the circumstances.

G. Veitchiorum is a larger, more robust plant than *G. ornata*, with relatively broad, obtuse leaves, larger flowers, with broader corolla-lobes, and very broad toothed folds between them. The flowers are of an intense blue with light longitudinal bands on the outside.

trigynous apiculate about 7 mm. long and broad patent and recurving, traversed by the antipetaline bands outside, deep royal-blue inside; folds about 2 mm. long 4.5 mm. broad slightly paler blue with a triangular central obtuse tooth and slight erosion at the sides. Staminal filaments free from about 2.8 cm. above base of corolla, free portion about 1.2 cm. long pale violet and spotted, narrowly fringed; anthers sagittate about 2.8 mm. long. Ovary about 1.4 cm. long; stipe about 2.7 cm. long; style as much as 6 mm. long its stigmatiferous branches recurved 2 mm. long.

W. Szechwan. Wilson.

G. Veitchiorum is a fine garden plant, although not, I think, of the merit of *G. Farreri* and *G. sino-ornata*. It was introduced to cultivation, as Hemsley informs us, by Messrs. Veitch, who raised it from seed collected by E. H. Wilson in W. Szechwan. When describing it as a species distinct from *G. ornata*, Wall., Hemsley identified it as the plant which Franchet described under the name *G. ornata*, var. *obtusifolia*. Subsequently W. Irving gave it the name *G. ornata* var. *Veitchii*.

Without doubt Hemsley was right in giving the plant specific rank and separating it from *G. ornata*, Wall., which is a different plant. But the name *G. ornata* somehow got attached to it, and it received an Award of Merit at the Royal Horticultural Society on August 31, 1909, when shown by Messrs. Veitch under the name *G. ornata*. I may state here definitely that this plant so laureated was not the same as that which under the same name received an Award of Merit in 1915. Two species have been exhibited under the name *G. ornata* and each has received an Award of Merit. Neither of them is *G. ornata*, Wall. The plant shown in 1909 is *G. Veitchiorum*, that in 1915 is *G. sino-ornata*.

G. Veitchiorum may be distinguished at a glance from the three late-flowering species which I have already mentioned—*G. Farreri*, *G. Lawrencei*, and *G. sino-ornata*—by its habit and foliage. It is a stiffer more compact grower, and the stolon early leaves are ovate or elliptic or oblong, contracted at base of lamina and blunt at the apex. The stolons themselves are thick with short internodes. The plant is, to our experience at Edinburgh, by no means

so free a grower as the others. Its flower is dark blue, like that of *G. sino-ornata* but darker in colour.

The following key may aid growers in distinguishing these Gentians in the garden :—

- A. Diffuse plant. Stolons slender loosely and widely spreading up to 18 cm. long. Stolon-leaves epetiolate narrow linear or linear-lanceolate tapered to a long acute point, not contracted at base.
 - a. Flowers distinctly stalked, light blue with satiny sheen, throat white or pale blue and white.
 - 1. Stolon upper leaves dark green strongly recurved over 2 cm. long about 2 mm. wide at base. Pedicel above last leaf-pair about 1 cm. long dark red. Calyx-tube about 2 cm. long, lobes twice as long linear recurved not contracted at base. Corolla throat white, lobes somewhat apiculate bright satiny methyl-blue strongly recurving. Spread of corolla over 3 cm. *Farreri*
 - 2. Stolon upper leaves pale green erect hardly recurved over 2 cm. long about 1 mm. wide at base. Pedicel above last leaf-pair over 1 cm. long red. Calyx-tube about 1 cm. long or a little more, lobes twice as long filiform erect not recurved not contracted at base. Corolla throat lined pale blue and white, lobes obtuse pale blue hardly recurving. Spread of corolla about 2 cm. *Lawrencei*
 - b. Flowers sessile or nearly so, throat dark pure blue.
 - 3. Stolon upper leaves pale green strict spreading not recurved over 2 cm. long and 5 mm. wide at base. Pedicel above last leaf-pair nearly absent at most 5 mm. long. Calyx-tube about 1 cm. long, or a little more, lobes not twice as long linear flat somewhat spreading not recurved not contracted at base. Corolla-lobes apiculate royal-blue recurving. Spread of corolla about 3 cm. *sino-ornata*
- B. Compact plant. Stolons stout short close. Stolon-leaves shortly petiolate linear-oblong or oblong obtuse or somewhat acute, contracted at base.
 - c. Flowers sessile or nearly so, throat dark purple-blue.
 - 4. Stolon upper leaves dark green horizontal about 2 cm. long and 6 mm. wide. Pedicel hardly visible above last leaf-pair. Calyx-tube about 1·5 cm. long more or less, lobes shorter than or at most equal to tube erect not recurved contracted at base. Corolla-lobes apiculate deep purple-blue *Veitchiorum*

