2 and 3 feet high, thick, rounded, and glabrous. It is brown at the base in consequence of the great number of small reddish brown lines scattered over its green surface, its upper portion is unspotted. The numerous leaves are alternate, and scattered equally over the stem, linear-lanceolate in outline, acute at the point, narrowed at the base, with five or seven nerves prominent on the lower surface, slightly channeled above; they spread widely, and offer at their extreme base a transverse callosity. They are very small at the base of the stem, where they soon dry up, and gradually increase in size upwards; the three or four uppermost form a kind of false verticil at the base of the flower-stalk: these attain a length of 20 centimètres (about 8 inches). The flower is solitary, and very large and beautiful. It is of pure white in the interior, and even on the exterior of the three petals, which have only their prominent median nerve coloured of a purplish brown colour. This same tint is spread over the outer face of the sepals, which are margined with white. I have always found an agreeable and rather strong perfume in the flower, though according to M. Lemaire it is completely scentless, and in the opinion of M. Planchon nearly so. The flower is tubular, bell-shaped, with a spreading revolute limb; the petals are much wider than the sepals, the stamens are bent downwards and have greenish awl-shaped filaments, supporting large brown anthers filled with reddish brown pollen. The stamens are as long as the tube of the flower, and are greatly exceeded in length by the style, which is much bent downwards and terminated by a deeply 3-lobed orange yellow stigma.—*Duchartre.*

In order to clear up the difference between the two forms, *Odorum* and *Brownii*, we adduce the following observations.

Having grown twenty-five plants of *L. Odorum* side by side in 1878 with one hundred plants of *L. Brownii*, we have noted the following differences.

L. Japonicum.	*L. Brownii.*
Bulb white or whitish yellow, never red or brown, broad at base; the scales which are somewhat narrow and acute at tip, differ in length, the outer ones terminating at about ⅔ the height of the inner scales.	*Bulb* on exposure to light assumes a red or reddish brown tint, the scales are broad, and all pass up overlapping, and terminate together at the apex of the bulb, thus giving it the peculiar shape (figured on page 96) known as oblate in form, the base being curiously constricted, much narrower than the apex.
Bud when about 1 inch above ground.	
Green; leaves broad and blunt, edged with a thin brown line showing a darker tinted venation; apex, round, flat, blunt, resembling that of *Longiflorum.*	At first reddish brown with no green; apex acute; at about the height of 1½ inch, a little green shows under the red bracts; resembling that of *Auratum.*

When about 3—4 inches high.

L. Japonicum.

Stem green, thickly irrorated with brown—or green with brown rings just below the insertions of the leaves; leaves 1½ inch to 2 inches long, of a bluish green colour, edged with a thin brown line, having a lighter coloured midrib on upper surface, erect, bluntly obovate, wide spreading, unfolded to base of stem.

L. Brownii.

Stem and bracts dark brownish red, the upper 1½ inch of bud only showing a green tint, tipped at the point more or less with brown both on upper and under surface of leaf; bracts closely appressed to stem, no leaves unfolded, bud closed up.

When about 8—10 inches high.

Stem a blue green, more or less irrorated with brown, getting darker near the base where it leaves the soil, the insertion of the leaf is marked with a brown line or patch; leaves alternate, continued down the stem to a distance from the soil of 2 inches; semi-erect or horizontal, not arched, not curving downwards at tip; broadest in the middle where they are four times wider than at the insertion, diminishing gradually thence to apex and base; about 3½ inches long, soft to the touch; bracts have died off and fallen.

Stem rich dark brown, with brown bracts adherent and fresh, the lower 6 inches unfurnished with leaves, leaves about 4½ inches long, harsh to the touch, lanceolate, pointed green with broader brown edging, more or less erect, curving in an arc, with the tips invariably pointed downwards. At its broadest part which is nearer the apex than the base, it is only twice as broad as at the insertion.

Apex of bud at summit of stem when 8 inches high.

Formed of 4 leaves, open, divergent, with their tips directed outwards, as in *Longiflorum.*

Formed of 4 or 6 leaves tightly closed together, as in *Auratum.*

Prevailing tint of plant.

Bluish green.

Bronzed red relieved with green.

Flower bud.

Pale green, tinted on the upper surface with brown, considerably swollen about the middle; blunt at the tip, one of the petals generally shorter than the others, exposing a yellow surface.

Chocolate or reddish brown, tinted both above and below; the tip which is acute being of a darker colour than the middle of the bud; shape long and narrow, only slightly thickened at about two-thirds of its length.

Flower.

When first opened disclosing a golden yellow interior, which fades gradually to a rich cream colour; tube dilating from base to disc, but especially dilated about one-third down; disc somewhat revolute, anthers light brown, fragrance very great, resembling that of the Cape Jessamine.

When first open disclosing a white or light creamy white tint, soon fading to a pure white, contrasting very beautifully with the rich chocolate coloured exterior. Tube cylindrical, and but slightly dilated; disc large, rounded, very greatly revolute; anthers dark brown; fragrance moderate like that of *Longiflorum.*

Compare likewise the following statement of the celebrated Bulb grower, J. H. Krelage, of Haarlem.

"About 40 years ago, there was cultivated with success in my father's garden, under the name of *L. Japonicum*, a fine and rare Lily.

"I cannot say whence it was introduced, but it is possible that my father bought it at the sale of the stock of the famous nursery of Voorhelm Schreevogt, in 1837. Of this Lily, there were sold annually a few dozen bulbs, especially in Belgium, at a price of 10*s.* 6*d.* each. It was then considered to be the true *L. Japonicum* of Thunberg, and was a form allied to *L. Odorum* of Planchon, figured and described in the "*Fl. des Serres*," t. 876-77.

"I find *Japonicum* under that name in the nursery catalogues of our firm in 1850—55, the last year at a much higher price than before. It had not been offered for a couple of years, as the stock had diminished too much. In 1858, it is again quoted at the former price, with a remark as to its rarity, but, in the following year, it was omitted, being lost or sold out, and since that time I have never met with this form in any collection. Planchon speaks about this Lily as being figured in Loddige's "*Botanical Cabinet*," t. 438, and states that it is in some points different from his *Odorum*. This is quite true, and both Lilies must be considered as two, perhaps closely allied, but different forms. *Odorum* was introduced to our nursery in 1854, and in the catalogue of that and the following year, it was noted that it was a distinct form of the old *Japonicum*. Both these Lilies shewed, at least from a horticultural point of view, so great a difference from *Brownii*, that if not considered a distinct species, they at least must be accepted as strikingly different varieties. *Brownii* was once cultivated and considered by some to be identical with Thunberg's *Japonicum*. This erroneous impression was, if I remember rightly, first cleared up by Spae in his "*Memoire sur le Genre Lis*," in 1845. M. Const Ghildorf, Ghent, in his catalogue (1844—45), writes about the two Lilies in question, as follows—In *Brownii*, the exterior of the petals is white striped with dark crimson, nearly $\frac{1}{4}$ inch broad, sepals greenish white, dotted with crimson, and bordered with clear white. The Japan Lily introduced in 1804, has only the top petals tinged with crimson.

"As far as I can judge, there are four different forms which I should be inclined to unite in two groups. One, consisting of *Brownii*, the finest of all, the most popular, as well as the most hardy and most easily grown. The other group should comprise the old *Japonicum*, *Odorum* of Planchon, and *Japonicum Colchesterii*. Being delicate and difficult to manage, the two former are at present probably lost in Europe. Their three forms are very closely allied to each other, but differ much from *Brownii*, especially in the bulbs."—*J. H. Krelage, Garden, v.*, 13, *p.*, 541.

After this evidence, we think no one will in future, mix up under one name, these two very distinct horticultural, if not botanical, forms.

In the Abbe David's collection of Chinese plants, there are some specimens gathered at Kin-liang, which appear to hold a somewhat intermediate position between *Longiflorum* and *Brownii*, having a more open flower than the former, and being apparently tinted with purple outside; we should refer this form to our *L. Odorum*.

9. *L. Krameri.*—*Japonicum*, Thunb. Fl. Jap. 133; Mem. Acad. Peters., iii, 205, tab. v. fig. 2; Flor. and Pom. No. 73, t. 13, c. icone. —Hort. Wallace, Hook. fil., Bot. Mag., t., 6,058.—Stem, 3 or 4 feet high, slender, terete, smooth, spotted with purple; leaves, distinct from each other scattered, fifteen or sixteen in number, linear-lance

shaped, acuminate, very shortly stalked, firm, green, five-nerved, with minute papillæ on the margins, 6 to 9 inches long, and 6 to 9 lines broad; perianth fragrant, horizontal, solitary, broadly funnel-shaped, whitish with a slight reddish tinge, 6 or 7 inches long, gradually narrowed from the base to the neck; segments, oblanceolate-oblong, in the expanded flower, falcate above the middle in the upper third part, the outer ones 15 to 16, and the inner ones 20 to 21 lines broad; filaments about half the length of the perianth; anthers, of a dull brown colour, 8 or 9 lines long; pollen, red; ovary, 15 to 18 lines long, half the length of the slightly curved style; stigma, 4 to 4½ lines in diameter. Japan; flowers in the beginning of July. Probably a hybrid between *Speciosum* and *Odorum* (?), having leaves like those of the former, and perianth and anthers like those of the latter (v. v. ex hort. Wilsoni).—Var. Barrianum, Baker.—A smaller and slenderer form, with more numerous and more crowded leaves, which are three-nerved and from 2½ to 3 lines broad; perianth, white, 4 inches long; outer segments, 9 to 10 lines broad in the middle, inner ones, 15 to 18 lines broad; ovary, an inch long; style, ½ inch long; anthers. ½ inch long (v. v. in hort. Barr).

Kramer's Lily (*L. Krameri.*)

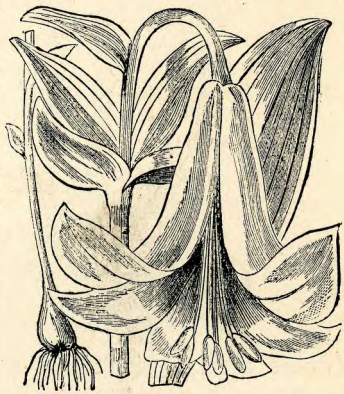
This novel and most beautiful form was sent over to me, for introduction into Europe from Japan, by M. Carl Kramer, in the winter of 1871—72, with 3 drawings, one white, one pale purplish blush, the third, similar in colour, but much larger in flower, of the size and shape of *Auratum* This Lily was at first received with incredulity, the drawings were considered exaggerated, and it was expected to turn out only a poor form of *Auratum*. Subsequent experience has, however, fully vindicated its fair fame as one of the most delicate and beautiful species of the Lily tribe. It is stated to grow wild on the mountains of Senano, in the island of Nippon, and also on the hills near Kioto, at a level of 3,000—4,000 feet above sea level, and ought, therefore, to be perfectly hardy in this country. The bulb, being small, bears the long journey to Europe very badly, at first few importations arrived otherwise than rotten, but now they come over, having been packed in clay, at my suggestion, by the thousand, in fair condition.

The young growth somewhat resembles that of *Auratum*, but it is more slender both as to stem and foliage, the latter is scanty, narrow, and pointed, the lower part of the stem is devoid of leaves. Out of doors, with us, it flowers in July, the colour varies from white, or white suffused with a faint lilac blush, to a rich purple, some of the deeper tinted forms are very beautiful. When fully established, it ought to be as hardy with us, as in Japan, and to produce 6 to 8 blooms. A considerable difference of opinion has arisen, as to whether the plant is really a species, or only one of the many distinct hybrids or seedling varieties, which Japanese gardeners know so well how to originate and perpetuate. Professor Baker suggests that it is a hybrid between *Japonicum (Odorum)* and *Speciosum*, but neither flower nor habit show the least trace of the last named species. Mr. T. Moore suggests that it is a hybrid between *Auratum* and *Japonicum*, if, indeed, it be not a mere selection from *Auratum* itself. Three forms were described by M. Kramer originally, but he added "there are many more startling varieties of it." It is no doubt one of the most delicately beautiful of all Lilies, and well deserving of the

most careful culture. We think the fact that it is gathered on the mountains of Japan, and exported annually in thousands, quite disposes of the idea that it is any thing else but an indigenous form; it may be originally a wild hybrid between *Auratum* and some other form, but it certainly did not originate in Japanese cultivation.

Compare Thunberg's remarks in the footnote on page 68, that his *L. Japonicum* "was spontaneous (indigenous ?) at Miaco and elsewhere, and often cultivated by the Japanese as an ornamental plant." Mr. Baker considers from his inspection of Thunberg's original specimen now in the herbarium at Upsala, that *Krameri* is the plant there referred to by Thunberg, in 1873, and described as an indigenous Japanese species.

10. *L. Nepalense*.—D. Don, Wern. Trans. iii., 412; Prodr. Nep. 52; Wallich. Pl. Asiat. Rar. iii., 67, 291, Cat. 5,078; Kunth, Enum. iv., 267.—*L. Ochroleucum*, Wall. in hb. Lindley.—Bulb, not known to me; stem, 2 to 3 feet high, straight, slender, smooth; leaves, 30 to 50 in number, scattered, of a shining green colour, ascending, smooth, lance-shaped, acute or linear, the lower ones 3 or 4 inches long, 6 to 9 lines broad in the middle, distinctly five to seven-nerved, the upper ones shorter and distant from each other; flowers, solitary, or few in an umbel, slightly fragrant (pedicels with bracts at the base in a whorl of reflexed leaves), or few in a loose raceme, the lower pedicles ascending, 2 or 3 inches long; nodding at the top; perianth, 4 or 5 inches long, broadly funnel-shaped, whitish-yellow, more or less tinged with purple on the inside, often marked with scattered dots; segments, oblanceolate-clawed, bluntish, in the expanded flower, falcate in the upper third part, 6 to 12 lines broad at two-thirds of their length from the base; stamens, shorter than the perianth by one-fourth; anthers, narrow, 6 or 7 lines long, pollen, yellow, ovary, 9 to 12 lines long, together with the style, a little longer than the stamens; capsule, ovate, 2 inches long, obtuse-angled. Temperate regions of the Western and Central Himalayas, at an elevation of 7,000 to 9,000 feet above sea level, from Gurwhal and Kumaon to Nepaul. Wallich, Thomson, Jacquemont, &c.



The Nepaul Lily (*L. Nepalense*).

Introduced into England in 1855. Evidently a very beautiful form. Unfortunately it is not in cultivation in Europe at the present time.

11. *L. Candidum*.—L. Sp., 433; Bot. Mag., t. 278; Red. Lil., t. 199; Bury, Hexand., t. 38; Reich., Ic. Germ., t. 445; Kunth, Enum., iv., 266.—Bulb (*see* p. 97), ovoid, perennial, large, yellowish; first leaves produced in winter, sessile, oblanceolate, 1½ to 2 inches broad; stem, 3 to 4 feet high, straight, smooth, blackish-green; leaves, 100 or more in number, scattered, ascending, green, acute, two to five-

nerved, with minute papillæ on the margin, those at the centre of the stem linear, 3 to 6 inches long, the lowest ones oblanceolate obtuse, the upper ones gradually smaller, the highest lance-shaped, 1 to 1½ inches long, and pressed close to the stem; raceme, short, deltoid, containing from 6 to 20 flowers, and, when fully expanded, 6 to 8 inches broad; lower flowers nodding; bracts, lance-shaped or linear; pedicels, ascending, the lowest ones 2 or 3 inches long, often with small bracts; perianth, white, fragrant, broadly funnel-shaped, 2 or 3 inches long, gradually widened from the base to the neck

The Double White Lily
(*L. Candidum* var. *Monstrosum*).

The White Lily
(*L. Candidum*).

(where it is 1½ inches in diameter); segments, in the expanded flower, falcate in the upper third part, obtuse, downy at the apex, 6 to 9 (or, rarely 12) lines broad above the middle; stamens, shorter than the perianth by one-third; anthers, yellow, 5 or 6 lines long; style, together with the ovary, much longer than the stamens, nearly as long as the perianth. Southern Europe, from Corsica to Northern Persia and the Caucasus.

1. Var. *Foliis Aureo Marginatis* is a form, in which a broad golden margin to the foliage prevails, especially valuable in a winter garden. The flower is the same, but of a very pure white colour.

2. Var. *Striatum*, Flore des Serres, t. 735, is a form with flowers streaked with purple on the outside.

3. Var. *Spicatum (Flore Pleno* or *Monstrosum)*, Hort., is an abnormal form, the flowers being abortive, and the bracts dilated, white, and petaloid.

4. Var. *Peregrinum*, Linn.—*Peregrinum*, Mill. Dict., No. 2; Hayne, Arzne., viii., 27; Sweet, Brit. Flow. Gard., ser. ii., t. 367. A slenderer form, with a purple stem, narrower leaves, and segments of perianth narrower, longer, more acute, and more spathulate. A garden variety, long in cultivation, not yet found in a wild state.

This is one of the earliest, if not the earliest known Lily, held sacred to the Virgin; and it may also be said, one of the most beautiful, most sweetly scented, and most useful for decorative purposes; its petals soaked in brandy are a popular remedy for cut fingers and bruises.

12. *L. Belladonna* (Leichtlin).—Stem, a foot or more high, slender, smooth, terete, green; leaves, about twenty in number, lance-shaped, very shortly stalked, distant from each other, green, smooth, acuminate, patent, 1½ to 2 inches long, 3 or 4 lines broad in the middle; flowers, one to three in number, the terminal ones erect at first, the lateral ones horizontal when expanded; perianth, broadly funnel-shaped, 3 inches long, of a deep reddish colour on both sides, tinged with green at the base outside; tube, gradually widened from the base to the neck; segments, oblanceolate, not dotted, in the expanded flower falcate in the upper third part, 8 to 12 lines broad at two-thirds of their length from the base, the inner ones broader; stamens, shorter than the perianth by one-fourth; anthers, narrow, reddish, 3 or 4 lines long; style, slightly curved, and, together with the ovary, longer than the stamens; stigma, small. The plant has the habit of *Speciosum*, with a perianth like that of *Candidum*, only reddish. Described from Max Leichtlin's figure. It is, perhaps, a garden hybrid from *Speciosum* and *Longiflorum*.* It is believed to have come originally from Japan, having a great resemblance to the *Amaryllis*, from which it derives its name.

13. *L. Washingtonianum*.—Kellogg, Proc. Calif. Acad., ii., 13; Wood. Proc. Acad. Phil., 1868, 166; Baker, Gard. Chron., 1871, 709, t. 142; Regel, Gartenfl., t. 170; Flore des Serres, t. 1,975-6.—*L. Bartramii*, Nuttall, herb.—Bulb (*see* page 98), oblique, white, sub-rhizomatous, with small lance-shaped scales; stem, 3 to 5 feet high, terete, smooth, green, racemose at the top, bare below the raceme; leaves, in six to nine whorls, each containing from five to twelve leaves, or the upper ones scattered, oblanceolate, patent, sessile, smooth, 3 or 4 inches long, 8 to 12 lines broad above the middle, acute, green, gradually narrowed from the middle to the base; lateral veins, oblique and indistinct; raceme, from 6 inches to 1 foot long, containing from 12 to 20 flowers when expanded, 8 or 9 inches broad, pedicels ascending, the lower ones 2 to 4 inches long; bracts, small, oblanceolate or linear; perianth, fragrant, funnel-shaped, whitish, 2½ to 3 inches long, slightly tinged with reddish or purple on the inside; dots, few, small, lilac-coloured, scattered; segments, oblanceolate, 6 to 8 lines broad at two-thirds of their length from the base (from which point they are gradually narrowed to the base), falcate in the upper third or fourth part when the flower is fully expanded; stamens, shorter than the perianth by one-fourth; anthers, yellow, 5 or 6 lines long; ovary, 8 or 9 lines long, about

* Max Leichtlin informs me that he has not seen the plant, but only its picture, which was sent to him from America some years ago. Very little, therefore, is really known about this species (?); but, there is reason to believe that there are yet some unknown wonderful forms in Japan.

one-third the length of the curved style. California, in woods on the Sierra Nevada, &c.—Jeffray, 1,139; Bridges, 270; W. Lobb, 248.