In the preceding pages I have made reference frequently to *G. ornata*, Wall., and have pointed out that three of the late-flowering species of which I furnish descriptions have been confused with it and received its name. It may be well, therefore, if I say something here about what *G. ornata*, Wall., really is and what it is not, and endeavour to clear up the confusion that attaches to the name.

G. ornata, Wall., is a plant obtained by Wallich from Gossain Than in Nepal in the years 1820-21. It appears in his Catalogue under No. 4386. Specimens of the Gossain Than plant are preserved in several public herbaria, of which Edinburgh is one, and the Wallichian specimens which we have are those upon which I rely for my knowledge of what *G. ornata*, Wall., is.

Wallich's plant was first fully described under the genus *Gentiana* by Grisebach¹ in 1839 and again in 1845.²

Previously, in 1838,³ George Don had given a description of it as *Pneumonanthe ornata*. George Don does not refer to it as a garden plant, and we may assume that it was not in cultivation at the time of his writing.

In 1880 a plant was figured in the Botanical Magazine, t. 6514, under the name *G. ornata*, Wall. This plant came from the Royal Botanic Garden, Edinburgh. I have found no record of whence Edinburgh obtained it, but I am disposed to think that it was raised from seeds distributed from Calcutta. It was soon recognised that this plant was

¹ Grisebach, Gen. et Sp. Gentianearum (1839), 277. The following is Grisebach's description:—

Gentiana ornata, Wall.—Radix dense fasciculata, quasi nidum referens, epidermide versus apicem incrassata patula radicemque sacculi instar cingente. Caulis plurimi 3-4-unciales, plerique fertiles, foliosi, declinati 1 adscendentes. Folia 8 longa, 1 lata, suprema longiora, cetera aequalia internodia aequantia, vagina apice ampliata. Calycis tubus patulus lobos aequans; lobi acuminati membrana intracalycina truncata prominula distantes. Corolla calyce duplo major, coerulea longitudinaliter striata; lobi acutissimi, mucronati, tubo 4plo breviores, plica obtusa duplo majores. Capsula oblongo-linearis, utrinque attenuata, corollam aequans. Semina oblonga, convexa, processibus scariosis asperima, utrinque obtusa, nec alata.

Proxima inter nostrates *G. frigida*, Hk., a qua differet caulibus caespitosis, calyce, foliis summis majoribus, omnibus brevioribus, vagina foliari ampliata, flore solitario sessili etc. Cf. ad calcem generis *G. Kurroo*.

Gossain Than, Himalayah.

² In DC., Prod. ix (1845), 110.

³ George Don, Gard. Dict., iv (1838), 194.

not the true *G. ornata*.¹ Hutchinson² suggests that it is near *G. nipponica*, Maxim.

C. B. Clarke³ brought into Wallich's species the "abundant material" of Sikkim specimens collected by Sir Joseph Hooker and others, and cites the erroneous figure of the Botanical Magazine, t. 6514. I have not had opportunity to examine the specimens dealt with by Clarke, but I note an important phrase in his description: "Radical leaves 0 or inconspicuous at flowering time." Now that does not apply to Wallich's Gossain Than plants. Our specimens show a conspicuous leafy rosette with long leaves in the flowering plant. On the other hand, the description does fit Sikkim plants (and I may add Bhutan ones), of which we have specimens. In them a leafy "radical" rosette is apparently not formed. Of this I shall write something later. Here I will only say that I suspect some—shall I say much?—of the Sikkim material is not *G. ornata*, Wall. Of the var. *meiantha* which Clarke regards as a "very dubious plant," I can say nothing.

In the same year (1883) as the Gentianaceae of Hooker's Fl. of Brit. Ind. appeared, there was published over the name *G. ornata* in the Gardeners' Chronicle⁴ a figure of a plant grown by Mr. Wilson at Wisley—probably from Calcutta seed. The plant is not *G. ornata*, Wall. The tuft of short ascending potential stolons in the centre of the far-spreading flowering stolons is not a character of *G. ornata*, but is found in another species of Gentian which extends from Sikkim into Bhutan. I shall describe presently this species under the name *G. prolata*. The construction to which I call attention is of biological import. It means that the stolons are biennial. The dried specimens of Wallich's Nepal *G. ornata* show annual stolons. I am disposed to interpret the figure as a representation of *G. prolata*. It cannot be *G. ornata*, Wall.

In 1896 the first Chinese plants to be identified with *G. ornata*, Wall. were described by Franchet.⁵ On p. 255

¹ Later pointed out in Gard. Chron., 3, xl (1906), 182, and again 3, xlv (1909), 178.

² Hutchinson in Bot. Mag. (1907), t. 8140.

³ Clarke in Hook., Fl. Brit. Ind., iv (1883), 116.

⁴ Gard. Chron., 3, ii (1883), 396, fig. 60.

⁵ Franchet in Bull. Soc. Bot. France, xliii (1896), 493.

is quoted what Franchet says. Some specimens collected by Soulié at and near Tungnglo, Franchet referred to *G. ornata*, Wall. (taking that species in the sense of C. B. Clarke), as varieties—one *G. ornata*, var. *obtusifolia*, the other var. *acutifolia*. I have pointed out elsewhere that Franchet, in his pioneer work on the Western Chinese Flora, was cautious and conservative, preferring to aggregate Chinese forms with Indian types rather than to segregate. This is an example. I have seen specimens of both the varieties, though I have not had opportunity to examine them critically, and in the light of our increased knowledge it is certain that neither is the typical *G. ornata*, Wall. Whether they are to be identified with any of the forms I have already spoken of in this paper I cannot say. Hemsley¹ is perhaps right in identifying the var. *obtusifolia* with his *G. Veitchiorum*.

Kusnezow² (1904) follows C. B. Clarke, but concludes that *G. ornata*, Wall. is a variable species. The plant of the Bot. Mag., t. 6514, may be a special variety. He cites the figure in the Gardeners' Chronicle for 1883 as *G. ornata*.

In 1907 there appeared in the Bot. Mag., t. 8140, an illustration with the name *G. ornata*, Wall. The same plant is referred to in the Gard. Chron. for 1906.³ I have already (p. 252) written of this, but will repeat here in order to complete my notes of *G. ornata*. Hutchinson, who writes the text to the figure, gives the story of the plant. It reached Kew in 1905 from Max Leichtlin. This is the history of the plant which flowered with Sir Trevor Lawrence in 1905, and is described and figured by Burkill⁴ as *G. Lawrencei*. A plant came to Edinburgh from Max Leichtlin in the same year, and it is *G. Lawrencei*. The Bot. Mag. figure is certainly not a representation of *G. ornata*, Wall. It represents, I believe, *G. Lawrencei*.