The Washington Lily.
(*L. Washingtonianum*) (from a woodcut, kindly lent to us by Mr. Masters, of the *Gardeners' Chronicle*).

This noble Lily inhabits the western slope of the Californian Sierra Nevada, and is found along the water-shed of the streams that run into the Sacramento. Professor Wood in the notice in the "Proceedings of the Academy of Philadelphia" above quoted, describes the plant as occurring in woods, here and there, from the Yosemite to the Columbia, and says further, "It is well-known to the miners, who recognise its superior qualities, and call it the *Washington* Lily." There are specimens in the Kew herbarium gathered by Jeffery in 1853, by W. Lobb in 1857, and also by Bridges. I am very glad to note that it has found its way at last into this country. It shows how Lilies have been neglected, when a plant like this has to wait 15 years for an orthodox botanical christening; and when growing in a country so much frequented and so easily accessible as California, it has to wait 17 years to reach the hands of our gardeners. Well, we have got it at last, and I hope we may not let it slip through our fingers, as we did in the case of *Nepalense*; and I only ask all those amongst your readers that can appreciate a fine Lily, to read the description I have just given, in order to realize what a treat is awaiting them.

The Purple-tinted Washington Lily. (*L. Washingtonianum Purpureum*).

14. *L. Washingtonianum Purpureum.*—A smaller and slenderer form; stem, 12 to 18 inches high; leaves, 1 to 1½ inches long; flowers, in umbels of four to eight; segments, more falcate, 5 or 6 lines broad, white when first expanded, but after a few days changing gradually to a deep vinous-purple colour, and with numerous small dots scattered over the entire inner surface; style, 9 to 12 inches long. California, on the coast ranges of the Sierras (*see* pages 22, 23).* Extensively cultivated in English gardens since 1873.

15. *L. Parryi.*—A new Californian Lily. Through the kindness of a correspondent, Mr. W. O. Gronen, I am enabled to furnish particulars of this new form, recently introduced into Europe, and placed by Mr. Watson in the Eurilion group. It has not yet, we believe, flowered in Europe.

"On one of my last botanical excursions in the vicinity of San Bernardino, Southern California, in the early part of July, 1876, I improved the opportunity to accept an often repeated invitation to visit the intelligent

* A very good description, with plates, of these two forms, is found in *Flor.* and *Pomol.*, 1874, p. 256.

brothers, J. G. and F. M. Ring at their mountain retreat near San Gorgonio Pass. Leaving the broad and picturesque basin of the Santa Anna Valley, near the emergence of this stream from the rugged mountain wall of the San Bernardino range, our route, after crossing Mill Creek, one of its largest eastern affluents, hugged close to the foot-hills bordering the upper Yucaipa Valley, thence by a more rapid ascent in a nearly direct easterly course, we reach an elevated bench, variously scattered with pine and oak groves, overlooking the broad sweep of San Gorgonio Pass, now traversed by the eastern extension of the Southern Pacific Railroad. In one of these mountain nooks the Messrs. Ring have located a Potato ranch, the elevation of over 4,000 feet above the sea level giving a sufficiently cool moist climate, while the adjoining mountain slopes afford an extensive summer cattle range long after the herbage of the lowlands has dried up.

"Owing to the lateness of the season, the early vegetation of this district had already given place to a more sparse mid-summer growth. In scattering groves of Pinus Coulteri, the ground was abundantly strewn with the massive cones of this peculiar species, its dense scales armed with formidable hooked spines; many of the largest cones were fully six inches in diameter, with a length of nine inches. At lower elevations throughout this district we find the large fruited Douglas Spruce quite common, this well marked variety in other particulars exhibiting the specific characters of this species in more northern and eastern localities. Among the rarities of this district we were able to secure a few specimens of Habenaria elegans (Bolander). The occasional perennial water courses here met with are mostly confined within deep and inaccessible ravines, but more frequently scant springs ooze out from beneath deep layers of porous strata, and spread out into boggy marshes generally choked up with rank willow and older growths, and occasionally expanding into small meadows of coarse grass and sedges. Near one of these largest expanses of moist, rich soil, is located the Potato ranch of Messrs. Ring, the special object of our visit. It is quite unusual, though none the less agreeable, to find in such secluded and unpretentious residences, indications of a refined taste exhibited in an excellent library, largely composed of scientific works, and books of exploration and travel, besides the necessary instruments for keeping up a meteorological record! No doubt from such resources the bachelor brothers find some relief from the tedium of their isolated location, and after the excitement and hardships of extensive travels on the north-west coast, seem reconciled to the independent solitude of a mountain ranch.

"Succeeding a cordial welcome, and the necessary care of our riding animals, the vegetation of this curious nook engaged our attention. On all the steep, gravelly slopes adjoining, there was the usual display of Californian evergreen shrubbery, including conspicuously the heath-like Adenostoma, which, under the common name of Chamisal, is largely used for fuel; the holly-leaved cherry Prunus ilicifolia, exhaling a strong odour of bitter almonds; the Heterorneles arbutifolia, with glossy varnished leaves, and a prevalent form of "Californian lilac" (Ceanothus crassifolius), with thick leathery foliage; the dull, green hue which everywhere

characterises the moorish growth is at this time of year partly relieved by brilliant scarlet festoons of Pentstemon cordifolius, trailing over adjoining bushes, or the less showy blossoms of Pentstemon ternatus. What, however, soon attracted more exclusive attention was a conspicuous yellow Lily, growing abundantly in the boggy ground adjoining the house, and sharing with the Potato patch the care and attention of the undisputed proprietors of the soil. Though not as showy as some other members of the Lily family in this region, there is a grace displayed in its large drooping flowers, surmounting a slender stem, beset with narrow scattered leaves, which occasionally are crowded at base into a distinct whorl; the plant varies in height from 3 to 5 feet, the number of flowers regularly unfolding from it is also variable, ranging from three to nine. The specimens then collected, together with later material, obligingly furnished by Mr. Ring, has supplied the necessary means for a complete description, and the whole having been placed at the disposal of Mr. Sereno Watson, who is now elaborating the endogenous flora of California, he has determined the same as an undescribed species, which he has complimented the discoverer by naming *L. Parryi*, Watson. At my request Mr. Watson has kindly furnished the following characteristic description :—

L. Parryi, Watson, Bot. Calif. ined.—"Bulb somewhat rhizomatous, of numerous crowded scales, fleshy and jointed, about an inch long, the upper joint broadly lanceolate; stem slender, glabrous, 2 to 6 feet high, 2-10 flowered; leaves usually scattered, occasionally the lower ones in a whorl; linear, oblanceolate, 4 to 6 inches long, and ½ inch wide or less, mostly acuminate; flowers horizontal, pale yellow, sparingly and minutely dotted with purple; segments 3½ inches long, and 5 or 6 lines wide, with long, narrow claws, slightly spreading from the base; stamens and style ½ inch shorter, equal; anthers, oblong, brownish, three lines long; capsules narrowly oblong, acutish, 2 inches long by ½ inch in breadth.

"Of the section Eulirion, to which also belongs the Californian *L. Washingtonianum*. It is distinguished from the latter especially by its small bulbs, with jointed scales, its more scattered and narrower leaves, its small yellow flowers with less spreading segments, and its longer, narrower and acuter capsules." — *Dr. C. G. Parry, Proc., Davenport Academy of Nat. Science, vol. ii., p.* 188, where an excellent plate is given of this new form.

SUB-GENUS III.

Archelirion (Baker), Open-flowered Lilies.

Perianth, broadly funnel-shaped, or campanulate; segments, ovate, or oblong-lance-shaped, and deeply falcate in the expanded flower, dotted on the inner surface, and with papillæ on the lower part; groove on the keel very deep; stamens, diverging widely from the curved style.

KEY TO SPECIES.

Leaves, sessile; 16, *Tigrinum*, 17, *Oxypetalon*.
Leaves, shortly stalked; 18, *Speciosum*, 19, *Auratum*.

16. *L. Tigrinum.*—Gawl., Bot. Mag., t. 1,237; Red. Lil., t. 395 and 475; Kunth, Enum., iv., 259.—*L. Speciosum,* Andrews, Bot. Rep., t. 586, non Thunberg.—Bulb (*see* page 99.), perennial, globose, with oblong-lance-shaped, acute scales; stem, 2 to 4 feet high, blackish or brownish, with a white cobweb-like pubescence; leaves, deep green, scattered, smooth, ascending, firm, linear, 3 or 4 inches long, 3 to 6 lines broad in the middle, 5 to 7 nerved, the upper ones shorter, and bearing brownish red bulbils in the axils; raceme, consisting of 3 to 10 (rarely 20 to 25) flowers, broad, deltoid when expanded, sometimes 12 to 15 inches in length and breadth; bracts, small, ovate; pedicels divaricated, straight, nodding at the top, the lower ones 3 or 4 inches long, and often furnished with bracts; perianth, 3 or 4 inches long, and of a brilliant red colour, or tinged with orange; segments, broadly falcate, acuminate, callous at the apex, downy, 9 to 18 lines broad below the middle, the inner ones much broader, all with large dark-purple dots on the inner surface; claws, covered with numerous black-headed papillæ, groove on the keel very deep, and with pubescent edges; filaments, crimson, 2 to 2½ inches long; anthers, blackish, 6 to 8 lines long; pollen, crimson; ovary, green, 9 to 12 lines long; style, 1½ to 2 inches long, very much curved. I have not seen the capsule. Temperate regions of Japan and China. Flowers at the end of July and during the whole month of August. For the forms in cultivation, *see* T. Moore, Florist, 1873, 14.

T. Splendens.—Flore des Serres, t. 1,932; Wilson, Journal Hort., 1873, 251, with a figure; Floral Mag., t. 509 (Leopoldi), Hort., is a large-flowered, very late blooming form, with larger dots, broader leaves, and with black smooth stem.

The Double Tiger Lily
(*L. Tigrinum Flore Pleno*).

The Great Tiger Lily
(*L. Tigrinum Splendens*).

T. Fortunei is an early flowering form, having its stem densely covered with greyish fluffy pubescence.

T. Lishmanni—.Moore, Florist, 1873, 13, with a figure, is a form which has the dots confined to the central part of the segments, the upper part and the base being without dots.

T. Erectum has the pedicels less divaricated, and the flowers nearly erect. Introduced to our gardens in 1804 by Captain Kirkpatrick, but well known previously, though not named, by a figure published in 1791 by Sir Joseph Banks.*

17. *L. Oxypetalum*, Baker.—*Fritillaria oxypetala*, Royle.—Ill. Him., 388? Hook., Bot. Mag., t. 4,731; Lemaire, Fleur., t. 422.—*L. Triceps*, Klotsch, Reise, Wald., 33, t. 93.—Bulb, oblong; scales, few, lance-shaped, acuminate, 1½ inches long: stem, slender, terete, green, one-headed, smooth, 1 to 1½ feet high; leaves, 20 to 30 in number, at first densely rosulate, scattered, ascending, green, smooth, lance-shaped or linear, 2 to 3 inches long, and 3 to 6 lines broad in the middle; perianth, horizontal, broadly funnel-shaped, 15 to 18 lines long; segments, oblong, acute, broadly imbricated, 8 or 9 lines broad in the middle, purplish, tinged with green on the back, dotted with purple on the lower half of the inner surface, and with numerous papillæ crowded together at the base; claw, short, deeply furrowed and bearded on the outside; stamens, shorter than the perianth by one-third; anthers, purplish, 3 or 4 lines long; filaments, diverging;

Snake's-head Lily (*L. Oxypetalum*).

* To these we may add two more forms. *T. Fortunei Giganteum*, a pyramidal and fine form of *Fortunei*, and *T. Flore Pleno*, a remarkably handsome and vigorous variety, in which the perianth segments, instead of forming a single series as in the type, are multiplied into about six series, and are for the most part opposite, lying over each other in their recurved position, like the petals of the Hexangular Camellias.

This group may be considered one of the most popular and well known; few objects, in autumn, stand out so conspicuously graceful as a group of tall well-grown *Tigers*, either the old *Sinensis*, or the grey hairy-stemmed *Fortunei Giganteum*, or the magnificent *Splendens*, especially if flanked on either side by a few blooms of *Auratum*.

It is also a most useful plant for harvest festival decoration, its time of bloom exactly coinciding. The old *Sinensis* is the first to appear, then, a fortnight later, *Fortunei* and *Flore Pleno*, and a fortnight later on, *Splendens*. So that for a period of about 6 to 8 weeks, *Tiger* Lilies together with *Specciosum* and *Auratum* are in full beauty.

The variety, *Lishmanni*, described and figured by Moore, does not, we incline to think, belong properly to this group, being not bulbiferous in the axils, but rather to be one of the forms of *Maximowiczii*, a recently introduced and very variable species, described later on. The great characteristic of the Tiger group, and one by which they are easily propagated, is the constant presence in the axils of each leaf of 1—3 bublets (*bulbillæ*), shiny and black, about the size of peas, which, in the autumn fall, or are gathered, and in 3 years time, will, if cultivated, produce flowering bulbs.

ovary, club-shaped, 5 or 6 lines long; style, straight, shorter than the ovary; capsule, obovoid-oblong, 9 to 12 lines long, obtuse-angled; valves, emarginate at the apex. Temperate regions of the Western Himalayas (Hoffmeister); Kumaon to Pindari, at an altitude of 8,000 to 12,500 feet (Strachey and Winterbottom).*

18. *L. Speciosum.*—Thunb., Linn. Trans., ii., 332; Bot. Reg., t. 2,000; Zuccarini, in Sieb. Fl. Jap., iii., 31, t. 12 and t. 13, fig. 1; Kunth, Enum., iv., 259; Bot. Mag., t. 3,785; Flore des Serres, t. 276.—*Lancifolium,* Mussche, Paxt. Mag., v., 267, with a figure, non Thunb. —Bulb (*see* page 101), perennial, globose, brown or brownish-red; scales, lance-shaped, an inch long, somewhat loosely set; stem, 2 or 3 feet high, straight, terete, smooth, green, or spotted with red; leaves, 12 to 20 in number, scattered, distant from each other, very shortly stalked (the stalk pressed close to the stem), oblong-lance-shaped, acute or acuminate, of a shining green colour, firm, smooth, round at the base, the lower ones 5 to 6 inches long, 15 to 18 lines broad in the middle, and with five to seven distinct nerves distant from each other; raceme, deltoid, containing from three to ten flowers; pedicels, divaricated and furnished with bracts, the lowest 3 to 5 inches long, the central ones nearly erect, the lateral ones nodding at the top; perianth, 3 or 4 inches long; segments, ovate-lance-shaped, deeply falcate, 12 to 21 lines broad, the inner ones broader, white, usually more or less suffused with red, dotted with red on the inner surface, and with numerous papillæ; groove on keel deep and smooth; filaments, diverging widely, 2½ to 3 inches long; anthers, narrow, 9 to 12 lines long; pollen, saffron or red; ovary, 1 inch long; style, slender, very much curved, 1½ to 2½ inches long; capsule, obovoid-oblong, 2 inches long, obtuse-angled, umbilicated at the apex. Temperate region of Japan, flowers in the beginning of August.

The Red-spotted Japan Lily (*L. Speciosum* var. *Rubrum*).

For the forms in cultivation, *see* Dr. Masters, "Gard. Chron.," 1872, p. 1,522.

Punctatum, Lemaire (*Lancifolium,* Paxt. Mag., v. t. 267, *Albiflorum,* Hook., Bot. Mag., t. 3,785), is a form which has white flowers with red dots and papillæ.

* We have no knowledge of this form, it is evidently very closely allied to the *Fritillarias.*

It seems altogether out of place among the Lilies with its alternate short slender leaves, its few but elegant lilac tinted star-shaped flowers, scarlet anthers, and broad acutely pointed petals, much dotted towards the eye with black, and a bulb elongated like that of a *Fritillaria,* with but few acute scales.

Tametomo, Zucc., and Spae. (eximium, Hort. olim; *Broussartii*, Morren, Mém. Acad. Roy. Brux., Feb., 1834, with figure; *Vestale*, Masters, loc. cit.), is a variety which has white flowers without dots.

Teppo, *Krœtzeri*, Duchartre, has white very symmetrical flowers, the segments of which are marked with streaks of green on the outside, with green mid-ribs and green star shaped eye in centre of flower, and green stems.

A native of Japan, long known through Kæmpfer's drawing published by Sir Joseph Banks, but not introduced to Europe till 1832. As every one knows, it varies greatly in the size and colouring of the flower, but it is a most distinct plant, with no close affinity except to *Auratum*. Unfortunately it was first sent out into cultivation under a wrong name, *Lancifolium*,* and a name when once put into garden circulation, even when entirely erroneous, is very difficult to get changed. Let me beg of all my horticultural readers who have not done so already, to call this commonest and best known of the Japanese Lilies, in their catalogues and on their labels, by its correct name of "*Speciosum*."

Confer the following extract from the *Gardeners' Chronicle*:—

Some time since Mr. Barr submitted to us a considerable number of specimens of *Speciosum*, with a view to getting their nomenclature definitely settled. This was no easy or satisfactory task, the degree of variation is considerable, the intermediate stages between one form and another numerous. To begin with, then, there are no absolute limits laid down by Nature herself, and any that may be made, are therefore arbitrary and liable to exception. Next, we have not sufficient evidence as to the constancy of particular forms. What security have we that the bulb, which this season produces flowers of any particular colour and form, will in the forthcoming season produce the same, especially if grown under different conditions. Again, there is the difficulty that with one or two exceptions, the varieties have not been authoritatively named. Neither Duchartre nor Baker have attempted to characterise the varieties of this species. What one grower calls *Roseum*, another calls *Rubrum*, and who shall decide which is correct?

It may be well then to state the method adopted in the following attempt to come to some conclusion that may be serviceable to cultivators.

In the first place, we studied the specimens individually, one by one, so as to become acquainted with their prominent characteristics; next, the several specimens were compared with each other, in order to see which marks were peculiar, which were general. This done, the next step was to look into the literature of the subject, and especially to compare the coloured figures that have been given, and to endeavour to ascertain whether any of the specimens before us conformed to the description or figure, and if so, to follow the botanist's rule of taking the oldest or first imposed name as the correct one, unless there be some special reason for deviating from the "law of priority."

All this demanded a considerable outlay of time and labour, and involved an amount of "detail" of which we do not think the cultivator would thank us to lay before him more than is absolutely essential for his purpose.

In brief, then, there is much variation in the colour of the stem, foliage, and particularly of the flower; there is a good deal of variation in habit, and in the form of the leaf. There are also great differences in size and vigour, but these latter we may pass over as probably accidental. It may save time to put the results of our examination of Mr. Barr's specimens into a tabular form, thus:—

LILIUM SPECIOSUM, *Thun.* (*var.* HORTENSES).

A.	Stems fasciated.		
	,, brownish		FASCIATUM RUBRUM.
	,, green		FASCIATUM ALBUM.

* The true *Lancifolium* (Thunb.) is a miniature form of *Thunbergianum*.

B. Stems not fasciated.

,, purplish brown.

flowers pink ... ... RUBRUM.

,, white or nearly so ... ALBUM.

,, green.

flowers rose-coloured ... ... ROSEUM.

flowers deep rose-coloured ... SPECIOSUM. (proper).

flowers white or nearly so.

flowers white with rose-coloured spots PUNCTATUM.

flowers quite white ... VESTALE.

Concerning the fasciated varieties there is little need to speak. They differ in nothing from the other varieties, except in their fasciation. We have adopted the name *Fasciatum* to avoid confusion, though in some catalogues the name *Corymbiflorum* is used for the same varieties. Of the non-fasciated forms we have, first of all, a division into those which have green stems and those which have purplish-brown stems. We find in practice that this is a fairly good character; moreover, it is usually associated with the presence of a similar tint on the mid-rib of the segments of the flower, easily seen even when in bud. Of these purple-stemmed varieties there are two main forms, the one with pink, the other with white flowers. We propose that the name *Rubrum* should apply to the pink-flowered varieties with purplish stems. There is no figure, that we are aware of, of this variety. The white-flowered form of this section we propose to call *Album*, the *Albiflorum* of the "*Botanical Magazine*," belonging to another form.