In the same year George Forrest published⁵ an account of some Gentians he had collected in Yunnan, and accepting Franchet's recognition of *G. ornata*, Wall., as a West Chinese species, assigned to it the plant which is described

¹ Hemsley in Gard. Chron., 3, xli (1909), 178, fig. 74.

² Kusnezow in Acta Horti Petrop., xv (1904), 268.

³ Gard. Chron., 3, xl (1906), 182.

⁴ Ibid., 3, xxxviii (1905), 307, fig. 119.

⁵ G. Forrest in Notes Roy. Bot. Gard. Edin., iv (1907), 71.

on a preceding page as *G. sino-ornata*, and this plant, as I have explained, is one of those which in cultivation often bear the name *G. ornata*.

Hemsley¹ in 1909, when describing Wilson's Szechwan plant, raised by Veitch, as *G. Veitchiorum*, concludes that his plant is *G. ornata*, var. *obtusifolia*, Franch. As I have previously said (p. 259), Hemsley was right in giving this plant specific rank.

Then in 1915 Irving,² in the text attaching to a figure of *G. Veitchiorum*, Hemsl., whilst agreeing with Hemsley that this *G. Veitchiorum* is *G. ornata*, Wall., var. *obtusifolia*, Franch., maintains that *G. ornata*, Wall. does extend into China, that *G. Veitchiorum* is only a variety of Wallich's type, and that the same plant was laureated by the Royal Horticultural Society in 1909 and in 1915. As the Franchetian varietal name *obtusifolia* is already attached to another species, Irving renames *G. Veitchiorum*, calling it *G. ornata*, var. *Veitchii*. But *G. ornata*, Wall. does not extend into China. *G. Veitchiorum* is a distinct species. The plants which received Awards of Merit in 1909 and in 1915 under the name *G. ornata* were not the same. The 1909 plant was *G. Veitchiorum*. The 1915 plant was *G. sino-ornata*.

From this history it will be learned that the name *G. ornata*, Wall. has been attached at different times to plants coming from Nepal and Sikkim on the West, Yunnan and Szechwan on the East, and Baikal and N. Mongolia on the North. I know it for certain only in Wallich's Nepal specimens, but it possibly occurs also in Western Sikkim. From amongst the forms that have been included in it we can segregate these species:—*G. Lawrencei*, *G. prolata*, *G. sino-ornata*, *G. Veitchiorum*, and the unidentified plant of the Bot. Mag., t. 6514.

The following is a description of *G. ornata*, Wall., based upon the plants from Gossain Than:—

Gentiana ornata, Wall. Cat., 4386; Griseb. Gen. et Sp.

Gentianearum (1839); id. in DC., Prod., ix (1845), 110.

G. ornata, Clarke in Hook., Fl. Brit. Ind., iv (1883),

116. Nepal plant only.

¹ Gard. Chron., 3, xlv (1909), 178, fig. 74. See p. 257 of this paper.
Ibid., 3, lviii (1915), 288, fig. 100.

G. ornata, Kusnezow in *Acta Horti Petrop.*, xv (1904), 268. Nepal plant only.

Pneumonanthe ornata, George Don, *Gard. Dict.*, iv (1838), 194.