Turning now to the green-stemmed forms, we have those with pale rose or blush-coloured flowers, in which the colour is not distinct; these we propose to refer to *Roseum*. The figure in *Paxton's Magazine*, vol. 5, plate 1, represents this form. Of the same colour, but much deeper, and with a defined white or whitish edge around the segments of the perianth, is the form we propose to call the true *Speciosum*. This is the plant well figured in the "*Botanical Register*," tab. 2000, by Lindley, under this name; also in the "*Flore des Serres*," t, 276-277. *Speciosum* var. *Kæmpferi* of "*Botanical Magazine*," tab., 3785, we take to be synonymous with this.

Of the white-flowered forms of this section we have one which is white with rose-coloured spots. For this the name *Punctatum*, given by Lemaire, "*Flore des Serres*," 276, seems most suitable, though if we were to follow botanical rules rigidly, it should be called by the Japanese name, *Tametono*. It is figured under the name *Albiflorum* in the "*Botanical Magazine*," t., 3785 and in "*Paxton's Magazine*," vol., 5, tab., 267, as *Lancifolium Roseum*. It has also been called *Broussartii* and *Eximium* in gardens, though the latter name applies to quite a different plant. So far as the bulbs of these varieties go, we have not personally had the opportunity of comparing any great number, but we are informed that the range of variation in the bulb is but slight. Lastly, for a variety with pure white unspotted flowers, we adopt the name *Vestale*.

Besides the typical form of *Rubrum* and *Roseum*, there are many intermediate (seedling) varieties, amongst these a few may be selected for special beauty.

1. *Speciosum Japonicum*, coming direct from Japan; with a broad crimson band, margined with white, introduced by us in 1869.
2. A form very similar to this, but, perhaps, rather broader in the petals; has gone under various names, as *Speciosum, Purpuratum* (Groom), *Schrymakersii*, &c.
3. A very richly coloured blood-red flower, with large petals, and of perfect shape; known as *Cruentum*.
4. *Macranthum*, a fine well-shaped form.
5. *Multiflorum*, a very free flowering form, with tall branching spike, &c., &c.

19. *L. Auratum*.—Lindl., Gard. Chron., 1862, 644b; Hook., Bot. Mag., t. 5,338; Flore des Serres, t. 1,528-1,531; Ill. Hort., ix., t. 338; Rev. Hort., 1867, t., 371; Miquel, Ann. Mus., iii., 156.—*Dexteri*, Hovey, Mag. Hort., Aug., 1862.—*Wittei*, Suringar in K. Koch, Wochens, 1867, 294.—*Speciosum*, imperiale, Hort., Siebold.—Bulb, somewhat like that of *Speciosum*; stem, 2 to 4 feet high, green, or

tinged with purple, slender, terete, smooth; leaves, 20 to 30 in number, scattered, distant from each other, very shortly stalked (stalk pressed close to the stem), lance-shape, acuminate, of a deep green colour, smooth, firm, five-nerved, the lower ones 6 to 9 inches long, and 9 to 15 lines broad; raceme, deltoid, containing from 3 to 10 flowers; pedicels, divaricated and furnished with bracts; perianth, 5 to 7 inches long; segments, broadly falcate, 1 to 2 inches broad in the middle (the inner ones broader), white, usually streaked with yellow in the middle, and with scattered purple dots and papillæ on the lower part of the inner surface; groove on the keel, distinct, and with smooth edges; filaments, 3 to 3½ inches long; anthers, narrow, 9 to 12 lines long; pollen, red; ovary, 12 to 14 lines; style, slender, very much curved, 2½ to 3½ inches long; capsule, 3 inches long, oblong, longer and narrower than that of *Speciosum*, emarginate at the apex.—Japan, Oldham,* 186, Maximowicz. There are forms approaching *Speciosum*, with flowers streaked with red; some of these have from 25 to 30 broader leaves, and others from 40 to 50 narrower leaves.—*Wittei*, Suringar, is a variety with white undotted petals.

The Golden-Banded Lily (*L. Auratum*).

It was first introduced into Europe in 1862 by Messrs. Veitch.

Auratum is decidedly the grandest Lily known to cultivators; for description of its gorgeous magnificence and beautiful fragrance, *see* pp. 33, 43, 44.

It is a most variable form, hardly any two being alike, amongst the most prominent varieties we may mention.

(*a*). A fasciated form, with broad banded (not cylindrical) stem, containing from 30 to 100 flowers, generally small, crowded together in its summit.

(*b*). *Rubro-vittatum*, in which the yellow streak is replaced by a broad crimson band, the spots and blotches being large, and of a vivid crimson tint. In this variety there are only two colours, crimson and white; forming a most splendid contrast.

(*c*). *Cruentum*, a dwarf form, with flowers 11 inches in diameter, the streak is maroon, darkening to the centre, so as to produce the effect of a dark eye, the spots are purplish crimson.

* Uri is the Japanese word for Lily, and Yama for Hill: Yama Uri the Hill Lily, is the native name for *Auratum*.—Oldham wrote of it, "a splendid showy plant, growing chiefly in light rich soil amongst the shrubs and between the rocks."

(*d*). *Emperor*, in this, perhaps, the most beautiful form; the eye is golden yellow, the whole is suffused, except at the margins of the petals, which are broad, by a rich blood red tint, as in *Speciosum*; at the junction of white and red, the colours are streaky, and run into one another, there are the usual spots and blotches, but the narrow white margin does not exceed ¼ inch.

(*e*). *Rubro-pictum*, in this very beautiful variety the yellow band prevails on the lower half of the petal, where it is suffused, and gradually lost in a beautiful light crimson broad streak, continued to the apex of the petal; the spots and blotches are also of the same crimson tint.

(*f*). *Pictum*, in this choice variety, the tip only or lower third of the petal is marked with a scarlet or blood red streak.

(*g*). *Virginale*, in this very beautiful form, there is no other colour but yellow and white, the spots, if any, and band being entirely of the former tint.

(*h*). *Wittei*, on this point we quote below M. Krelage's observations.—*Garden*, *vol.* 13, *p.* 180.

Lastly we must not omit to mention the splendid hybrids derived from *Speciosum* and *Auratum*, *Melpomene*, *see* p. 65, and *Parkmanni*. A coloured figure of the latter is given in the *Garden*, *vol.* 15, *p.* 456.

L. Wittei.—"As I have had both *L. Auratum*, var. *Virginale*, and *Wittei* in flower at the same time, I have been able to observe the decided difference between them. *Wittei* has not narrow, long petals, but rather broad and short ones. *Virginale* is papillose on all the divisions of the perianth, the outer as well as the inner, and these papillæ are very delicately tinged with light yellow. The divisions of the perianth of *Wittei* are totally glabrous. The last form I have never found among any lot of *Auratum*. *Virginale* I bought first in 1868; since that time I have found it sometimes among introduced lots of *Auratum*, and at present several of these plants are in flower in my nursery, which all have the papillose character on the perianth division, the petals being more or less narrow in the different plants. In consequence, I think I am right in considering *Wittei* and *Virginale* to be two different plants, leaving it to later examination to decide if *Wittei* must be considered as a separate species, or merely as a variety of *Auratum*."—*F. H. Krelage*, *Haarlem*.

SUB-GENUS IV.

Isolirion, Erect-flowered Lilies.

Perianth, broadly funnel-shaped, standing erect for a considerable time, usually of a brilliant red or yellow colour; segments, oblong, lance-shaped, spathulate, or clawed at the base with dots and papillose lamellæ on the inner surface, and with a deep groove on the keel; stamens, diverging on every side from the erect style.

KEY TO THE SPECIES.

Leaves in whorls.— 20, *Philadelphicum*, 21, *Medeoloides*.
Leaves scattered: style shorter than ovary.—22, *Concolor*.
style longer than ovary.—23, *Bulbiferum*, 24, *Croceum*, 25, *Davuricum*, 26, *Elegans*, 27, *Catesbæi*.

20. *L. Philadelphicum*.—L. Sp., 435; Miller, Ic., t. 165, fig. 1; Bot. Mag., t. 519; Red. Lil., t. 104; Lodd. Bot. Cab., t. 976; Herb. Amat., t. 92; Bot. Reg., t. 594; Kunth, Enum., iv., 263.—Bulb, (*see* page 102), small, annual, stoloniferous; scales, fragile, thick,

nearly club-shaped; stem, 1 to 3 feet high, green, slender, terete, smooth; leaves, twenty to thirty in number, lance-shaped, or linear, patent, slender, smooth, finely-nerved, sessile, the lower ones 3 or 5 inches long, 3 to 6 lines broad in the middle, arranged in whorls of four to six, or six to eight leaves, or few or many scattered; flower, solitary, terminal, erect, or a few in an umbel; pedicels, 2 or 3 inches long, ascending, with a whorl of large leafy bracts at the base; perianth, 2 or 3 inches long, of a brilliant yellowish red colour; segments, oblong-lance-shaped, 6 to 10 lines broad in the middle, with a distinct claw 6 to 8 lines long at the base, marked with large scattered purple dots on the lower half of the inner surface; groove, smooth, deep, margined on the edges by the revolute claws; stamens, shorter than the perianth by one-third; anthers, 5 or 6 lines long; pollen, red; ovary, 9 or 10 lines long, about half the length of the style; capsule, narrowly-obovoid, obtuse-angled. North America, from Canada to Carolina.—Var. *Andinum*, Nuttall, Gen., i., 221.—*Umbellatum*, Pursh, Flora., i., 229.

The Canadian Whorl-leaved Lily (*L. Philadelphicum*).

Var.* *Wansharaicum*, Hort. Leichl.; Duchartre, Obs., 88.—Leaves, linear, all scattered. Rocky Mountains, Douglas, Bourgeau, &c.

L. Philadelphicum is common in open copses through Canada and the Northern United States, stretching westward to the Rocky Mountains, and southward along the Alleghanies to North Carolina, and of couse quite hardy in English gardens. It was sent by Bartram, in 1754, to Philip Miller, who figured it at t. 165 of his "Illustrations." The *Umbellatum* of Pursh, and *Andinum* of Nuttall, are simply luxuriant conditions of this plant, figured in the "Botanical Register." It stretches north-westward to the Red River and Sashatchewan territory, and occurs sparingly on the west side of the Rocky Mountains; but all the western specimens I have seen, though even when single-flowered retaining the whorl of bracts, have all the leaves indiscriminately scattered along the stem, as in *Bulbiferum*, and the leaves also are narrower (linear not oblanceolate) and firmer in texture than in the whorled typical Canadian and New England form. Geographically, *Philadelphicum* quite represents *Bulbiferum* in the New World, and when the whorls of the leaves are thus broken up, they come very near to one another, though distinct enough in the extreme states. But *Philadelphicum* has always a more

* This well-marked variety has a more richly coloured and larger flower than the ordinary type. Both kinds are early flowering, pretty, bright coloured, dwarf Lilies, and do best in dry warm soils.

distinct claw than any variety of *Bulbiferum*, and wants the cottony pubescence that occurs upon the stem and outside of the perianth of all forms of the latter.

21. *L. Medeoloides.*—A. Gray, Mem. Amer. Acad., vi., 6, 415; Miquel, Ann. Mus. Lug. Bat., iii., 156.—*Maculatum*, Thunb., Linn. Trans., ii., 334; Mem. Acad. Petrop., iii., 204, t. 5, fig. 1?—*Canadense*, Thunb., Fl. Jap., 204? (a figure of the bulb is given, page 108). Stem, 1 to 2 feet high, slender, smooth, terete, flexuose; leaves, mostly arranged in a single whorl of seven to fourteen; leaves, above the middle of the stem, oblanceolate, patent, tender, smooth, green, 4 to 6 inches long, 9 to 15 lines broad above the middle, acute, with two to four distinct lateral veins; there are sometimes a few scattered leaves above the whorl; flowers, solitary, or two to three in an umbel; pedicels, short, erect at the top; perianth, 12 to 15 lines long, erect, of an open funnel-shape, and brilliant orange-red colour, marked on the inside with a few claret-coloured dots; segments, lance-shaped, slightly falcate from the base, callous at the tip, channelled, downy, 3 to 4 lines broad in the middle, slightly spathulate at the base; groove, on the keel indistinct, smooth; filaments, half the length of the perianth; anthers, 4 to 5 lines long; ovary, club-shaped, 4 lines long; style, erect, a little shorter.—Japan, near Hakodadi, C. Wright. The Corean Island, Herschel, in inundated woods, where it flowers in June. Oldham, 873; it approaches most closely to *Martagon* and *Avenaceum*; but is easily distinguished by its erect flowers, falcate (not revolute) segments, and short stamens and pistil.*

22. *L. Concolor.*—Salisb. Parad., t. 47; Kunth, Enum. iv., 259 and 673; Fisch and Mey. Ind. Sem., 1839, 55.—*Sinicum*, Lindl. in Paxt. Flow. Gard., vol. ii., Misc. 115, t. 193; Lemaire, Ill. Hort., t. 100; Van Houtte, Flore des Serres, t. 1,206.—Bulb (*see* page 106), ovoid, perennial, small; scales, few, whitish, oblong, acute; stem, slender, about a foot high, slightly pubescent, suffused with purple; leaves, 20 to 30 in number; ascending, scattered, lance-shaped, of a deep green colour, acute, 2½ to 3 inches long, 4 to 6 lines broad in the middle, indistinctly seven-nerved, fringed with papillæ on the edges;

* An exceedingly distinct species, discovered near Hakodadi, Japan, in the United States North Pacific Exploring Expedition under Captains Ringold and Rogers, in 1853—56, and since gathered by Oldham in Herschel Island, one of the members of the Korean group. In general habit and foliage it is most like *Martagon*, but in the shape of the flower and its divisions, it resembles *Concolor* and *Pulchellum*.

Owing to the extreme smallness and thinness of its scales, this Lily is an extremely difficult one to introduce from Japan. Many hundred bulbs sent to us have dried up on the voyage.

So far as our experience goes, the bulbs of *Avenaceum* and *Medeoloides* are alike in form and shape, *see* page 108, but *Medeoloides* is said to have an erect purple spotted flower, with a broad *Martagon*-whorled foliage, its Japanese name, *Kuruma Juri*, may be translated 2 wheeled or 2 whorled Lily; it would be as well to suspend judgment on the diversity of these forms till they are better known, at present but few specimens have flowered in Europe.

flowers, one to three in number; pedicels, somewhat downy, purple, ascending, 1½ to 2 inches long; sometimes bracteolated; perianth, 15 to 18 lines long, of a dark crimson colour, without spots on the inside, paler on the outside; segments, broadly falcate, lance-shaped, 4 to 9 lines broad in the middle, callous at the tip, somewhat downy, slightly papillose at the base; groove on the keel, deep, with smooth edges; filaments, half the length of the perianth; anthers, 3 or 4 lines long; pollen, red; ovary, club-shaped, 5 or 6 lines long, deeply furrowed, club-shaped, 3 or 4 lines long, shorter than in any other species; capsule, 1 inch long, obovoid-oblong, obtuse-angled. China; flowers in the end of June.—*Concolor*, Bot. Mag., 1,165, is a form in which the segments have a few dark spots on the inside, near the base.

Crimson Erect-flowered Lily (*L. Concolor* var. *Pulchellum*).

Var. *Buschianum*, Lodd. Bot. Cab., t. 1,628.—*Pulchellum*, Rev. Hort., 1862, 131, with a figure.—*Concolor* var. *Sinicum*, Bot. Mag., t. 6,005. This variety sometimes grows taller, and has a larger and solitary bulb (the scales of which are few and broad), narrower dark green leaves, flowers sometimes four to six in number, segments of the perianth a little broader and of a brilliant crimson on the inner surface, the lower half of which is covered with numerous scattered small blackish dots; capsule, narrowly obovoid, ½ inch long, umbilicated at the apex. Southern Siberia.

Var. *L. Parthenion*, Sieb. and De Vriese, Tuinbow Flora, ii., 341, with a figure, scarcely differs from *Buschianum*, except in its slenderer habit, shining leaves, and cæspitose bulbs. Japan.—*Coridion*, Sieb. and De Vriese, loc. cit., Duchartre, Obs. 42, is the same plant with yellow flowers.

Var. *L. Pulchellum*, Fisch. and Mey., Ind. Sem. Petr., 1839, 56; Kunth, Enum, iv., 266, 676; Regel, Gartenfl., 1860, 81, t. 284, fig. 2.—Bulb, ovoid, scarcely an inch long; stem, very slender, about a foot high; leaves, 12 to 20 in number, narrowly linear, ascending; 2 to 2½ inches long, and 1½ to 2 lines broad; perianth, often solitary, red, 12 to 15 lines long; segments, oblanceolate, obtuse, 3 to 5 lines broad in the middle, covered on the lower half with numerous minute blackish dots; filaments, 5 or 6 lines long; ovary, 3 or 4 lines long, longer than the style. Eastern Siberia. A yellow-flowered variety is cultivated in Japan, Maximowicz; on stony hills in Chinese Mongolia, Meyer and Turczaninow, in herb. DC.

Under this head are included several very distinct forms, horticulturally speaking, viz.:—

1. *Concolor*, from Japan. This kind has cæspitose bulbs, mostly small, *i.e.*, the bulbs have a great tendency to break up and form a cluster, and are said to thrive best when left alone, and not torn asunder and re-planted as single bulbs; it is rather a difficult Lily to grow, but in very wet summers, and on light soil, it has done well with us. It has a dwarf habit, scarcely a foot high, with erect light-green foliage, narrow, acute, 1 to 1½ lines broad, 1½ inch long, 3-nerved, very numerous, crowded; late flowering, with two or three erect crimson star-shaped spotted flowers; the native name is *Shemi-Juri*.

2. *Coridion*, in bulb, growth, and habit, similar to the preceding, but the flower is somewhat larger, of a rich yellow, flaked here and there with brown; the handsomest by far of the group; its Japanese name is *Ki-Fime-Juri*.

3. *Sinicum*, but little known in this country; the Chinese form, growing 2 to 3 feet high from a solitary larger bulb, bearing a spike of 4—6 flowers, larger and more heavily spotted than those of the preceding forms; brought over from China, in 1806, by the Hon. C. Greville, and again by Fortune in 1850; figured and described by Salisbury.

4. *Pulchellum*, also known as *Buschianum*, from Siberia; a much earlier flowering form, growing 1½ to 2 feet high, with a star-shaped crimson flower, very similar to that of *Concolor*, but with narrower and smaller petals, possessing a solitary bulb, figured at page 106, with sparse arching foliage, 5-nerved, 1½ to 2½ lines broad, 1½ inch to 2 inches long, and of a deep green colour. The figure and foliage in the woodcut given (page 155) are those of *Pulchellum*, not of *Concolor*.

5. *Parthenion*, a form closely allied, if not identical with, *Concolor*; not sufficiently known to me to be acknowledged as a thoroughly distinct form.

Closely allied to these must be the form of *Davidi* (Duchartre M.S.), collected in the Manze country of Thibet, 9,000 feet above sea level, in June, 1869. Described as having an orange-coloured star-shaped flower with purple spots, a stem 2½ feet high, and foliage like that of *Tenuifolium*, but more sparse.

All these forms are exceedingly graceful for button-hole decoration.