Excluded are :—

G. ornata of *Bot. Mag.* (1880), t. 6154.

G. ornata of *Gard. Chron.*, 3, ii (1883), 396, fig. 60.

G. ornata, var. *acutifolia*, Franch. in *Bull. Soc. Bot. France*, xliii (1896), 494.

G. ornata, var. *obtusifolia*, Franch. in *Bull. Soc. Bot. France*, xliii (1896), 493.

G. ornata of *Gard. Chron.*, 3, xl (1906), 182, and of *Bot. Mag.* (1907), t. 8140.

G. ornata, G. Forrest in *Notes Roy. Bot. Gard. Edin.*, iv (1907), 71.

G. ornata, var. *Veitchii*, W. Irving in *Gard. Chron.*, 3, lviii (1915), 288, fig. 100.

A perennial herb with a very short rhizome crowning the long fleshy roots and producing a close rosette, conspicuous at the flower-period, of linear somewhat fleshy leaves as much as 2·5 cm. long and 2 mm. broad, acute at the apex and expanding at base into a wide vagina connate with that of the opposite leaf to form a sheath. From the rosette radiate many prostrate short branches (at most about 5 cm. long) which ascend at the point and end in a solitary sessile flower. Stem of the shoots thin about 1 mm. in diameter, longest internodes about the middle and there about 0·5 cm. long, slightly tinted red. Leaves at base of shoots with an oval lamina about 4 mm. long and 2 mm. broad somewhat fleshy, obtuse or acute, slightly cartilaginous and obscurely scaberulous at the margin, at the base contracted into a short parallel-sided petiolar portion about 1 mm. long, which expands into a vagina connate with that of the opposite leaf to form a membranous (when dry) sheath about 2 mm. long open at the mouth; leaves at the top of the shoot with a linear-lanceolate lamina about 1·2 cm. long and 3 mm. broad shortly mucronulate, margin thinly cartilaginous and obscurely scaberulous, contracted at base into a petiolar portion about 1·5 mm. long, vaginal sheath of the leaf-pair about 3 mm. long membranous and open at top. Flower sessile

varying in size. Calyx (in larger flower) about 2·4 cm. long; tube funnel-shaped not cleft reddish outside about 1·4 cm. long somewhat thin not rugose inside, intracalyxine membrane truncate, 5-lobed; lobes about 1 cm. long and 1 mm. broad subequal narrow linear acute, margin slightly cartilaginous and obscurely scaberulous, not contracted at base, intersepaline sinus about 1·75 mm. broad. Corolla clavate (in larger flower) 4·3 cm. long (but sometimes only 3 cm.) striate outside with broad bands along middle of petals, each band with three equidistant coloured lines (no trace of spots in dried specimen); tube within the calyx about 2 mm. in diameter, ampliate above and 5-lobed; lobes about 6 mm. long and 5 mm. wide at base broadly triangular acute and mucronulate erect or only slightly spreading in flower; folds broad about 7 mm. across, one-fifth or one-quarter the length of the lobe with a central more or less triangular tooth and elsewhere more or less erose or slightly toothed. Stamens (in larger flower) free from about 1 cm. above base of corolla, free portion about 1·2 cm. long narrowly winged; anther about 3 mm. long. Gynaeceum shorter than stamens; stipe longer than ovary; ovary linear fusiform.

Nepal. Gossain Than.

On a previous page (p. 262) I have stated that some of the Sikkim material (more or less) placed in *G. ornata*, Wall., belongs to a distinct species which I name *G. prolata*, of which the fig. 60 in the Gard. Chron. (3, ii (1883), 396) is a representation. This will be found to be, I believe, a type not uncommon in Sikkim, and it certainly extends into Bhutan. I have been able to study this plant in living flowering specimens raised from seed obtained in Sikkim by Cave and in Bhutan by Cooper. Cave's seeds came under the name *G. ornata*. The following is a description of this species:—

Gentiana prolata, Balf. f.¹

G. ornata, Hort. in Gard. Chron., 3, ii (1883), 396, fig. 60.

¹ *Gentiana prolata*, Balf. f.—Herba perennis stolonifera. Stolones eradicantes ramosi biennes a rhizomate multicapite centrali erosulato ad 18 cm. patentes. Folia breviter petiolata opposita vaginato-connata,

G. ornata, Clarke in Hook., Fl. Brit. Ind., iv (1883), 116, in part.

G. ornata, Kusnezow in Acta Horti Petrop., xv (1904), 268, in part.

A perennial herb with a copiously branched root-system, the main branches somewhat thick and fleshy, crowned by a multicapital rhizome which does not form a leaf-rossette but emits many erect stout leafy shoots in a central cluster which become prostrate towards the end of first year's growth but do not root, and after elongation in their second year to as much as 18 cm. turn upwards and end each in a single sessile flower. Each branch may be simple or towards the end bear some (4-5) short lateral upturned branches each of which ends in a solitary sessile flower. At time of flowering of the prostrate shoots the shoots to flower in following year are conspicuous. Shoots bear decussate leaves from base upwards; the internodes at base of whole shoot and of beginning of second year's growth shorter, the longest internodes about 1 cm. long. Leaves more or less thick succulent connate in pairs by the vaginae to form a closely adpressed scaberulous sheath round the stem; lower leaves of the shoot smaller, lamina in the smaller lower leaves elliptic about 4 mm. long by 2 mm. broad or larger, in the larger upper ones lanceolate or oblong about 1.4 cm. long and 5 mm. broad, apex obtuse with very short mucro, margin slightly cartilaginous and scaberulous, base slightly contracted to a broad membranous parallel-sided petiole about 1 mm. long in the smaller leaves, 2 mm. in the larger, passing into the leaf-sheath, surfaces with stomatic punctulations. Calyx about 1.5 cm. long (after flowering larger) entire, tube obconoid-tubular often reddened outside about 1 cm. long or less somewhat thin

infera elliptica, supera lanceolata vel oblonga obtusa ad 1.4 cm. longa 5 mm. lata basi contracta. Flos solitarius terminalis sessilis. Calycis tubus infundibuliformis haud dimidiatus circ. 1 cm. longus; lobi dimidio breviores oblongi acuti basi haud contracti. Corolla clavata 3.5-4 cm. longa extus vittata vittis 3-lineatis pauci-maculatis, fauce purpureo-suffusa; lobis late triangularibus vel ovatis circ. 3 mm. longis pallide coeruleis; plicis circ. 2 mm. latis sub-erosis et dentatis. Filamenta staminum in parte libera circ. 8 mm. longa purpurea anguste alata; antherae sagittatae. Ovarium vix 1 cm. longum; stipes circ. 2 cm. longus; stylus circ. 2 mm. longus ramis stigmatiferis circ. 1 mm. longis recurvis.

Sikkim; Bhutan.

not rugose inside, intracalcine membrane truncate; lobes 5 subequal about 5 mm. long or a little longer by about 1.5 mm. broad oblong acute, shortly apiculate not contracted at base, intersepaline sinus under 0.5 mm. broad seldom more, margin scaberulous. Corolla 3.5–4 cm. long clavate; tube within calyx very narrow about 1.5 mm. in diameter ampliate upwards and 5-lobed, purple striate outside on a yellowish ground having 5 bands one along middle of each petal, bands marked by 3 purple equidistant lines and a few spots; lobes and folds blue erect hardly spreading; lobes broadly triangular or ovate about 3 mm. long and 3 mm. broad at base slightly apiculate, folds about 2 mm. broad showing a central tooth about 0.25 mm. high and slight erosion at its sides. Stamens free from about 18 mm. above base of corolla, free filament purple narrowly winged about 8 mm. long; anther 1.5 mm. long sagittate. Gynaecium about 3 cm. long; ovary fusiform not 1 cm. long stipitate; stipe about 2 cm. long; style about 2 mm. long stigmatiferous through about half its length and there recurved. Capsule about 1.5 cm. long oblong, but slightly tapered to the ends, far exserted from corolla on a stipe as much as 5 cm. long. Seeds ovoid about 1 mm. long by 0.5 mm. broad with straw-coloured alveolar testa.

Bhutan. Parsheng, Timpu. Alt. 14,000 ft. Cooper. No. 3499. 27th October 1914.

Sikkim. Kapup. Cave. 31st October 1916.

G. prolata flowered at Edinburgh in 1917. The plants were raised from seeds taken from Cooper's Bhutan specimens. This was not the first flowering at Edinburgh. In the nineties of last century plants were raised and flowered from Calcutta seed which came with the name *G. ornata*.