23. *L. Bulbiferum* (Parkinson, Parad., 37, t. 2).—*Speciosum*, 433, ex parte; Jacq., Fl. Austr., t. 226; Bot. Mag., t. 1,018; Fisch. and Mey., Ind. Sem., 1839, 54; Kunth, Enum., iv., 264, 674; Regel. Gartenfl., 1872, 231, with a figure of the bulb.—Bulb (compare p. 109), ovoid, perennial; scales, few, broad, acute; first shoots, broad, obtuse, tinged with red; stem, 2 to 4 feet high, straight, furrowed, spotted with purple, covered with white cobweb-like down on the upper part; leaves, fewer and more ascending than in *Croceum*, the lower ones about 3 inches long and 3 to 6 lines broad in the middle (the upper ones drawn back), and bearing bulbils in the axils; flowers, in wild specimens, one to three in number, in cultivated plants often more numerous, and arranged in an umbel or deltoid raceme; pedicels, thick, short, spotted with purple; and covered with a white cobweb-like down; perianth, 2 to 2½ inches long, erect, scentless, of a brilliant red colour, often tinged with orange at the bottom; segments, oblong-spathulate, 9 to 15 lines broad in the middle, the inner ones less clawed than in *Croceum*, all with black dots, and numerous lamellæ and papillæ on the inner surface; groove, ½ inch long, very deep, with pilose edges;

The Umbellate Lily (*L. Umbellatum*).

filaments, 18 to 21 lines long; anthers, 3 or 4 lines long; pollen red; ovary, 7 or 8 lines long, half the length of the style; capsule, 1½ inches long, obovoid, obtusely six-angled, umbilicated at the top. Central Europe, and South-eastern Scandinavia, flowering in our gardens amongst the earliest, blooming in June, before *Croceum* and *Davuricum*.—*Latifolium*, Link, Enum., i., 321, is a large-growing garden form with broad leaves.—*Humile*, Miller, Dict. No. 4, is a small form, with narrow leaves.—*Pubescens*, Bernh., Kunth, Enum., iv., 265, is probably a garden form with peduncles thickly covered with cobweb-like down. For its various forms, *see* Parkins, Parad., 38.

Under the head *Bulbiferum* (rather than under the head of *Davuricum*, as Mr. Baker, does) we are inclined to class the numerous garden varieties, mostly raised from seed, some of which are very beautiful, generally called *Umbellatum*; they are all early flowering. The true type we hold to be a tall growing form, 3—4 feet high, with crowded large dark green lanceolate foliage, bearing bulblets in the axils (like the Tiger group), and having an umbel of large broad petalled cup-shaped flowers, of a rich dark cherry red colour, having an orange blotch, and a few black dots in the centre.

The seedling forms, classed as *Umbellatum*, do not as a rule carry bulblets in the axils, but should their flower heads be cut off early in the season, bulblets are often formed at the scar and in the axils of the then terminal leaves.

Some of the best seedling forms are *Punctatum* and *Immaculatum* (without spots), also known as *Rubens* and *Vulcan* by some growers, these are tall, strong-growing forms, very nearly approaching the type, with large, well-formed, cup-shaped, richly coloured flowers.

Erectum and *Bicolor*, dwarfer forms, with few or no spots, yellow centre, and rich cherry-coloured tips, very vivid.

Sappho, a dwarf, broad-petalled, symmetrical flower, heavily spotted and richly coloured.

Atrosanguineum and *Incomparable*, the very dark tinted, dwarf forms, remarkable for the intensity of their colouring; generally much admired.

24. *L. Croceum* (Fuchs.)—Chaix. in Vill. Delph., i., 322; Kunth, Enum., iv., 265 and 675; Fisch. and Mey., Ind. Sem., vi., 56; Gran. Flor. France, iii., 182.—*Bulbiferum*, DC., Fl. France, iii., 202; Bot. Mag., t. 36 (the figure much above the natural size).—*Aureum*, Parkinson, Paradisus, 37, t. 3.—Bulb, globose, perennial; scales, large, ovate-lance-shaped, not narrowed at the middle; first shoots, broad, obtuse, tinged with red; stem, 3 to 6 feet high, stout, furrowed, green, spotted with purple on the upper part, more or less covered with cobweb-like down; leaves, 50 to 100 in number, scattered, very close, patent, or the lower ones slightly squarrose, linear, the lower ones 3 or 4 inches long, 3 or 4 lines broad, three to five nerved, sessile, smooth, firm, never bearing bulbils in the axils; flowers, in wild specimens, often solitary, in cultivated plants often 10 to 20 in number, arranged in a deltoid raceme or umbel; pedicels, ascending, 2 or 3 inches long, covered with white cobweb-like down; perianth,

The Orange Lily (*L. Croceum*).

erect, broadly funnel-shaped, 2 to 2½ inches long when fully expanded, 3 inches broad, at first covered with white cobweb-like down on the outside; outer segments, oblong-lance-shaped, 8 or 9 lines long, broad below the middle, spathulate at the base; inner ones, ovate-lance-shaped, 12 to 14 lines broad below the middle, distinctly clawed at the base, all of a brilliant orange colour, scarcely tinged with crimson, cuspidate at the apex, somewhat downy, imbricated in the expanded flower, marked with numerous dots and lamellate papillæ; groove ½ inch long, very deep, with pilose edges; filaments, 15 to 18 lines long; anthers, 4 lines long; pollen, red; ovary, 8 or 9 lines long; style, 12 to 14 lines long; capsule, obovoid, 1½ inch long, somewhat acutely angled. Switzerland, France, Northern Italy; long grown in gardens under many forms. Flowers in the beginning of July, after *Bulbiferum*.*

25. *L. Davuricum*.—Gawl., Bot. Mag., sub. t. 1,210; Kunth, Enum., iv., 264; Regel, Gartenflora, t. 740, and 1872, 295.—*Pennsylvanicum*, Gawl., Bot. Mag., t. 872.—*Spectabile*, Link, Enum., i., 321; Reich., Ic. Exot., t. 30; Fish. and Mey., Ind. Sem., vi., 58; Kunth, Enum., iv., 676; Regel, Gartenfl., t. 349, 1872, 231, with a figure of the bulb.—Bulb,† globose, perennial; scales, small, fiddle-shaped, acute, white, brittle, contracted in the middle: first shoots, narrow, acute, tinged with brown; stem, 2 or 3 feet high, slender, green, slightly covered with white cobweb-like down in the upper part; leaves, 20 to 50 in number, ascending, sessile, linear, three-nerved, the lower ones 4 or 5 inches long, 3 or 4 lines broad in the middle, never bearing bulbils in the axils; flowers in wild specimens, often solitary, in cultivated plants, few, in umbels or short racemes; pedicels, naked or slightly covered with cobweb-like down; perianth of a brilliant red colour, 2 to 2½ inches long when fully expanded, 3 to 4½ inches broad; segments, oblong-lance-shaped, 9 to 12 lines broad below the middle, scarcely imbricated in the expanded flower, less dotted and lamellated than in *Croceum* and *Bulbiferum*, spathulate at the base; groove, very deep, 3 or 9 lines long, with pilose edges; filaments, red, 18 to 21 lines long; anthers, 5 or 6 lines long; pollen, red; style, twice the length of the ovary; capsule, 1½ to 2 inches long, obtuse-angled. Central and Eastern Siberia, from the Altai Mountains to Kamtschatka, where the bulb is eaten by the natives.

* The var. *Chaixii*, collected by Mr. Geo. Maw, comes up later, and flowers earlier than *Croceum*, the flower-buds are visible from the very earliest stages of its growth. In the wild state it has never more than from 1 to 2 (rarely 3) flowers, while *Croceum* has 10 to 15, and its spike is twice as high as that of *Chaixii*, which averages 15 inches. It flowered with Rev. Harper Crewe, who pronounced it to be "very pretty and distinct, and sure to become a favourite."—*Garden*, vol. 10., p. 37.

The var. *Tenuifolium* is very frequently sent out as *Catesbæi*, but is closely allied to *Davuricum*, and evidently a very tender and delicate Lily in this country; the bulbs resemble those of a small *Croceum*, but easily break to pieces, the foliage is narrow, acute, crowded; the flower much resembles that of *Croceum*: it is not easily cultivated.

† For figures of these curious bulbs, *see* pages 104, 105.

It flowers in our gardens in July along with *Croceum*, and after *Bulbiferum*.* *Umbellatum*, of most gardens, is a luxuriant garden form of *Davuricum*. For its varieties, *see* Regel, Gartenfl., 1872, 295.

26. *L. Elegans*.—Thunb., Mem. Acad. Petr., iii., 203, t. 3, fig. 2.—*Bulbiferum*, Thunb., Linn. Trans., ii., 333.—*Philadelphicum*, Thunb., Fl. Jap., 135.—*Thunbergianum*, Schultes fil., Syst. Veg., vii., 415; Lindl. Bot. Reg., 1839, t. 38; Maund. Bot., t. 158; Regel., Gartenfl. 1872, 296.—*Aurantiacum*, Paxt. Mag., vii., 127, with a figure.—Bulb† like those of *Bulbiferum* and *Croceum;* stem, about a foot high, smooth, or slightly covered with cobweb-like down, or pilose, stout, furrowed; leaves, 20 to 30 in number, ascending, scattered, firm, deep green, smooth, distinctly five to seven nerved, the lower ones 3 to 4 inches long, the upper ones shorter, 6 to 12 lines broad in the middle, not bearing bulbils in the axils; perianth, usually solitary, 3 to 3½ inches long, when fully expanded, 5 or 6 inches broad, of an orange-red colour; segments oblong, spathulate, obtuse, scarcely dotted, much less lamellated and papillose than those of *Davuricum*, outer ones 12 to 13 lines, and inner ones 15 to 18 lines broad in the middle; groove, distincly excavated, 8 or 9 lines long, with pilose edges; filaments, 1½ to 2 inches long; anthers, 4 or 5 lines long; ovary, 1 inch long, half the length of the style; capsule, obovoid, 2 inches long, sub-acutely six-angled, one half longer than its breadth. Japan; it flowers in our gardens in the beginning of July, under very many forms, of which the following are the most notable:—

Var. 1, *Brevifolium*, Baker and Dyer, "Gard. Chron.," 1872, 1,356.—*Alternans*, hort.; leaves, broader and shorter, the lower ones 2 to 2½ inches, the upper ones 1 to 1½ inches long, all 7 to 9 lines broad, and of a deep green colour; perianth, less open, of a pale red colour throughout, with a few black dots at the bottom: filaments and style a little longer.

Var. 2, *Bicolor*, Moore, "Floral Mag.," t. 104.—*Pictum*, hort. Siebold.—*Aurantiacum*, hort. Krelage; stem, scarcely a foot high; leaves, about 40 in number, narrower, the lower ones 4 to 6 lines broad; perianth, 3 to 3½ inches long; segments, broader than in any other variety (the inner ones 18 to 21 lines broad), with yellow centre, red sides, and a few dots near the base.

* It was originally figured in the Botanical Magazine, under the name of *Pennsylvanicum*, under the supposition that it came from America; but the mistake was corrected in the volume for 1809, and the plant re-named *Davuricum*, after the region of Siberia in which it is most abundant. This name, *Davuricum*, has priority over *Spectabile*, which only dates from 1821.

† We have been unable to obtain a satisfactory woodcut of bulbs of the true *Thunbergianum* type; they are in shape and size much like those of *Philadelphicum* on page 102, but the numerous scales are thinner, flatter, broader at the base, and more acute at the tip than are those of *Philadelphicum*. The bulb of *Thunbergianum Splendens*, page 105, approaches in form and size those of the *Umbellatum* group, and is altogether a coarser bulb than that of the true *Thunbergianum* type.

Var. 3, *Pardinum*, Moore, "Florist," 1861, 121, with a figure. This scarcely differs from var. 2, except in having a taller stem (2 to 3 feet), and the flowers few and in an umbel.

Var. 4, *Alutaceum*, Baker and Dyer, "Gard Chron.," loc. cit.—*Thunbergianum Aureum Nigro-maculatum*, Flores des Serres, t. 1,627: stem, dwarf; leaves about 30 in number; flowers, solitary; perianth of a pale apricot colour; inner segments, 12 to 13 lines broad, with numerous purplish dots on the lower half.

Var. 5, *Armeniacum*, Baker and Dyer, loc. cit. Stem, about a foot high: leaves, 30 to 40 in number, the lower ones linear; flowers one or two in number, orange, not dotted, and without lamellæ or papillæ; segments 9 to 12 lines broad.

Var. 6, *Citrinum*, hort., Wilson, scarcely differs from *Armeniacum*, except in having the stem 2 to 2½ feet in height, the leaves lance-shaped, and flowers two to three in number.

Var. 7, *Sanguineum*, Lindl., "Bot. Reg.," 32., t. 50. Stem, 1 to 1½ feet high; leaves, about 40 in number, lance-shaped; flowers, one to two in number; segments, broad; blood-red, slightly tinged with orange, and with a few small dots near the base; papillæ and lamellæ nearly obsolete.

Var. 8, *Atrosanguineum*, Baker and Dyer, loc. cit.—*Coruscans*, hort. Stem, 1 to 1½ feet high; leaves, lance-shaped; flowers, usually solitary; segments, broad, deep red, with numerous dots on the lower half; papillæ and lamellæ, numerous and only slightly raised.—*Hæmatochroum*, Lemaire, Ill. Hort., t. 503, is a similar form, with darker livid red flowers.

Var. 9, *Fulgens*, Morren, in Spae Mem., 29; Lemaire, Ill. Hort., t. 657, approaches *Davuricum*. Stem, 1 to 1½ feet high; leaves, about 40 in number, linear; flowers, often four to six in number, of a deep red colour; dots, lamellæ, and papillæ, almost obsolete.—*Venustum*, Kunth, Flore des Serres, t. 652, is a similar form with a more brilliant flower, more tinged with orange.—*Wilsoni*, hort., according to Max Leichtlin, is probably a hybrid between *Elegans* and *Speciosum*.

In early and mid-growth, apart from their flowers, just as the *Tiger* group may be recognised by a straight tall habit, more or less woolly stem, and crowded long pointed foliage; *Speciosum* by the broad alternate shiny leaves; *Martagons* by their tall habit, whorled or much broken up foliage; *Umbellatum* by the elongated, crowded, light green, rough, pubescent foliage, flattened at the top into an umbel as if crushed; so by its dwarf habit, smooth, rather broad and short shiny foliage, *Thunbergianum* may be easily differentiated from all other forms.

We have grown for years many varieties of the *Thunbergianum* group, and consider them to have been raised from one type by the horticultural skill of the Japanese, extending over a number of years, who, in dealing with this type, have produced strains of far greater excellence, in form, and in variety of colour, than has been effected by Europeans in dealing with the sister group, *Davuricum* or *Umbellatum*. It seems curious, that while no form of the *Thunbergianum* group has been found outside Japan, no form of *Umbellatum* has been as yet, *to our knowledge*, sent over to us as indigenous to those islands.

We are accustomed to divide this very variable group into three divisions, based upon the perianth or flower.

(*a*). With long narrow widely open petals and sepals, such as—

Armeniacum (*Venustum*), *Fulgens*, *Atrosanguineum*, *Sanguineum*, *Alutaceum*, *Alternans*, *Flore Pleno*, *Prince of Orange*.

These are mostly deep self-coloured flowers, with few spots, chiefly black.

(*b*). With broad symmetrical widely open petals and sepals, such as—

Bicolor, *Marmoratum*, *Marmoratum Aureum*, *Van Houttei*, *Aurantiacum Verum*, *Alice Wilson*, &c.

These are mostly in two or three colours, in improved tints, and shew a considerable advance in cultivation, &c.

(*c*). Cup-shaped, with broad petals and sepals, such as—

Brevifolium, *Splendens*, *Wilsoni*, &c.

These, in their erect cup-shaped form, large size, richness of spotting, and shot colour of tint, manifest a crossing with some other group, possibly *Auratum*.

Group (*a*). *Armeniacum* (*Venustum*), one of the latest flowering, a rich vermilion orange-coloured form, without spots, known at once by its peculiar twisted foliage, grows about 1 foot high.

Fulgens, also about 1 foot high, with spotted reddish flower.

Fulgens Flore Pleno, the double form of the above variety, remarkable more for its curiosity than for its beauty.

Fulgens Atrosanguineum, this is really a fine variety, being more robust in habit than *Fulgens*, and of a deeper rich blood-red tint.

Fulgens Alternans, a light tinted form of *Fulgens*, suffused and flaked with lighter tints.

Sanguineum (*Biligulatum*), an early form, inclined somewhat to be cup-shaped in flower, but with narrow petals; reddish brown flower, with a few black spots.

Alutaceum, known under a great number of names by the Dutch growers; a very distinct dwarf form, scarcely 6 inches high, with rich apricot-coloured flowers, symmetrically spotted; suitable for edging. A larger form of this is known under the name *Grandiflorum*, with more robust habit, and larger richer coloured flowers.

But the most beautiful variety is that known as *Prince of Orange*, a spotted form, of a soft pleasing light buff tint, also dwarf.

Group (*b*). *Bicolor* (*Pictum*), one of the handsomest of the forms, but, alas! the petals are flimsy, and its beauties are soon over; a stout-growing form, from 1 foot to 2 feet high, bearing several large, broad-petalled, slightly cup-shaped flowers, yellow tinted, but tipped and splashed with crimson tints, and when quite fresh, with a lilac sheen, but few spots.

Aurantiacum Verum, figured in Paxton, vol. 6, p. 127; without spots, but with large open flowers, of a rich salmon yellow colour, a very fine form.

Marmoratum, a very early form, broad-petalled, of a rich deep crimson colour, flaked and tipped with orange, spotted.

Marmoratum Aureum, also very early; more heavily spotted than the preceding form; here, yellow predominates, margined with red.

Alice Wilson, a beautiful, broad-petalled, lemon-coloured, spotted form, one of the handsomest and rarest of the group.

Mawii, very large flower, orange crimson, and heavily and distinctly spotted, richly coloured.

Van Houttei, a very richly tinted deep scarlet form, with a yellow blotch in centre, and sometimes at the tip, broad-petalled; a very beautiful and grand Lily.

Horsmanni, a deep blood red broad-petalled form, spotted; one of the handsomest and most richly tinted forms.

Group (*c*). *Brevifolium*, distinguished by its very short, acute-pointed, broad, thick leaves, only 1½ to 2½ inches long, very early flowering, bears a cup-shaped flower of light reddish tint, shot with a purplish gloss, spotted, and having the tips flaked with yellow.

Splendens, one of the largest and most vigorous forms of this group, grows 2½ feet high, with stout stem, and *Umbellatum*-like foliage, very light green, 3 inches long, has an umbel of deeply cupped flowers, very large, of a rich apricot-yellow, with purple spots; it is the earliest flowering form in the group.

Wilsoni (*Pardinum*) (Moore), this, on the contrary, is the latest to bloom in the whole section; the stem is stout, about 2 feet high, slightly pubescent, bronzed

below, green above, the leaves very short, glossy, of a very deep green, and curled downwards, the flowers very large, deeply cupped, apricot tinted, with a broad yellow band down the centre of the petal, purple spotted.

Both these two last varieties have a lilac sheen when fresh, and the bulbs are large and coarse, resembling much those of the *Umbellatum* section.

27. *L. Catesbœi.*—Walt., Fl. Carol., 123; Bot. Mag., t. 259; Lodd., Bot. Cab., t. 807; Sweet, Brit. Flow. Gard., ser. ii., t. 185; Kunth, Enum., iv., 263.—*Spectabile*, Salsb., Stirp. Rar., t. 5, non Link.—*Carolinianum*, Catesby, Car., ii., t. 58, non Michx.—Bulb (*see* page 103), like that of *Philadelphicum* (?); stem, 1 to 2 feet high, slender, terete, smooth, green; leaves, 20 to 30 in number, scattered, ascending, smooth, green, lance-shaped, or linear, the lower ones 2 or 3 inches long, 4 to 6 lines broad, the upper ones gradually smaller; perianth, solitary, erect, broadly funnel-shaped, 3 or 4 inches long, of a brilliant orange-red; segments, oblong-lance-shaped, 6 to 12 lines broad in the middle, distinctly cuspidate for some length, and with purple spots scattered over the inner surface; claw, channelled at the base, 9 to 15 lines, with revolute margins; filaments, 2½ to 3 inches long; anthers, narrow, 4 to 6 lines long; pollen, red; ovary, 9 to 12 lines long; style, slender, twice the length of the ovary. North America, from Georgia and Carolina to Florida.

Catesby's Orange Lily (*L. Catesbœi*).

This Lily received by us from the swampy regions of S. Carolina, is somewhat tender; the bulb has scales longer and more acut than those of *Philadelphicum*, and at the upper part, the outer claw-like scales exhibit a blunt scar, where the leaf has broken off: so that, in fact, the scales of this Lily, which are few in number, are the extended bases of the leaves, which are long, very slender, grass-like, and crowded at the base. The bulb is tender, and growing on during the winter must be kept under glass. We have flowered it, but we are not aware that anyone else has done so.

SUB-GENUS V.

Martagon (Endl.), Turk's-cap Lilies.

Flowers, in racemes, nodding, dotted, usually of a brilliant red or orange colour; perianth, broadly campanulate; segments, lance-shaped, deeply falcate; grooves, deep; stamens, diverging on all sides from the curved style.

KEY TO THE SPECIES.

Leaves verticillate, in whorls—

(1).—American Species (a), bulbs annual, rhizomatous—
28, *Canadense*, 29, *Pardalinum*, 30, *Superbum*, 31, *Lucidum*, 32, *Roezlii*.

,, (b), bulbs perennial, not rhizomatous—
33, *Columbianum*, 34, *Humboldtii*.

Leaves verticillate, in whorls—
(2).—Old world Species (c)—35, *Martagon*, 36, *Avenaceum*, 37, *Hansoni*.

Leaves scattered—
(c), leaves, lanceolate, many-nerved—
perianth, falcate above the middle—
38, *Szovitzianum*.

(d), perianth, revolute to behind the middle—
39, *Polyphyllum*, 40, *Ponticum*, 41, *Carniolicum*.

(e), leaves, narrowly linear, with one or a few nerves—
segments of the perianth from 6 to 12 lines broad in the middle—
42, *Testaceum*, 43, *Leichtlinii*, 44, *Batemannii*, 45, *Pseudo Tigrinum*, 46, *Wallacei*.

(f), segments of the perianth from 3 to 6 lines, broad in the middle—
47, *Pomponium*, 48, *Chalcedonicum*, 49, *Callosum*, 50, *Tenuifolium*.

In this Sub-Genus we have many superb forms, among which, we may place first the very beautiful, early-flowering, canary-coloured *Szovitzianum*, with its 20 or 30 bell-shaped, broad petalled flowers, beautifully spotted. *Excelsum* with its tall, peculiarly graceful, nankeen-coloured flowers, so exquisitely scented. *Tenuifolium*, elegant for its slender foliage, handsomest among dwarf Lilies with its spike of scarlet bells. *Humboldtii* and *Pardalinum* remarkable for their tall floriferous spikes of light orange flowers, variously spotted and tipped with carmine or scarlet. *Parvum*, one of the most beautiful and floriferous, small as to its individual flower, but excessively graceful, and very tall growing. *Columbianum*, remarkable for its golden bells. *Polyphyllum*, for its symmetrically purple spotted, bell-shaped, white flowers. The blood-red *Dalmaticum*, 6 to 8 feet high, bearing from 30 to 40 flowers. *Hansoni*, a very early stout-growing kind, likely, when better known, to be an universal favourite; and last, but not least, *Leichtlinii*, long acknowledged to be, with its delicately yellow tinted, purple spotted flowers, one of the most graceful Lilies in existence.

28. *L. Canadense.*—Linn. Sp., 435; Bot. Mag., t. 800 and 858; Kunth, Enum., iv., 258; Bury, Hexand., t. 12; Flore des Serres, t. 1, 174.—*Penduliflorum*, DC. in Red Lil., t. 105.—*Pendulum*, Spae, Mem., 28.—*Martagon* sive *Canadense Maculatum*, Parkins, Parad, 32, t. 2. —Bulb (*see* p. 110), annual, emitting runners 5 or 6 inches long; scales, thick, obtuse, scarcely ½ inch long; stem, 1½ to 2 feet high, slender, smooth, terete, green; leaves often arranged in four or five regular distant whorls of four to eight leaves (the whorls being, however, sometimes more or less broken up), oblanceolate, acute, 3 or 4 inches long, 6 to 9 lines broad above the middle, green, slender, five to seven nerved, the veins sometimes ciliated; flowers, solitary, or a few in an umbel or corymb; pedicels, 2 to 6 inches long, nodding very much at the top, sometimes bracteolated; perianth, 2 to 2½ inches long, broadly funnel-shaped, a brilliant orange-red, segments, oblanceolate, 6 or 7 lines broad, falcate above

The Canadian Bell-flowered Lily (*L. Canadense*).

the middle, with numerous claret-coloured spots on the inner surface, lamellated in the upper part; groove, distinctly sunk, with smooth edges; filaments, shorter than the perianth by one-third; anthers, 4 to 6 lines long; ovary, 8 or 9 lines long, a little shorter than the almost straight style; capsule, turbinate, obtuse-angled, 1½ inch long, not umbilicated at the apex; septa, delicate. North Eastern America, from Canada to Georgia. It recedes (along with *Monadelphum*) from the *Martagon* section towards *Eulirion*, the funnel-shaped perianth, in the expanded flower, being revolute only above the middle.—Var. *Penduliflorum*, hort., Leicht., is a form with segments revolute to or below the middle.

Var. 1, *L. Parvum*.—Kellogg, Proc. Calif. Acad., ii., t. 52; Regel, Gartenflora, t. 725; Duchartre, Obs., 98.—Bulb (*see* page 110) and perianth, like those of the type, but in our gardens the plant has a smaller and slenderer habit; stem, green, 1 to 1¼ feet high; upper leaves, usually scattered; flowers, much less nodding, sometimes nearly erect; perianth, 15 to 18 lines long, brilliant orange-red, with numerous dots; segments, acute, 3 to 5 lines broad, falcate above the middle; anthers, oblong, 2 or 3 lines long; ovary, 3 or 4 lines long, half the length of the almost straight style. California, on the Sierra Nevada chain, at an altitude of 6,000 feet. Jeffray, 1,283. According to Kellogg, it attains a height of 5 feet, and bears as many as fifty flowers.

Var. 2, *L. Walkeri*.—Wood, Proc. Amer. Acad., 1868, 166.—Stem, 3 feet high, or more; leaves, tender, narrower, arranged in regular whorls of seven or eight leaves, the whorls being very distant from each other; lower leaves, 4 or 5 inches long, 4 or 5 lines broad, the veins very slender in comparison with the mid-rib; flowers, more numerous, arranged in an elongated raceme; perianth, funnel-shaped, 10 to 15 lines long; segments, 2½ to 3 lines broad, falcate only at the apex; stamens, a little shorter than the perianth; anthers, oblong, 1½ lines long; ovary, 4 lines long, half the length of the straight style; stigma, very small. California, Walker, Bridges, 268.

Var. 3, *L. Parviflorum*.—Hook., Flor. Bor. Am., ii., 281; *Sayii*, Nuttall, MSS.; *Canadense* var. *minus*, Wood, Proc. Acad. Phil., 1868, 166.—Stem, 2 or 3 feet high; leaves, in whorls, or most of them scattered; oblanceolate, tender, the lower ones 6 to 12 lines broad; flowers, solitary, or few in an umbel, nodding; perianth, 18 to 21 lines long, segments, oblanceolate, bluntish, deeply reflexed from the middle, where they are 3 or 4 lines broad; stamens, shorter than the perianth by one-third; anthers, 3 lines long; ovary, 6 lines long, as long as the style. British Columbia and Oregon. Nuttall, Douglas, Lyall, &c. Bulb, like that of *Canadense*; perianth, more revolute, but smaller than in *Pardalinum* and *Superbum*.

Under the head *Canadense*, Mr. Baker has in the above description, included both the Eastern and Western North American forms. We are inclined to consider them as distinct. The Eastern group, the true *Canadense*, is quite hardy with us, and widely

spread in cultivation. It appears to have been one of the first plants introduced to European Gardens from America, and is figured in Parkinson's Paradisus in 1629. There are 3 varieties of this eastern form, one, the smaller, with an entirely yellow ground-work (the variety, *Flavum* of Kunth), a very pretty elegant Lily; another, with an entirely red ground-work, and much larger flower, the variety, *Coccineum* of Kunth, and *Pendiflorum* of Redoute, both figured in Bot. Mag., t. 800 and 858; there is a third intermediate form, which with the red variety, is figured in *Florist*, 1875, p. 157. For a figure and description of these bulbs, which are stoloniferous, *see* p. 110. The miniature buds of this form are triangular in shape, not rounded. Of the western analogous forms, mentioned by Mr. Baker; we have not grown var. 2, *Walkeri*, sufficiently to be able to speak confidently about it.

28 *a.* Var. 1, *Parvum*, we have cultivated for years, and find it very distinct, and one of the most beautiful of the small-flowering Lilies. The bulb is rhizomatous, and figured on p. 110. The plant grows 4 to 6 feet high, and bears in a raceme on long stalks, a great number of pendulous, small, yellow-dotted flowers, with broad blunt petals, scarcely at all revolute; foliage in whorls: until fully established, this Lily may attain only the small stature mentioned above by Mr. Baker, for it seems to be an especial characteristic of the Martagon group, that the first year after planting, they emit poor sickly looking growth, with feeble or no flowers, and so greatly disappoint cultivators; but afterwards, when fully established, they astonish the eye with their vigorous growth, tall stem, and multitude of richly coloured flowers. The causes seem to be, that early autumnal root-action is a necessity of growth, and this cannot always be afforded to moved or transplanted bulbs. We consider *Parvum* to be one of the most graceful and beautiful of the western forms, and regret that its rarity prevents it from being more frequently grown.

28 *b.* Var. 3, *Parviflorum*, as we have grown it, seems very closely allied to *Parvum*, but less tall and floriferous; the flowers are smaller, more reflexed and spotted with purple or dark brown.

Either the same or a closely allied species, recently described by Dr. Kellogg in the Proc. Calif. Acad., Sc. vi., p. 140, as *L. Maritimum* may here be introduced.

28 *c.* *L. Maritimum*, Kellogg.

"Leaves alternate, or rarely verticillate, chiefly clustered near the base, narrowly oblong-lanceolate, sub-obtuse narrowing into a short petiole, three nerved (intermediate or secondary nerves obscure), margins scarcely a little scaberulose, quite glabrous throughout, upper cauline successively diminishing to minute linear-lanceolate sessile leaves barely ¼ inch long; peduncles elongated-terminal. Flowers, few, 1—3, somewhat nodding, short, or equilaterally obconic-campanulate; segments, lanceolate, slightly revolute, equal; style, short, straight."

This differs essentially, according to Dr. Kellogg, from *Canadense*, its nearest kin, in the stamens being included. It is a small-flowered maritime Lily, found in low peaty meadows, exposed to the bleak, foggy climate of the coast of California, near San Francisco. The flowers are deep reddish orange brown, spotted dark purple inside.

We have grown this Lily for several years as a form of *Parvum*, but the flower is more campanulate, and the tips of segments more reflexed, while the colour is more richly tinted with crimson, and the spots numerous and darker than in that species. The bulb is said to be like that of *Columbianum*, and if so, this kind must be placed alongside of that species.

29. *L. Pardalinum.*—Kellogg, Proc. Calif. Acad., ii., 12, with a figure; Duchartre, Obs. 97.—Bulbs, *see* p. 112. (annual or biennial), shortly rhizomatous; scales, few, lax, lance-shaped, acute; stem, 3 or 4 feet high, terete, green, smooth; leaves, often arranged near the middle of the stem in 3 or 4 whorls of 9 to 12 leaves, the whorls distant from each other; upper leaves, few, scattered, oblanceolate, of a shining green, 3 or 4 inches long, acute, 9 to 12 lines broad in the middle, smooth, tender; lateral veins, sunk; flowers, 3 to 6 in number, arranged in a corymb or lax umbel; pedicels, elongated, nodding at the top; perianth, 2 to 2½ inches long, of a brilliant red, orange

at the base; segments, lance-shaped, bluntish, 6 to 9 lines broad in the middle, deeply revolute, the lower half abruptly orange, covered with large purplish brown spots, and slightly lamellate-papillose; groove, deep, with smooth edges; stamens, shorter than the perianth by one-third; anthers, red, 4 or 5 lines long; style, 12 to 14 lines long, scarcely longer than the ovary; capsule, oblong, umbilicated at the apex, with somewhat acute angles. California, W. Lobb, 249, &c.

Var, 1. *Californicum*, hb., Lindley, Floral Mag, 1872, t. 33.—Leaves, fewer, smaller, and in less regular whorls; flowers, 1 to 3 in number, longer, 3 or 4 inches long; segments, bluntish, 9 to 12 lines broad, the upper half, as in the type, of a brilliant scarlet, the lower half abruptly orange, with large purplish brown dots; filaments and style, 1½ to 2 inches long. California, Hartweg. I have seen the original specimen in Lindley's herbarium, now at Cambridge.

Var. 2, *Pallidifolium*, Baker.—*Puberulum*, hort., Leichtlin, non Torrey.—Taller, in our gardens the stem being 4 or 5 feet high, green and smooth; leaves, 50 to 80 in number, oblanceolate, smooth, pale green, firmer than those of *Pardalinum*, distinctly five to seven nerved, the upper ones usually in regular whorls, the lower ones scattered at the base, at the time of flowering; flowers, if more numerous, in a loose raceme or umbel; pedicels, elongated, nodding at the top; perianth, 2 to 2½ inches long; segments, more acute, 5 or 6 lines broad in the middle, deeply reflexed below the middle, of a paler red on the inner surface than in *Pardalinum*, and more tinged with yellow at the base, with fewer and smaller dots; stamens, shorter than the perianth by nearly one-third. California, hort., Leichtlin.

Var. 3, *Bourgæi*, Baker, differs from *Pallidifolium*, in the few specimens I have seen, by having narrower leaves all arranged in regular whorls, and distinctly three to five nerved, the veins on the lower part of the inner surface ciliated, and the dots more numerous and larger, after the manner of *Pardalinum*. Banks of Lake Winipeg, Borgeau. Very recently introduced into English gardens.

This is an extremely variable form, ued doubtless to locality as well as habit, *see* pages 24 and 25. We recognise, in the main, 3 forms.

1. *Puberulum*, the pale tinted small spotted form, with short blunt frequent foliage, crowded at base, whorled above.

2. *Pardalinum*, the medium tinted form, with large spots and reddish tips, with long narrow pointed dark foliage.

3. *Californicum*, the richest tinted and finest form, with large spots, and scarlet tipped perianth, foliage similar to that of *Pardalinum*.

But as to foliage, there is great individual variation in all three forms.

4. There is also another form described by Dr. Moore as "var. *Robinsonianum*," which is simply a larger growing form, varying slightly. "In all the plants we have seen cultivated under this name, the pale green stems, and *alternate* lanceolate leaves, have been well marked features, while in the colour of the flowers, the tint of sanguineous red pervading the upper half of the perianth segment is deeper, and the ocellate spots (dark spots on yellow ground within the red portion) are more distinct." Dr. Moore, in "*Florist*," Oct., 1875. For a good plate of *Humboldtii*, *Californicum*, and *Pardalinum*, *see* that number.

30. *L. Superbum.*—L. Sp., 434; Bot. Mag., t. 936; Red. Sil., t. 103; Bury, Hexand., t. 36; Kunth, Enum., iv., 258; Flore des Serres, t. 1,014-15.—Bulbs (*see* p. 111), large, cæspitose, globose, perennial; scales, numerous, acute, closely imbricated, tinged with red; first leaves, firm, glaucous green; stem, 4 to 6 feet high, stout, tinged with purple; leaves often arranged in 3 or 4 whorls of 8 to 10 leaves, few or numerous scattered, narrowly lance-shaped, acute, somewhat firm, of a dull green colour, smooth, distinctly three to five nerved, the lower ones 4 or 5 inches long, 6 to 9 lines broad in the middle; flowers often 6 to 12 in number, sometimes 20 to 40, arranged in a deltoid panicle 9 to 12 inches broad, pedicels nodding at the top, the lower ones 3 to 5 inches long, divaricated; perianth, 3 or 4 inches long, brilliant orange red; segments, acute, lance-shaped, 6 to 9 lines broad, deeply revolute, with conspicuous claret-coloured slightly lamellated dots on the lower half; groove, deep, with smooth edges; filaments, 2 to 2½ inches long, very divergent; anthers, reddish, 6 to 7 lines long; ovary, 9 to 12 lines long, a little shorter than the curved style; capsule, obovoid, obtusely six-angled. From Canada to Georgia and Carolina, in woods and marshy places.

The Superb Orange Lily (*L. Superbum*).

A very valuable, late, graceful Lily, in growth so like *Canadense*, that it is difficult to distinguish them, except by means of the immature flower buds, which are rounded in *Superbum*, but triangular in *Canadense*. Properly an eastern form, but stretching westward, and intermingling with the western varieties, so that it becomes difficult to separate the intermediate forms.

Var. *L. Carolinianum*, Michx., Flora, i., 197; Bot. Mag., t. 2,280; Bot. Reg., t. 580; Kunth, Enum., iv., 258.—*Michauxii*, Poir., Ency., iii., 457.—*Michauxianum*, Schult. fil., Syst., vii., 258. *Autumnale*, Lodd., Bot. Cab., t. 355.—Bulb, exactly like that of the type; first leaves appearing earlier, of a shining green, and thicker; leaves much fewer, broader, and shorter, often 5 or 6 in number, arranged in whorls near the middle of the stem, the others scattered; stem, 1 to 2 feet high, bearing one or few heads; perianth, exactly like that of the type, but the segments are sometimes broader and more obtuse. From Virginia and Carolina to Florida, flowering in our gardens in August, among the late flowering kinds.

Carolinianum or *Michauxii* is a form closely allied to *Superbum*, but really larger. It is called the Carolina Swamp Lily; it has broad obovate dark foliage, and bears a very richly tinted perianth, its bulb, however, is more like that of *Pardalinum*.

We may here introduce a description from Dr. Kellogg, of *L. Lucidum*, a new form as yet unknown to us, which seems allied to the preceding species.

31. *L. Lucidum*, Kellogg, p. 144.—"Leaves whorled, scattered below and above, lanceolate or ovate-lanceolate, very short, petioled or subsessile, pseudo tripli-nerved or somewhat three-nerved, smooth throughout, short peduncled. Flowers 4 (or 1—6) nodding, sepals sessile, lanceolate, strongly turbinate, revolute, thickened at the base; stamens and style exserted, about equal; style straight, thick; perianth light translucent yellow orange, the dark purple spots on the inside visible from without. June to August. Bulb spheroid or slightly depressed oblate spheroid, scales thickened, lanceolate acute, strongly incurved, and very closely appressed, whitish, with a yellowish green tinge 1½ to 2 inches in diameter, isolated, perennial; stem central, 2 to 3 feet high, quite glabrous throughout; shortish thick peduncles from axils of bracteoid leaves; lower and larger leaves, 1 to 1¼ inches wide, about 3 to 4 inches long, diminishing above; flowers 1½ inches in expansion, 1 inch deep; style ½ to ¾ inch long." A Lily from Oregon and Washington territory, long known, but also considered by authorities as a variety of *Canadense*. "Without recapitulating the isolated and peculiar bulb, the position of the stem, form and colour of flower surface, equal genitalia, &c., we take these to be constant characters. Indeed, the very revolute sepals remind us more of *Superbum* than *Canadense*, while the smaller closer flowers and thickened base are peculiar."—*Gardeners' Chronicle, vol.* 10, *p.* 627.