The habit of the plant is very different from that of *G. ornata*, Wall., as that appears in the type-specimens. A plant of *G. prolata* in flower shows a central tuft of several erect branches 5 or 6 cm. long, with short more or less elliptic bright green leaves springing from a common many-headed rhizomatous axis from which descend the much-branched roots which are somewhat thick at their point of origin. The base of each of these shoots begins with some scale-leaves. Spreading out from these and arising

from the same rhizomatous axis are several decumbent non-rooting stolons some 18 cm. or so long which are unbranched through about two-thirds of their length and bear a few branches in about the upper third. Upon the unbranched portion two regions are to be recognised—a lower, which may be half the length of the whole, less or more, is clad with small more or less elliptic straw-coloured or brown withered leaves, the upper bears larger green fresh leaves increasing in size upwards and without interruption into the branched region where they are larger than elsewhere. The limit between the lower and upper regions of this unbranched portion is clearly marked by the leafage, for at the point of junction the leaves are particularly small often appearing almost as scale-leaves; and then there is the contrast between the withered and fresh leaves. The junction marks the limit between the growth of two successive years. Each of these stolons shows two years' growth. The leaves of the first year's growth are withered, those of the second are green and active and the portion of stolon bearing them ends itself in a solitary flower and gives origin from the leaves immediately beneath this terminal flower to some 4 or 5 or more lateral short leafy curvingly ascending shoots each in the axil of a leaf and ending in a solitary flower. The flower terminating the stolon expands first, the lateral ones expand in succession from below upwards and we have a typical definite racemose branching. Normally only one leaf of each pair in dextrorse sequence gives origin to an axillary flower-branch. Sometimes in vigorous stolons some of the leaves lower down upon this green leafy part of the stolon may form axillary buds. These are weak vegetative shoots which do not reach an advanced stage of development.

After flowering and at the end of the vegetative season the whole of these branched stolons die back to the base—crisply desiccating not suddenly rotting—and remain attached to the rhizomatous axis around the group of green shoots in the middle. These green shoots have by this time altered their direction. They are now nearly in or are approaching the prostrate lie, their growth in length is arrested, the ultimate leaves being very small, but I do not

find anything of the nature of a scale-leaf bud. It is a green-leaf bud. In this condition they remain during the winter period of rest as incipient stolons. Some of the basal leaves wither, but there is always a group of green leaves at their top. These are perennating stolons.

The recurrence of the active vegetative period sees two developments in these stolons—one at their base, one at their apex. At their base buds in the axils of the lowermost scale-leaves grow out as erect green shoots and eventually form the central tuft which is so conspicuous at the flowering period of the plant. At their apex growth in length is resumed and a longer portion is added which forms the green leafy flowering termination to the stolon.

Thus the features of the plant in flower are explained. The long flowering stolons are biennial. The demarcation of the lower and upper regions in the unbranched area of the stolon indicates, as I have said, the limit between a first year's growth and a second year's growth. The green erect shoots of the tuft in the middle of the spreading stolons are the stolons in their first year of growth. Branching of the one-year-old stolons is limited to the base—to the formation of new stolons. Branching of the two-year-old stolons is limited to the apex—to the formation of flower-shoots. The long intermediate region is unbranched. The bases of all the stolons go naturally to the formation of the short rhizomatous axis of the plant, and possibly latent buds may exist or new buds may form at the base of flowered stolons, but I do not know if this is the case. But there is not found on the central rhizomatous axis a rosette of conspicuous green linear and pointed leaves standing up above the bases of the flowering stolons.

In contrast with this construction in *G. prolata*, I find in *G. ornata*, Wall., at flowering time a central rosette of many linear pointed leaves—radical leaves of many systematic descriptions—crowning the roots which are thick at their origin, branching freely as they pass into the soil. Spreading out from this rosette are short, non-rooting stolons, each ending in a solitary flower. I see no trace of biennial growth upon them. They suggest annual growths.

Not having living specimens of *G. ornata*, Wall., I cannot write with the same certainty of its life-history as I can of

G. prolata, of which living plants are before me. But one has only to put side by side Wallich's Gossain Than dried specimen of *G. ornata* and specimens of the Sikkim plant which I am calling *G. prolata* to recognise that the whole habit and growth in the two plants is quite different and that they are different species.

I cannot say whether *G. prolata* is to prove a free-growing hardy garden plant or not. It will certainly never rival those great acquisitions to our gardens—*G. Farreri* and *G. sino-ornata*. Were I limited to two blue-flowering autumn species these are the two I would select.

The following is a summary of the results of my analysis of the nomenclature and figures of these Gentians that are under review:—

G. Farreri, Balf. f. Kansu species.

In cultivation.

G. Lawrencei, Burkill. Siberian species.

In cultivation.

Is the *G. Lawrencei* of Gard. Chron., 3, xxxviii (1905), 307, fig. 119.

Is the *G. ornata* of Gard. Chron., 3, xi (1906), 182.

Is the *G. ornata* of Bot. Mag. (1907), t. 8140.

G. ornata, Wall. Nepal species.

Not in cultivation. Probably never has been.

Is the *G. ornata* of Hook., Fl. Brit. Ind., iv (1883), 116. Nepal plant.

Is the *G. ornata* of Acta Horti Petrop., xv (1904), 268. Nepal plant.

G. ornata, var. *acutifolia*, Franch. Szechwan form.

Is not *G. ornata*, Wall.

G. ornata, var. *obtusifolia*, Franch. Szechwan form.

Is not *G. ornata*, Wall.

May be *G. Veitchiorum*, Hemsl.

G. prolata, Balf. f. Sikkim and Bhutan species.

Is in cultivation and has been more than once previously in cultivation.

Is the *G. ornata* of Gard. Chron., 3, ii (1883), 396, fig. 60.

Is the *G. ornata* of Hook., Fl. Brit. Ind., iv (1883), 116. Sikkim plant (? all).

Is the *G. ornata* of Acta Horti Petrop., xv (1904), 268. (Except Nepal plant.)

G. sino-ornata, Balf. Yunnan species.

In cultivation.

Is the *G. ornata* of Notes R.B.G. Edin., iv (1907), 71.

Is the *G. ornata* which received Award of Merit, Royal Horticultural Society, Oct. 12, 1915.

G. Veitchiorum, Hemsley. Szechwan species.

In cultivation.

Is the *G. Veitchiorum* of Gard. Chron., 3, xlvi (1909), 178, fig. 74.

Is the *G. ornata* var. *Veitchii* of Gard. Chron., 3, lviii (1915), 288, fig. 100.

Is the *G. ornata* which received Award of Merit, Royal Horticultural Society, Aug. 31, 1909.

FIGURES.

- G. Lawrencei* of Gard. Chron., 3, xxxviii
 (1905), 307, fig. 119 . . . = *G. Lawrencei*, Burkill.
G. ornata of Bot. Mag. (1880), t. 6514 . . . = Uncertain what the figure
 represents.
G. ornata of Gard. Chron., 3, ii (1883), 396,
 fig. 60 . . . = *G. prolata*, Balf. f.
G. ornata of Bot. Mag. (1907), t. 8140 . . . = *G. Lawrencei*, Burkill.
G. ornata, var. *Veitchii* of Gard. Chron., 3,
 lviii (1915), 288, fig. 100 . . . = *G. Veitchiorum*, Hemsl.
G. Veitchiorum of Gard. Chron., 3, xlv
 (1909), 178, fig. 74 . . . = *G. Veitchiorum*, Hemsl.

ENVOY.

The name *Gentiana ornata* should be dropped out of
 the literature of gardens. It is not in cultivation. Probably
 never has been. The place which its attractive name seems
 to claim for it is now occupied by much finer Chinese
 species.