32. *L. Roezlii.*—Regel., Gartenfl., t. 667.—*Canadense*, var. *Hartwegii*, Baker, Gard. Chron., 1871, 321.—Bulb, perennial, rhizomatous; stem, 2 or 3 feet high, slender, smooth; leaves, in the specimens I have seen, 20 to 30 in number, a few of the upper or lower ones in whorls, or all scattered, ascending, firm, glaucous, narrowly linear, acute, indistinctly three to five nerved, the lower ones 4 or 5 inches long, 3 or 4 lines broad in the middle; flowers, 1 to 10 in number, if several in a corymb or raceme; pedicels, elongated, nodding at the top; perianth, 2 or 3 inches long, brilliant orange red: segments, acuminate, 5 or 6 lines broad in the middle, lower half yellow, with several purple spots, closely reflexed above the base; groove, distinct, with smooth edges; stamens, shorter than the perianth by one-third; anthers, 5 or 6 lines long; style, curved, twice as long as the ovary. I have not seen the capsule. Rocky Mountains in the Utah territory, introduced by Roezl into European gardens. California, on the Santa Cruz Moun-

Roezl's Lily (*L. Roezlii*).

tains, Hartweg, 2,000. Easily distinguished from allied forms, by having narrow acute leaves, and perianth segments.*

33. *L. Columbianum.*—Hanson in hort., Leicht.—Bulb (*see* p. 113), *ovoid,* perennial, small white, acute, with lance-shaped scales; stem, 1½ to 2 feet high, slender, green, smooth; leaves, few, the lower ones in whorls of four or five leaves, the upper ones scattered, oblanceolate, acute, 1½ to 2 inches long, 5 or 6 lines broad in the middle; flowers, two or three in number, in an umbel; pedicels, slender, 2 to 4 inches long, nodding at the top; leaves, reflexed, bracted at the base, sometimes bracteolated; perianth; 1½ to 2 inches long, brilliant orange-red; segments, lance-shaped, closely reflexed from the middle, where they are 4 to 6 lines broad; inner surface covered thickly with purple dots; groove, shallow, smooth; stamens, shorter than the perianth by one-third; anthers, 3 or 4 lines long; style, scarcely longer than the ovary.—Oregon, W. Lobb, 350, hort., Leichtlin. It scarcely differs from *Canadense* var. *Parviflorum,*† except in the bulb not being rhizomatous.

A very graceful form, known as the Oregon Lily, found in dry sandy plains in that country and in British Columbia, 500 to 1,000 feet above sea level, with an ovoid bulb: from habit of growth and shape of flower, it has by many been considered to be a small variety of the next form *Humboldtii,* dwarfed by dry sandy habitat. It is, however, though smaller, a more elegant and graceful Lily, growing to the height of 3 and 4 feet, bearing numerous recurved pendulous flowers of a bright golden colour; and is one that seems easy of cultivation.

34. *L. Humboldtii.*—Roezl and Leicht., Duchartre, Obs. 105; Regel. Gartenfl., t. 724; Flore des Serres, t. 1,973-4—*Bloomerianum,* hort. Aug.—Bulb, large, 2 to 4 inches in diameter, oblique, perennial, not rhizomatous; scales, few, ovate-lanceolate, acute, 2 or 3 inches long; stem, terete, stout, 4 or 5 feet high, smooth or downy, green, with reddish spots; leaves, usually in four to six regular whorls of 10 to 15 leaves, oblanceolate, the lower ones 4 or 5 inches long, 9 to 12 lines broad above the middle, acute, firm, of a deep green colour, undulated; lateral veins, distinct, sometimes ciliated on the lower part of the inner surface; flowers, often six to ten in number, sometimes thirty to forty, in a deltoid panicle, which is a foot across when fully expanded; pedicels, divaricated, nodding at the top, the lower ones 3 to 5 inches long; leaves, oblanceolate, very much reflexed, bracted; perianth, 3 or 4 inches long, brilliant orange-red; greenish at the base outside; segments, acute, 9 to 12 lines broad in the middle, closely reflexed above the base, with numerous claret-coloured dots on the inner surface, slightly lamellate-papillose near the base; groove, distinctly excavated, with smooth edges; filaments, 1½ to 2 inches long; anthers, red, 6 to 8 lines long; style, 6 or 7 lines long, about one-third the length of the ovary; capsule large, obovoid, acutely six-angled as in *Martagon.* California, on the Sierra Nevada,

* We have no knowledge of our own, as regards this Lily.

† The form we have grown as *Parviflorum* is quite distinct from *Columbianum.* *See* our remarks on each species.

Roezl, in hort., Leichtlin.—*Canadense*, var. *Puberulum*, Torrey, Bot. Whipple, 90 (Hartweg 2,004), is a form of this species which has the stem and under-surface of the leaves puberulous.

This form, of all Lilies, has the largest and most peculiar bulb, sometimes globose, sometimes rhizomatous, often intermediate in form, with large long broad scales. We have had bulbs weighing as much as 1 lb. It is a very distinct, beautiful, and graceful form—graceful in whorled foliage, graceful in its spike of numerous pendent, golden purple-spotted flowers. Its reddish brown stem, bluish green smooth leaves, distinguish it even in early growth from all other Lilies. There is a good coloured figure given in the "Florist," 1875, p. 217.

Var. *Ocellatum*, Kellogg, Proc. Calif, Acad., v. 88, t. 4, from the Island of Santa Rosa, is a form with a yellowish perianth, marked on the inside with conspicuous purple dots.

This var., *Bloomerianum Ocellatum*, so called because each purple spot is (like a pupil) surrounded with a yellow circle ; is a distinct form, with smaller bulb, not so vigorous in its growth, but with as large or larger flowers. *See* page 23.

Humboldt's Orange Lily
(*L. Humboldtii*).

Flower spike of Martagon Lily
(*L. Martagon*).

35. *L. Martagon.*—*Speciosum*, 435 ; Jacq., Austr., t. 351 ; Bot. Mag., t. 893 and 1,634 ; Red., Lil., t. 146 ; Eng. Bot., t. 279, edit. 3, t. 1,518 : Reich., Ic. Germ., t. 451.—Bulb, ovoid, 1½ to 2 inches long, yellowish, perennial, with very numerous narrow scales ; stem 3 to 6 feet high, terete, smooth or puberulous in the upper part, green or spotted with purple ; leaves, mostly in two to four whorls of six to nine leaves, the upper ones (rarely all) scattered, horizontal, oblanceolate, spathulate, sessile, tender, the lower ones 4 to 6 inches long, 12 to 15 lines broad above the middle, tender (with three to five distinct veins on each side of the mid-rib), smooth or pubescent ; central internodes, 6 to 9 inches long ; raceme, lax, elongated, containing from three to twenty flowers; bracts, small; pedicels, nodding when bearing flowers, the lowest ones 1 to 3 inches long ; perianth, fragrant, claret-coloured, 15 to 18 lines long, pubescent on the right outside ; segments, lance-shaped, very revolute, with numerous livid purple dots on the inside ; claws, slightly lamellated (groove deep,

with papillose edges), hooded, thick, and puberulous at the apex; filaments, 8 to 10 lines long, twice the length of the anthers; pollen, red; ovary, 5 or 6 lines long, shorter than the very curved style by one-third; capsule, turbinate, acute-angled, umbilicated at the apex. Central and Southern Europe, to Siberia and Japan, flowering in our gardens at the end of June and beginning of July. For the forms of this species, *see* Parkinson, Parad., 31.

L. Hirsutum, Miller, Dict., No. 10 (*Milleri*, Schultes, Obs., 67), is a stout form with a puberulous stem.

L. Glabrum,* Spreng, Syst., ii., 62, is a form with white flowers, a smooth stem, shining green leaves, and yellow pollen. There are also forms with claret and flesh-coloured undotted flowers.

Var. *L. Cattaneæ*, Visiani, Fl. Dalm., Suppl. 32, t. 3.—Segments of the perianth, thicker than in any other species, of a dark purplish-claret colour; dots, nearly obsolete. Dalmatia, Hort., Leichtlin.—

L. Martıcum Dalmaticum, Malay, is a similar form, or the same.

It is the commonest wild European species, stretching from Spain and France through all Central and Southern Europe, and in Asia far into Siberia, but in the extreme East and Japan, appearing to be entirely replaced by *Hansoni*, which is confused with it in Ledebour's "Flora Rossica." It is the old original *Turk's-cap* Lily of the gardens, and is mentioned in Gerarde's list of the plants cultivated in 1596, but it has now given way to a large extent, as a popular favourite, to its allies with brighter coloured flowers. It is a very well-marked plant, not likely to be confounded with any other species, and, though so widely spread, it is very little liable to variation in its characters. *L. Martagon* is quite different from all other Lilies in the colour of its flowers.

I have seen a single specimen gathered by Bourgeau, in Piedmont, in which the whorls were entirely broken up, and the leaves scattered indiscriminately down the stem.

The *Martagon* group, stand alone in their peculiarities; they are remarkable for their whorls of broad dark-pointed foliage, for the peculiar mode in which the flower spike ascends, bearing a nodding, compact raceme of flower buds, hanging downward, which as the spike elongates, gradually unfold, and turn upwards one by one, till the branching spike, is symmetrically upright. (I have never seen this peculiarity in any other group; but it is the normal, proceeding in the true *Martagon*). Lastly in the short, but very thick fleshy petals of the perianth.

Of the above named forms, *Album* is perhaps the most elegant and graceful; but *Dalmaticum*, the grandest and most superb: the stems of this exceedingly graceful plant rise with 5 to 7 whorls of broad pointed foliage, to a height of 6 to 8 feet, bearing a long symmetrical spike of from 20 to 40 flowers, varying from a light purple to a deep blood-red; sometimes spotted, sometimes unspotted.

36. *L. Avenaceum*.—Fischer, Maxim. in Regel., Gartenfl., 1865, 290, t. 485.—*Martagon*, Led., Fl. Ross., iv., 149, ex parte.—Bulb (*see* page 108), globose, small, perennial; scales, numerous, lance-shaped; stem, smooth, terete, 18 inches to 2 feet high; leaves,

* The well-known, very graceful, *Martagon Album*.

usually in a whorl of six to nine leaves at the middle of the stem, a few scattered between the whorl and the raceme, seldom in two whorls or all scattered, horizontal, oblanceolate, 3 or 4 inches long, 6 to 18 lines broad above the middle, smooth, tender, similar in texture and venation to those of *Martagon*; flowers, few, sometimes sub-umbellate: bracts, small; pedicels, nodding at the top, 2 or 3 inches long; perianth, slightly fragrant, 15 to 18 lines long, of a brilliant yellowish-red; segments, lance-shaped, 4 to 6 lines broad in the middle, hooded at the apex, covered with minute dots on the inside; groove, smooth and deep; filaments, 9 to 12 lines long; anthers, 3 or 4 lines long; ovary, 4 or 5 lines long, half the length of the curved style. Kamtschatka, Manchuria, Kurile Islands, and Japan; Pallas, Maximowicz, &c. It has the habit and foliage of *Martagon*, and the yellowish-red perianth of *Canadense*.

The Oat-scaled Lily (*L. Avenaceum*).

This form differs from *Medeoloides*, in having drooping flowers with reflexed tips (like *Tenuifolium*), unspotted, or but little spotted, and of a very variable tint; it is found in the north of Japan, near Hakodadi.

It was first introduced in 1829, by Fisher, to the St. Petersburgh Botanic Garden, but soon disappeared. Afterwards by Dr. Regel in 1856, and flowered; the colour of the flower varies much from yellow to scarlet. In Hakodadi, the winter is very long, 8 or 9 months, and very severe; the summer, hot and brief. This Lily, might therefore, be very properly introduced into Norway or Switzerlend, with every chance of success.

The name *Avenaceum*, is given from the "oat-like" appearance of the scales of the bulb.

37. *L. Hansoni* (Leichl.)—Bulb (*see* page 109), like that of *Tigrinum*, globose, perennial, compact, whitish; stem, 3 or 4 feet high, slender, smooth, terete, stout, green; leaves, oblanceolate, acute, green, tender, smooth, with three distinct, oblique, tender, distant, lateral nerves, usually collected in a whorl of eight to twelve patent sessile leaves at the middle of the stem, the others scattered, 4 or 5 inches long, 8 to 12 lines broad above the middle, gradually narrowed from the middle to the base; flowers, 4 to 10 in number, in a loose raceme, or crowded in an umbel; pedicels, erect-patent, 1½ to 2 inches long, of a brilliant reddish orange; segments, thick, lance-shaped, 4 or 5 lines broad in the middle, deeply falcate-revolute, dotted with purple on the lower half, inside; groove, long, smooth, very deep; filaments, 10 to 12 lines long, yellow; anthers, narrow, 4 or 5 lines long; pollen, yellow; ovary, club-shaped, deeply channelled, 5 or 6 lines long, a little shorter than the style. Japan, Hort., Leichtlin; coming into growth and flowering amongst the earliest. This species is midway between *Martagon* and *Canadense*.

The figure of this Lily in *Florist*, 1874, p. 193, there miscalled *Avenaceum*, gives a very inadequate idea of its beauty, and must have been taken from a plant not fully

established. When well grown, it throws up a spike from 4 to 5 feet high, with 12 to 30 flowers, of a much brighter tint than that given in the drawing above referred to.

It is a very early-flowering Lily, with well-marked whorled foliage; the flowers are golden yellow, star-shaped, and spotted, like other true *Martagons*, has petals stout and fleshy in substance, broad and ovate, rather than long.

It was discovered by Maximowicz in 1860, in Japan; we have had drawings of this Lily, with bulbs sent over to us thence, as far back as the winter of 1869-70, but we never flowered it till 1878. We consider it to be by far the most striking and graceful form of all the true *Martagons*.

38. *L. Monadelphum.*—M. Bieb., Flor. Taur., i., 267; Cent. Pl. Ross., t. 4; Gawl. Bot. Mag., t. 1,405; Kunth, Enum., iv., 260; Fisch. and Lall., Ind. Sem. Petrop., 1839, 57; Reich. Exot., t. 89; Regel, Gartenfl., t. 723.—*Loddigesianum*, Schultes, fil, Syst. Veg., vii., 416; Kunth, Enum., iv., 261; Lemaire, Jard. Fleur., t. 204; Paxt. Flow. Gard., t. 58.—*Szovitzianum*, Fisch. and Lall., Ind. Sem. Petr., 1839, 58; Kunth, Enum., iv., 674; Regel, Gartenfl., t. 436; Flore des Serres, 507-9.—*Colchicum*, Steven.—Bulb, ovoid (*see* page 114), whitish, perennial; scales, numerous, lance-shaped; stem, 2 to 5 feet high, stout, green, puberulous; leaves, 30 to 50 in number, scattered, ascending, linear lance-shaped, or oblanceolate, green, distinctly many-nerved, the central ones 3 or 4 inches long, 6 to 12 lines broad in the middle, pubescent on the back and edges; raceme, usually containing from 2 to 16 (sometimes 20 to 30) flowers; peduncles, 1½ to 2 inches long, nodding at the top; bracts, large, lance-shaped, in pairs; perianth, fragrant, of a sulphur-yellow, 2½ to 3½ inches long; segments, oblanceolate, falcate above the middle, 9 to 12 lines broad, tinged with purple at the base and apex, and having a few small blackish dots on the inner surface, not papillose; groove, smooth and shallow; filaments, 18 to 21 lines long, green, flattened from the base, valvate at the base of the upper third of their length; anthers, 5 or 6 lines long; pollen, red; ovary, 7 or 8 lines long, half the length of the almost straight style; capsule, obovoid, 18 to 21 lines long, obtuse-angled, umbilicated at the apex. The Caucasus, and northern Persia, flowering in our gardens in June, amongst the earliest. The original plant of Bieberstein is merely a form which has the filaments united below. This species recedes from the others of this group towards Eulirion, which it resembles in the form of the perianth, and in the absence of papillæ, &c.

Crimson-anthered Lily (*L. Szovitzianum*).

Var. *L. Ledebourii*, Baker; *Pyrenaicum*, Led. Fl. Ross, iv., 151, non Gouan.—A dwarfer variety with narrower leaves (80 to 100 in number), linear, seven-nerved, 4 to 6 lines broad in the middle, scarcely pubescent underneath; segments of the perianth, 6 to 8 lines.

broad. Caucasus, Güldenstadt, C. A. Meyer. (I have seen it growing in Kew Gardens.)

This Lily, more generally called *Szovitzianum*, and sometimes *Colchicum*, is a most beautiful and rather variable species; not merely from the unusual (canary) colour of the flowers, their large size, and contrast with the chocolate-brown anthers, but from the symmetry of the pyramidal spike. Each flower, (when well-cultivated), like an evenly suspended bell, hangs with base parallel to the horizon. In this respect the woodcut above fails to do justice to the plant. We have had in one season over 1,500 spikes in bloom, from 4 to 6 feet high, with from 4 to 20 bells on each spike, some of them (the flowers) 6 inches across, most beautifully coloured, scarcely any two alike, a sight of beauty that falls to the lot of but few.

Among its many varieties, we have selected the following as especially worthy of notice:—

A.—A fine broad petalled form with large bells of flowers, rather pale in tint, but regularly and heavily spotted with about 4 rows of dark purple spots on either edge of the petal.

B.—A very rich deep canary, almost citron coloured form, with very few spots.

C.—A pale lemon tinted form, few spots.

D.—Has a deep yellow centre and paler tinted edges.

E.—A peculiar pale coloured form, very regularly and richly spotted, with pale coloured anthers of a light greenish tint.

F.—The unspotted variety, of a very deep citron colour. We have been accustomed to call this variety *Monadelphum*. According to some Liliophilists, this form (*Monadelphum*) differs from the type in (a) having anthers covered with lemon yellow pollen, instead of chocolate brown. (b), in being earlier by three weeks to flower, and (c) in shewing its flower buds directly it is above the ground, whereas, in the type, the buds are concealed by the leaves till ready to bloom. As regards (a), we have noticed anthers bearing pollen of all shades, from a pale greenish yellow to a very rich red brown. As regards (b and c), we have noticed there differences, more especially in plants that have been planted the previous autumn, and are not yet well established, but not with plants like our own, that have been undisturbed through three winters. Cultivators must not expect to see this Lily in all its beauty, unless planted in a moist, loamy, or clayey soil, and left undisturbed for at least two winters,—then it will be **magnificent.**

39. *L. Polyphyllum.*—D. Don in Royle, Ill. Him., 388; Kunth, Enum., iv., 677; Klotzsch, Reise Wald., 53.—*Punctatum*, Jacquem, Duchartre, Obs., 76.—(For description of bulb, *see* pages 114 and 115), stem, smooth, terete, 2 to 4 feet high; leaves, 40 to 60 in number, ascending, scattered (or the lower ones sometimes whorled, according to Jacquemont), green, sessile, acute, smooth, minutely papillose on the edges, resembling those of *Martagon* in their texture and venation, the lower ones oblanceolate, 4 or 5 inches long, 6 to 9 lines broad above the middle, the upper ones narrower and linear; peduncle, naked for 5 or 6 inches below the raceme; raceme, lax, containing from 4 to 10 flowers, branches often opposite; bracts, in whorls; pedicels, nodding at the top when bearing flowers, the lower ones 3 to 5 inches long; perianth, 18 to 21 lines long, fragrant, "of a livid-yellow, with claret-coloured dots" (Jacquemont); segments, oblanceolate, 2 or 3 lines broad, revolute from the middle; filaments, 15 to 16 lines long; anthers, 4 lines long; ovary, 6 or 7 lines long, one-third shorter than the very curved style; capsule, obovoid, 12 to 15 lines long, sub-acute-angled. Temperate region of the Western Himalayas (Kunawar, Kashmir, &c.); Royle, Thomson, Jacquemont. 6,000 to 8,000 feet above sea level, also in Thibet.

This rare, but very beautiful Lily, was flowered by Mr. Geo. Maw, at Benthall Hall, in 1877, the flowers were then described of a pale cream colour, speckled internally with linear dark purple markings. We have also flowered it at Colchester. It is a beautiful and elegant form, colour yellowish, with purple lines and spots, resembling much in shape of flower the preceding form, *Szovitzianum*. For remarks about its culture, *see* pages 19 and 20.

40. *L. Ponticum*.—K. Koch, Linnæa, xxii., 234; Duchartre Obs. 22.—Bulb, ovoid, an inch in diameter; scales, numerous, lance-shaped; stem, 1½ to 2 feet high, slender, faintly pubescent in the upper part; leaves, 20 to 30 in number, scattered, lance-shaped, firm, ascending, 15 to 18 lines long, 4 to 5 lines broad, the upper one narrower; veins, numerous, distinct; lower part of the inside, and edges pubescent; flowers, 1 to 6 in number, nodding, 18 to 21 lines long, yellow; segments, oblanceolate, reflexed below the middle, where they are 3 or 4 lines broad, scarcely dotted; groove, shallow; filaments 3 or 4 lines long, half the length of the perianth; ovary, 6 lines long, a little shorter than the club-shaped style; capsule, 1 inch long, obovoid, obtuse-angled. Mountains of Asia Minor, at an altitude of 6,000 to 7,000 feet, K. Koch; the mountainous regions of Lazistan Balansa, Plantes de l'Orient, anno 1866, No. 1,531. It has the leaves and habit of *Monadelphum;* but is more slender, and the typical perianth of this species is more revolute. Regel's figure (Gartenflora, t. 436), which is referred by K. Koch to *Ponticum*, in my opinion represents the true *Szovitzianum*. In De Candolle's herbarium there is a narrow-leaved specimen from Lazistan, in which the leaves are more crowded, the lower ones 3 inches long, and 3 or 4 lines broad, resembling a variety of *Monadelphum*.

We cannot recognise this form as ought, but a variety of *Szovitzianum*, probably our variety. B. *See* preceding page.

41. *L. Carniolicum*.—Bernh. in Mert and Koch., Deutsch. Flora, ii., 536; Kunth, Enum., iv., 260; Reich. Ic. Flor. Germ., t. 990; Parl. Flor. Ital., ii., 404.—*Chalcedonicum*, Linn. sp. Plant., 434, ex parte; Jacq. Fl. Austr. Suppl., t. 20; *Martagon Pannonicum* sive *Exoticum Flore Spadiceo*, Parkins, Parad., 35.—Bulb (*see* page 113), perennial, ovoid; scales, numerous, lance-shaped; stem, 2 or 3 feet high, green, puberulous; leaves, thirty or forty in number, scattered, ascending, lance-shaped, or linear-lance-shaped, the lower ones 2 or 3 inches long, 6 to 9 lines broad in the middle, flat, distinctly many-nerved, and distinctly ciliated on the margins and the veins of the lower part inside; upper leaves shorter; pressed close to the peduncle; raceme, few-flowered; pedicels, 2 or 3 inches long, nodding at the top, sometimes bracteolated; perianth, 1½ to 2 inches long, of a brilliant yellow or vermilion; segments, oblanceolate, closely revolute, 5 or 6 lines broad in the middle, with numerous minute dots on the inner surface, papillose downwards; groove distinctly excavated; filaments, 8 to 12 lines long; anthers, 5 or 6 lines long; pollen, saffron; ovary, 5 or 6 lines long, as long as the club-shaped

style; capsule, 1½ inch long; obtuse-angled. Lombardy, Istria, Dalmatia, Illyria, and Bosnia; flowering in June.

We have received and flowered a variety of the above Lily without spots in the flower (*Unicolor*); we also have reason to believe that there is a white variety.

The Carniolian or Nodding Red Lily (*L. Carniolicum*).

The Nankeen Lily (*L. Testaceum*).

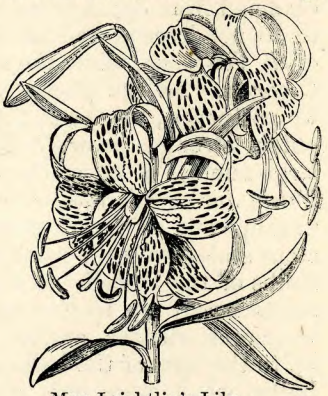
42. *L. Testaceum*.—Lindl., Bot .Reg., 1842, Misc., 51, 1843, t. 11; Paxt. Mag. Bot., 1843, 221, with a figure; Kunth, Enum., iv., 673; Flore des Serres, t. 39; Regel, Gartenfl., t. 349.—*Excelsum*, Walp. Ann., xi., 110.—*Isabellinum*, Kunze, in Mohl. and Schlecht., Bot. Zeit., i., 609.—Bulb, globose, perennial; stem, 4 or 5 feet high, slightly downy, tinged with brown; leaves, sixty to a hundred in number, scattered, very close, linear, ascending, firm, dull, green, three to five-nerved, the lower ones 3 or 4 inches long, 3 or 4 lines broad in the middle, the margins covered with whitish down, the upper ones gradually smaller, 1 to 1½ inches long, pressed close to the stem, more distinct, being at some distance from the flowers; flowers, three to ten in number, in an umbel or raceme, fragrant; pedicels, erect-patent, 4 to 6 inches long, nodding at the top, bracted with small white-margined leaves; perianth, 2½ to 3 inches long, dull yellow; segments, deeply revolute, 9 to 12 lines broad, with a few small reddish dots near the base, slightly lamellate-papillose; groove, deep, with smooth edges; filaments, half the length of the perianth; anthers, 5 or 6 lines long; pollen, red; ovary, 6 to 8 lines long, about half the length of the curved style. A garden variety, probably a hybrid between *Candidum* and *Chalcedonicum*; flowers in the end of July.

This very graceful and distinct Lily is said to have been first noticed at Erfürt, in a bed of seedlings, in 1846. It has a most pleasant perfume, graceful appearance, and is a general favourite.

It has been thought not to have a Japanese origin, because no bulbs of it have ever been traced as coming over from those Islands of the Western Sea, so productive of new and graceful forms; but, we have seen more than once, in Japanese drawings executed for us, years ago, by some of the best artists in Yeddo, as containing "all the Lilies of Japan," forms represented, bearing a very strong resemblance to *Excelsum*. It is true

that amongst these Lilies, there are some most wonderful forms and gorgeous pieces of colouring, such as would lead many to disbelieve in the veracity of the artist, but, on the other hand, we can point to other Lily forms which we know well, depicted therein with fair accuracy, while the birds and insects pourtrayed in some numbers, we recognise to have been truthfully delineated. Our own conclusion is, that as yet, we have scarcely touched the rich treasure of wonderful Lilies, which Japan will one day send to us.

43. *L. Leichtlinii.*—Hook. fil., Bot. Mag., t. 5,673; Ill. Hort., t. 540; Flore des Serres, t. 1,736; Belg. Hort., t. 11; Floral Mag., t. 509.—Bulb (*see* page 99), small, perennial, globose; scales, few, broad, acute, thick, closely imbricated; stem, 2 or 3 feet high, of a dark brown colour, slender, faintly covered with down, creeping at the base; leaves, 30 or 40 in number, scattered, linear, ascending, of a deep green colour, firm, flat, distinctly three-nerved, the lower ones 3 to 5 inches long, 3 or 4 lines broad, the upper ones lance-shaped and distant from the flowers; flowers, few, in a loose corymb; pedicels, erect-patent, 3 or 4 inches long, nodding at the top; perianth, scentless, 2½ to 3 inches long of a brilliant lemon colour, tinged with purple on the outside, and sprinkled from the base to above the middle on the inside with conspicuous claret-coloured dots; segments, lance-shaped, 6 to 9 lines broad in the middle, deeply revolute, callous at the apex, channelled, slightly lamellated near the base; groove, deep, with faintly pubescent edges; filaments, yellow, 2 to 2½ inches long, diverging widely: anthers, brownish red, 6 to 7 lines long; ovary, slender, 9 lines long, one-third the length of the curved style. Japan, Maximowicz. It flowers in our gardens in August, at the same time as *Tigrinum*.



Max Leichtlin's Lily (*L. Leichtlinii*).

Var. *Majus*, Wilson, in Journ. Hort., 1873, 371, with a figure, is a luxuriant form, 5 feet high, with leaves 6 or 7 inches long.—*Maximowiczii*, Regel, Ind. Sem. Hort. Petr., 1866, 26; Gart., 1868, 322, t. 596; Animad., 1873, 20, is a variety with brilliant scarlet flowers. Japan, Maximowicz.

A very beautiful form is *Leichtlinii*; it has one peculiarity not noticed above, that, apparently without reason, the shooting stem will run along beneath the soil for a foot or more before making its appearance, consequently, these Lilies are erratic in their nature, and unfit for pot culture.

With regard to the *Maximowiczii* mentioned above, we have always referred it to the later mentioned form, No. 45, *Pseudo Tigrinum*.

44. *L. Batemanniæ.*—Closely allied to *Leichtlinii* is another new Lily from Japan, which, through the kindness of Mrs. Bateman, a well-known Liliophile, and one of the first possessors of this kind, we have had the pleasure of calling *Batemanniæ*. It grows from 3½ to 4 feet high, and with suitable cultivation, might be expected to

attain at least 6 feet. It has a slender, light green, somewhat rough stem, inclined to bronze at the insertions of the lower leaves, which are crowded, alternate, long, and slender, arching downwards. The flowers are semi-cup-shaped, with spreading segments somewhat recurved, medium sized, of a deep apricot tint, and *unspotted* They are produced in umbels of from 4 to 8 or 12, not unlike in colour those of *Thunbergianum Venustum* (*Armeniacum*), but the plant, as to bulb, habit of growth, foliage, and time of flowering, resembles very closely *Leichtlinii* or *Maximowiczii*, to which it is closely allied. This new Lily first flowered with us in 1875, from some small bulbs obtained from Japan in rather poor condition; we were much puzzled by its nondescript appearance, for the flowers reminded us strongly of *T. Venustum*, while the foliage and habit were more like those of *Croceum*. As the plants were dwarf, weak, and poorly developed, we postponed, that year, any decision as to its character, till we could obtain stronger growth. Fortunately, in the winter of 1877—78, a large number of queer-shaped bulbs from Japan, under the name of *Talsta Juri*, made their appearance in the market: these were small, in shape and size much resembling those of *Leichtlinii*, having broad stout scales, with the front tier reaching nearly half way up the bulb. Bulbs of the *Umbellatum* section are in general large and flatter, with scales nearly up to the apex; those of *Thunbergianum* have more numerous, slender, and narrower scales, reaching vertically higher, up to the apex of the bulb. We purchased and planted a lot of these bulbs, which were new in shape to us, and, at first, during growth, comparing them with some of the true plants growing near, we thought we had got *Leichtlinii*, but, later on, a difference appeared in stems and foliage; the former were too rough and green, whereas, those of *Leichtlinii*, were smooth and dark coloured, the foliage was large, more crowded, and arching, whereas, in *Leichtlinii*, it was sparse, erect, and acute; lastly, the immature flower buds were blunt at the tip, marked with red, and arranged in an umbel: those of *Leichtlinii* were elongated, green at the tip, and arranged in the form of a spike. When the flowers expanded, we saw at once that we had again grown our old friend, which had so puzzled us in 1875. We have no doubt this form is a hybrid, it may be between *Excelsum*, which it much resembles in shape and substance of flower, and in being destitute of spots, and *Maximowiczii*, to the bulb of which its bulb is very similar; or it may be *Armeniacum*. Whatever its parentage, as an intermediate form it is most interesting; as a decorative autumnal form, it is floriferous, elegant, striking, and well worthy of a good place in the garden. A good plate of this Lily is given in *Garden, vol.* 15 *p.* 39.

45. *L. Pseudo-tigrinum*.—Carrière, Revue Hort., 1867, 410, with a figure; Regel. Gart., 1868, 118; Animad, 1873, 21.—Bulb (*see* p. 100), ovoid, perennial; scales, acute, adpressed, moderately thick;

stem, 3 or 4 feet high, erect at the base, covered with whitish down, of a lurid green colour, faintly spotted; leaves, scattered, linear, 4 or 5 inches long, 3 or 4 lines broad, recurved-patent, revolute at the edges, when young covered with whitish cobweb-like down on the edges and base outside; raceme, loose, containing 4 to 6 flowers; pedicels, erect-patent, 2 or 3 inches long, nodding at the top; bracts and bracteoles, linear; perianth, 2 to 2½ inches long, brilliant scarlet, with numerous dark brown dots on the inside; segments, ovate-lance-shaped, 8 to 12 lines broad above the base, very revolute, and covered with numerous lamellate papillæ; groove, deep; filaments, 2 inches long, scarlet; anthers, 6 or 7 lines long; pollen, red; style, scarlet, 1½ inches long, very much curved, twice as long as the ovary. China. It flowers in our gardens in July and August.*

46. *L. Wallacei.*—Very closely allied to this form and *Leichtlinii*, is another form, to which we have given the name *Wallacei*. The bulbs, curiously enough, are small and cæspitose, at least, they have a great tendency to reproduction, and throw up numerous stems from the one bulb; the foliage and appearance are like those of a young Tiger, but with more crowded foliage; a Japanese form, and probably a garden hybrid between *Maximowiczii* and *Concolor;* the foliage is narrow, lanceolate, pointed, alternate, smooth; stem, light green, not pubescent; flower, of a rich vermilion orange, spotted at base and centre with numerous slightly raised small maroon spots; petals, stout, some reflexed; autumn flowering. It flowered with us first in 1877, having been introduced in 1876.

47. *L. Pomponium.*—*Speciosum*, 434; Bot. Mag., t. 271; Kunth, Enum., iv., 266; Reich. Ic. Germ., t. 991; Gren. Fl., France, iii., 181. —*Rubrum*. Lam. and DC., Gall., iii., 213.—Bulb, ovoid, perennial; scales, numerous, lance-shaped; stem, 2 to 3 feet high, thick, straight, channelled; leaves, 100 or more in number, deep green, scattered, narrowly linear, ascending, the lower ones 2 to 4 inches long, 1½ to 2 lines broad, three-nerved, with papillose and slightly revolute margins, the lowest ones 3 or 4 lines broad, the upper ones shorter and narrowly linear; peduncle, bare for 2 or 3 inches below the raceme; raceme, containing from 2 to 15 flowers; pedicels, nodding at the top, often bracteolated; perianth, fragrant, 1½ to 2 inches long, usually of a *vermilion-red,* furnished with numerous papillæ and black dots on the inside; segments, closely revolute,

* This Lily reminds one much of the Tiger group, which, indeed, it resembles in bulb, and flower, but differs in the fact, that it has an erect, smooth, less woolly stem, and does not emit bulbs in the axils of the leaves its foliage also is of a lighter green colour. It rejoices in various names, such as *Jucundum*, *Maximowiczii*. *See Florist*, 1873, p. 13.

It grows wild in Japan, on mountain slopes, and is very variable in colour, and spotting of the flower.

It may be regarded as a hybrid, between a Tiger (perhaps *Fortunei*) and *Leichtlinii*. It is a strong, erect, grower, 3—4 feet high, stem, more or less green; flower, in shape that of *Leichtlinii*; but in colour and marking more like *Tigrinum Fortunei*; flowers the end of August; is a fine acquisition to our hardy Lilies.

oblanceolate, 3 or 4 lines broad; groove, smooth, distinctly excavated. with smooth edges; filaments, green, 12 to 14 lines long; anthers, 3 or 4 lines long; pollen, vermilion-red; ovary, 5 to 6 lines long, a

Little Turk's Cap Lily (*L. Pomponium*).

Flower of The Little Turk's Cap Lily.

little shorter than the style; capsule, ovoid, 1½ inches long, umbilicated at the top, somewhat acutely six-angled. Northern Italy and the South of France. It flowers in our gardens at the end of June. —*Angustifolium*, Mill. Dict., No. 6, is a more slender form, with very narrow one-nerved leaves.

Var. *L. Pyrenaicum*, Gouan. Ill. 25; Red. Lil., t. 145; Reich. Ic. Germ., t. 992; Kunth, Enum., iv., 262.—*Flavum*, Lam. Gall., iii., 283. A more robust variety, with leaves a little broader and distinctly three-nerved, often extending to the base of the raceme; flowers, *yellow* and larger; bracts larger and style thicker. Pyrenees—*Martagon Luteum* non *Punctatum*, Parkins, Theat., 35, is a variety which has yellow flowers without dots.

Mention must also be made of a form called *Pomponium Verum*, collected by Mr. George Maw, 14,000 feet above sea level, in the Maritime Alps, and from Lantosca, near Mentone; it grows from 2 to 3 feet high, and is distinguished from the common garden form, by the bright scarlet tint of its flowers dotted over with linear arranged dots, and by its numerous, very slender, keeled, crowded, linear leaves; each leaf has a white edge and is somewhat sickle-shaped, with a spiral twist following the course of the sun: its foliage, therefore, has a very peculiar appearance, especially when just unfolded, resembling much that of *Tenuifolium*, but rather more white edged, like that of some Yuccas. It is a much more beautiful form than the preceding.

L. Albanum is a Transylvanian form, exactly like the yellow Pyrenaicum, but with a little larger leaves, and pollen of a different colour, the odour is sweet, like that of honey, whereas the savour of the garden form is rather nauseous; it occurs in quantities, near Verespatch; but the Macedonian plant from which Griesbach drew his description, referred to under head of Chalcedonicum, differs somewhat (Leichtlin).

48. *L. Chalcedonicum.*—Linn. Sp. Plant., 434, ex parte; Gawl., Bot. Mag., t. 993, non Jacq.—*Rubrum Byzantinum* sive *Martagon Constantinopolitanum*, Parkins., Parad., 34.—Bulb, ovoid, perennial, yellowish; scales, numerous, lance-shaped; stem, straight, downy, 3 or 4 feet high, green, tinged with purple; leaves, 100 or

more in number, ascending, very close, sessile, pale green, the lowest oblanceolate, the central ones linear, 2 or 3 inches long, 2 or 3 lines broad, three to five-nerved, covered with distinct white papillæ on the edges and on the veins of the lower part inside, upper leaves smaller and pressed close to the peduncle; raceme, few-flowered; pedicels, nodding at the top, often bracteolated; perianth, scentless, 1½ to 2 inches long, usually of a brilliant vermilion red without dots (but sometimes having a few minute dots on the inside), seldom yellow; segments, oblanceolate, closely revolute, 5 or 6 lines broad in the middle, with numerous papillæ; groove, distinctly sunk, with smooth edges; filaments, 12 to 14 lines long; anthers, 4 to 4½ lines long; pollen, vermilion-red; ovary, 5 or 6 lines long, about the same length as, or a little shorter than the style; capsule, obtuse-angled. Greece, and the Ionian Islands. It flowers in our gardens at the end of July and beginning of August, among the late blooming kinds.—*Albanicum*, Griseb. Fl. Rumel, ii., 385; Schur. Transyl., 662.

The Scarlet Turk's-cap Lily
(L. Chalcedonicum.)

Pyrenaicum, Baumg, Transyl., 632, non Gouan, from the Mountains of Albania, and *Transylvania* is a variety found in the Mountain Woods with yellow, and usually solitary flowers.

Gracile, Ebel, Zwolf Tage auf Montenegro, 8, t. 1, from the Mountains of Montenegro (flower not described) is now said to be a *Fritillary*.

L. Chalcedonicum is a very favourite Lily, not merely for its tall, graceful spike, with pendulous scarlet bells, but because with *Candidum* and *Excelsum* it seems to have the happy knack of doing well everywhere, and in all soils, consequently, it is not an uncommon tenant in cottage gardens. The demand for it of late years, has been greatly on the increase, but cultivators must not be discouraged if the first year after planting, little or no growth above ground is apparent, *see* our remarks, p. 53, 54, & 174.

49. *L. Callosum*.—Sieb. et Zucc., Fl. Jap., ix., 86, t. 41; Kunth, Enum., iv., 262; Miquel, Ann. Mus. Lug. Bat., iii., 156.—*Pomponium*, Thunb., Fl. Jap., 134, non Linn.—Bulb (*see* p. 107), small, perennial; scales, few, lance-shaped; stem, 1½ to 3 feet high, slender, terete, smooth; leaves, 30 to 40 in number, scattered, linear, ascending, smooth, firm, green, three to five-nerved, with narrowly revolute margins; lower leaves, 3 or 4 inches long, 1 to 2 lines broad in the middle, the upper ones becoming gradually smaller; raceme, narrow, lax, containing from 2 to 12 flowers; pedicels, short, nodding; bracts, in pairs, ligulate, thick, 4 to 9 lines long, obtuse at the apex, and callous (*hence the name Callosum*); perianth, always of a brilliant scarlet, 12 to 18 lines long; segments, oblanceolate, spathulate, 2½

The Callous Lily (*L. Callosum*).

to 3 lines broad, hooded at the tip, and without dots of any kind on the inner surface; groove, smooth, deep, and with smooth edges; filaments, one-third shorter than the perianth; anthers, scarlet, 3 or 4 lines long; ovary, 5 or 6 lines long, of equal length with the club-shaped, slightly curved style; capsule, obovoid, 15 to 18 lines long, obtuse-angled. Japan and the Loochoo Islands, Maximowicz, Oldham, 872; Buerger, &c. Introduced into Europe in 1840, indigenous to the mountainous regions of Japan.

After having handled several hundred bulbs of this Lily, we can hardly agree with the description above given of the bulb. For a more correct representation, *see* page 107, where a round bulb is given. If the elongated figure (?) in the annexed woodcut is intended to represent the bulb, it is utterly unlike those we have seen, and the fact that it is an article of food in Japan, points out that the bulb must be of a respectable size. No other Lily has the blunted thickened bracts, peculiar to this form, and shown in the woodcut, hence the name.

Var. *L. Stenophyllum,* Baker.—*Pumilum,* Hort., Leichtlin, non., DC.—Bulb, more ovoid; scales, fewer and broader; stem, stouter and taller; leaves, distant from each other, 1½ to 2 lines broad, three-nerved; perianth, 18 to 21 lines long; tube, longer and more cylindrical than in the type; segments, narrow and more ligulate. Eastern Siberia, Hort., Leichtlin.

The Var. *Pumilum,* from Mantchouria is (Regel) identical with *Callosum.*

50. *L. Tenuifolium.*—Fisch. Ind. Sem. Hort. Gorenk., 1812, 8; Schultes, fil., Syst. Veg., vii., 409; Kunth, Enum., iv., 263.—*Pumilum,* DC. in Red. Lil., t. 378; Kunth, Enum., iv., 263: *Linifolium,* Hornem Hort. Hafn., i., 326.—*Puniceum,* Sieb. and De Vriese, Ann. Hort. Pays-Bas, 1861, 23.—Bulb (*see* page 106), small, globose,* annual (?); scales, numerous, lance-shaped; stem, 1 to 2 feet, very slender, terete, smooth; leaves, 40 or 50 in number, very narrow, scattered, ascending, the central ones 1½ to 2 feet long and ½ to 1 line broad, one-nerved, and with revolute margins; peduncle, bare for 2 or 3 inches below the raceme; raceme, loose, containing from 1 to 20 flowers; pedicels, 2 or 3 inches long, nodding at

The Slender-leaved Lily (*L. Tenuifolium*).

* We believe this statement to be correct.

the top; bracts, linear-subulate, in pairs; perianth, 15 to 18 lines long, of a bright pale crimson colour; segments, oblanceolate, 3 or 4 lines broad in the middle, very revolute, usually of one colour, rarely marked with a few small blackish dots; groove, smooth, distinctly sunk; filaments, pale red, 8 or 9 lines long; anthers, twice as long; pollen, scarlet; ovary, 4 to 4½ lines long, one-third shorter than the slender style. Siberia, from the Altai Mountains to Amoor-land and Northern China. Pallas, Maximowicz, &c.

An early flowering kind, as may be supposed from its habitat. The most elegant and graceful of all the dwarf Lilies.

CHAPTER X.
SUPPLEMENT TO THE SYNOPSIS.

SPECIES FORMERLY GROUPED WITH LILIES, BUT NOW PLACED AMONG THE FRITILLARIES.

L. Nanum.—Klotsch., Reise Wald., 53.—6 inches high, downy, as far as the base of the leaves, one-flowered; leaves, linear, grass-like, bluntish, straight, erect, five-nerved; flower, nodding, small, bell-shaped, white; perigonous leaflets, oblong, obtuse, all sessile; stigma, thickened, three-angled, downy; filaments, subulate; anthers, oblong, obtuse, bluntly bifid at the base. Western Himalayas, Hoffmeister; Mount Gossain—Than, Nepaul; Gardner, Sikkim, 9,000 to 10,000 feet elevation, Dr. Hooker. Now known as *Fritillaria Gardneriana.*

L. Thompsonianum, now identified as *Fritillaria Macrophylla,* D. Don, Prod. Nep., 51 (1825)—*L. Roseum*—Wallich, Cat. No. 5077 (year 1832), Hook. in Bot. Mag., t. 4725.—*Lilium Thompsonianum,* Lindl., Bot. Reg., 1845, t. 1; Spae, Mon., p. 9.—*Fritillaria Thomsoniana,* D. Don, in Royle Ill. Him., p., 388, t. 92 (year 1839), Kunth, Enum., iv., p. 672.—A native of the Western Himalayas, extending from Affghanistan eastwards by way of Mussoorie and Kumaon to Nepaul. It has been gathered by nearly all the collectors who have visited those regions. In the eastern part of its range, the height which it attains above the sea-level appears to be from 5,000 to 8,000 feet. Figures will be found in the three publications quoted; that in the "Botanical Magazine" being the most recent and much the most satisfactory, both botanically and artistically.

L. Thompsonianum, Thomson's *Fritillary.*

Royle's plant, called *Thomsonianum,* has flowers half as large again as those I have described, but differs in no other respect from Wallich's original *Roseum.* It seems to have been first introduced into cultivation by Loddiges, who flowered it in 1844. Captain Strachey sent it to Kew in 1853 from Kumaon, and it was from his specimens that the figure in the "Botanical Magazine" was drawn.

"It may surprise some to be told, that the plant of which the annexed is a representation, is sometimes a Lily and sometimes a Fritillary. It has been alternately referred to the genera Lilium and Fritillaria by different botanists, and even now, it is doubtful whether it has found a permanent resting place. It is one of those plants which puzzle botanists, and it illustrates the fact that it is often as difficult to characterise genera, as it is to define species. The plant was originally described by David

Don, as *Fritillaria Macrophylla*, and Mr. Baker, in his revision of the Tulipeæ (Linnean Society's Journal, vol. xiv.) retains this name for it, placing in it a sub-genus having the floral characters of Lilium, and the scariously coated bulbs and distinctly three-lobed style of Fritillaria. Messrs. Loddiges, imported and flowered it about the year 1844, and it was figured in the "Botanical Register" under the name of *L. Thompsonianum*. Mr. Baker's description, drawn up from a number of dried and living plants will aid in giving an idea of the general range of variability of this species. Bulb, ovoid, 1 inch thick, clothed with several scarious coats 2 inches thick, or more in length, striped on the outside, and bearing bulblets in their axils, stem, 1½ to 3 feet high, erect, round, and smooth, leaves, 20 to 30 directed upwards, narrow, bearing bulblets in their axils, lower ones crowded, 12 to 18 inches long, 3 to 4½ lines broad, upper ones looser and shorter; flower spike 12 to 18 inches long, bearing 6 to 30 flowers, flowers when expanded, 3 to 4½ inches across, lower ones nodding, upper ones smaller, half erect. A native of Afghanistan and the North West Himalayas."—*W. B. Hemsley, Garden, vol.* 12, *p.* 136.

Fritillaria Hookeri.—Baker, n. sp.—Closely allied to the last, but clearly distinct from it specifically. Bulb quite similar in shape and vestiture, but considerably smaller. Stem more flexuose, at most only a foot long, much more slender, not more than a line thick at the base, quite glabrous, like the rest of the plant. Leaves similar in shape and texture, but much fewer, not more than 6—9, all laxly scattered, not aggregated towards the base as in the other species, with 10—12 subequal nerves, the lowest 5—6 inches long. Raceme subsecund, 2—8 flowered, 3—6 inches long; lower pedicels ascending, 6—9 inches long; upper pedicels shorter, cernuous. Bracts, linear, 1—1½ inch long. Perianth, in the lower flowers, 15—16 lines, in the upper, about an inch long, so far as can be judged from dried specimens, just like that of *Roseum* in colour, direction, and texture; divisions, oblanceolate, bluntish, ¼ to ⅜ inch broad, narrowed gradually to the base. Ovary, clavate, ⅜—½ inch long; style, 7—8 lines long; stigmas linear, 1 line long. Capsule, oblong or obovoid, ½—⅝ inch long, bluntly lobed. Filaments, very slender, nearly straight, 8—12 lines long; anthers, linear-oblong, 2 lines long.

Discovered by Dr. Hooker in the temperate region of the Sikkim Himalayas, at an elevation above the sea-level of 9,000 to 10,000 feet, in 1849.

It is figured in "*Bot. Mag.*," tab. 6385, also in "*Gard. Chron.*," 1871, p. 201, and is said to be restricted to the valley of Lacking, Sikkim. Flowers 3 to 8 in a lax raceme, perianth funnel-shaped, pale rose lilac, flowers from 1 to 1½ inch long. It flowered in 1877 with Mr. Max Leichtlin.

Sarana Kamskatchense, often called the Blue Lily.—*F. Kamtschatcensis*, Gawl., Bot. Mag., Sub., t. 1216; Regel, Gartenfl., t. 173.—A well-known and peculiar form, having an annual bulb, common in the northerly regions of Siberia, Asia, America, and Japan, bearing a small bell-shaped dark purple flower; it is rather a difficult bulb to flower, and very impatient of change of place; it has been well-flowered at the Edinburgh Botanic Garden by the late Mr. James McNab.

CHAPTER XI.

"FALLACIES" OF DUNEDIN (!)

PHYSIOLOGY OF LILY BULBS.

THE following peculiar views have been recently put forward in the *Horticultural Journals*, by a Veteran Lily grower, writing under the *nom de plume* of "Dunedin."

FALLACIES (?) OF LILY GROWERS.

§ 1. "There is hardly a situation in which Lilies will not thrive, and yet how rarely do we see them grown. This is true enough, but it raises the important question, who is to blame? Is it the buyer, or the seller, the amateur gardener, or the professional Lily grower? There are thousands upon thousands of amateurs in the suburbs of London, and other large towns, who could spare time for the interesting and healthy exercise of gardening in August and September; but who could not spare a day, or even an hour during the latter part of October, and yet, if they apply to nurserymen, they are told that Lily bulbs* will not be ready for lifting before the end of that month. If they apply to the Lily growers in Holland, the answer is even more fallacious, for they are told that Lily bulbs will not be harvested until the end of October, and that the best time for planting is from October to March. Others say, as an excuse for late planting, that Lily bulbs are not fully "matured" before the end of October. Now, this is a fallacy, most hurtful to both buyer and seller. No Lily bulb can be said to be fully matured, until it has advanced to a state of perfection, that is, until it is in full bloom,† this being its last and highest stage. In October, and onward through the winter months, Lily bulbs can only be said to be maturescent, that is approaching maturity. We are told by a writer on Lilies that a Lily will flower better the second year after planting than the first. This also is a fallacy, but why? Too late planting. The growth of the first year is checked, while the growth of the new, or successional bulb, is undisturbed, consequently, that bulb blooms well the following year, leaving the parent bulb to decay and die. In some Catalogues we are told that Lily bulbs should not be disturbed for

* Lilies have been obtained from the New Plant and Bulb Company, Colchester, for years past, after the 31st August, and even before that date, if specially ordered.

† Surely this is incorrect, no one ever heard of a *bulb being in full bloom*. Dunedin means evidently, that the whole plant is in a state of perfection, and fully matured at the season of flowering, and, that therefore, the bulb is also fully matured or ripened. Continental, as also English nurserymen, in using the word matured or ripened, apply it certainly to bulbs, but mean (which is quite another thing) that after flowering, there follows a season of rest, shorter or longer it may be, during which the bulb ripens, consolidates and matures its juices, plumps out its buds, and prepares, so to speak, for another effort, just as trees after loosing their leaves, put on internal growth, harden their wood, &c., during the season of rest, and this process of hardening and consolidation is what is generally known by the term ripening.

three or four years after planting, as patches that have been undisturbed, flower much better, and grow taller than those fresh planted. Why? For the same reason as already stated, too late planting in the first instance.

§ 2. "As regards the evils of late planting, it would be folly to attempt to transplant the White Lily (*L. Candidum*) in October, as it will then be making active growth, and if the roots be disturbed, it will have the effect of wholly, or partially, preventing its flowering next year. This remark holds good with regard to all Lilies,* with the exception of a very few late-flowering ones. We see the green tufts of leaves shooting up from the White Lily bulbs before October arrives, and we can therefore imagine the activity that must be going on beneath the surface of the soil. With regard to other Lilies, we cannot see this, but experiments can lay open the mysterious underground workings of Nature, as plainly as the green tufts of leaves can be seen by the naked eye. At the end of June, 187€, I lifted and transplanted a number of White Lilies; they bloomed well during the next summer, if not better than those which had not been disturbed. At the end of October in the same year, I lifted and transplanted a few bulbs, each of five different sorts, including the White Lily; only three stems out of all I had transplanted came up the following season, and even these did not show the slightest signs of bloom. So much for early and late planting. The method of reproduction is different in different plants, but, as a general principle, it may be stated that a parent bulb is charged with the function of liberating germs or seed-buds,† which vegetate as soon as brought into a condition fitted for their growth. And this is, in general, about eight or ten days after the flowers of the parent bulb have faded.‡ It is very soon after this time, that we are enabled, by experiment, to observe the phenomenon called "*the three generations in one*," that is, *the parent bulb, now destined by Nature to perish, the new bulb within it, which is destined to bloom next summer, and the seed bud within the new bulb, which is destined to flower the year after that.* From this, it will be seen that a Lily is not an annual, nor is it a biennial, but a part of both, two years comprising the period of its existence from birth to death; it is certainly not a perennial, as some have called it. These seed-buds, as soon as they can be discerned, even by the aid of a magnifying glass, can, by a simple, though necessarily protracted,

* Dunedin's assertion is a little too sweeping, much depends on the character of the season, whether fine or dry, wet or cold, early or late; we should prefer planting after the first autumnal showers had begun to soften the ground, and before the later and heavier rains had stimulated root growth. In some years, Lily planting may be done well at the end of August and September, in other seasons, a month or six weeks later will suit better. *L. Candidum* and one or two others are exceptions to this rule, they start in the autumn, and their foliage is persistent all the winter. The majority of Lilies push up their foliage in April and May.

† With Dunedin's use of the term seed-bud, I do not agree; germs, offshoots, bulbils, or bulblets are admissable, as applied to axillary or root-stock buds, but the term seed-bud is a misnomer.

‡ A good time to remove Lily bulbs. But I should not consider them to be properly matured and fit for removal, during the period of inflorescence. From a fortnight after the flowers have faded, to a month, if the weather be dry, is the best time; after that period, growth will ensue as soon as the first heavy rain-fall takes place.

course of experiments, be followed in their growth distinctly, until they become flowering plants, leaving no room, whatever, for those who are otherwise biassed or prejudiced, to theorize on the subject.

§ 3. "It is a *fact* which science* has placed beyond a doubt, that, if Lilies do not all bloom at the same time, they should not all be transplanted at the same time. Beginning, therefore, eight or ten days after the Lilies which flower first have shed their bloom, we go on lifting and transplanting from time to time, until October, during the most agreeable part of the year, and during a period, too, when amateurs have a good deal of spare time on their hands, which might be turned much to their own advantage, and, at the same time, to the advantage of our professional growers."

§ 4. "I know of no other plants, though there may be some, which we can compare in their underground action with the Lily. Of it there is undoubtedly an annual bloom, but not from the same bulb, though many who have not studied the matter sufficiently, believe it is. From what I have already said, it may be seen, that while one bulb is flourishing in its first and only bloom, another bulb within it,—mark these words, 'within it,'—not outside, or offsets of any description whatever,—another bulb, a new bulb within it,—is progressing in its growth, so as to be enabled to bloom next year, in the place of the one now blooming, which will then be dead, thus keeping up a yearly bloom from successional bulbs "ad infinitum," if properly cultivated. There is, therefore, no foundation whatever for saying that, the same (?) bulb goes on living and blooming for an indefinite period, and then dies of exhaustion, or old age. A greater fallacy than this could not be uttered; for the term of a Lily's existence, from the period of germination, till the final decay of the plant, is so designed by nature, as not to exceed two years. It is, thus, that every year witnesses a birth and death; that is the birth of the seed bud, and the death of the flowering bulb, being the youngest and the oldest of the 'three generations in one' the new bulbs being always intermediate between these two."—*Garden, vol.* 12, *p.* 557.

§ 5. "Some Lily growers call the bulb 'the root of the matter,' but this is incorrect. The bulb is a permanently abbreviated stem, clothed with scales, which are imperfect, and thickened leaves. The new bulb does not send up a stem during the first summer, but elaborates what it receives from the roots into organic or nourishing matter, and stores it up for future use in the core, and in the cells of the scales born on the core, which enlarge, and becomes more fleshy as the nourishing matter accumulates. When vegetation becomes active in the following spring, the new stem and the successional bulbule within the new bulb, fed by this stock of nourishment, grow with great vigour, and the stem produces leaves, and at last flowers. When the plant has continued in flower for some time, longer or shorter, according to the quantity of nourishment stored up, the stock will then become exhausted, and by using the microscope it will be

* Dunedin puts it rather too strongly, he omits to give chapter and verse for his "fact," and I cannot recall any reference. Nature is generally elastic and accommodating, and, as but little new root growth is made by any Lilies (except *L. Candidum* and its allies) in September, we really have August, September, and most of October for our operations, and we can choose the time which best suits our own convenience.

seen that the cells in the scales have become emptied of their contents, and are now soft and flabby, the old roots being dead or dying. The scales then dry up, and the parent bulb entirely perishes, leaving it to the successional bulb to go through the same course the next season."—*Garden, vol.* 13, *p.* 592.

Core or Central Axis.

§ 6. "If we take a Lily bulb in the autumn, and cut it in two, right down from the apex to the base, it will be observed that it is composed of a core or fleshy part (*central axis, Baker*), more or less conical in the upper portion, and truncated below. This core gives rise, at its upper face, to fleshy scales, pressing one against the other, and to a central short stem (formed of leaves and rudimentary flowers), whilst from its lower face spring the root fibres. These root fibres, will be seen to emanate from the base of the stem itself and pass down through the core or fleshy part,* thus preserving a distinct connection between the stem and the roots, without interfering with the scales of the bulb, for these scales, if carefully picked off will be seen to have no connection whatever with the root fibres. The bulb itself, composed of the scales, is in fact, nothing more or less than the cradle, or nursery of the legitimate seed-bud, which imbibes its nourishments from the scales, through the core, until it has grown and become a fully developed bulb, capable of emitting a flower stem the next year."—*Garden, vol.* 13, *p.* 142.

§ 7. "I have in my garden, a bulb of *Croceum*, the progenitor of which I planted 35 years ago. During all these years I have watched this plant with more than ordinary interest, and, as I lifted and replanted it every year, I found that the fading flower stem was always attached to the fading parent bulb, and not to the new bulb, which appeared every succeeding year fresh, clean, plump, and crisp, with the scales firmly and closely set upon one another, while the scales of the parent bulb were discoloured, loose, and flabby. How far back the pedigree of this bulb could be traced, it is difficult to say, though, I believe, I could get evidence of 10 years more to add to the 35."—*Garden, vol.* 12, *p.* 557.

* This is surely incorrect, and would seem to imply that the central axis takes no part in the vital action, but that the roots proceed from the base of the stem through, and independently of the central axis, to collect nourishment for the leaves and flowers. We have pointed out before (page 4), that the upper set of roots formed in early summer at the base of the stem and above the bulb, provide support and nourishment for the stem, leaves and flowers, and that the lower set of roots emanating from the base of the bulb in autumn, provide nutriment for the bulb itself, and its requirements. Moreover, these last roots are active during the winter and spring months, at a time when the stem is in embryo; they are continued upwards throughout the central axis like the parietal divisions of an orange, and in spring when the stem is emitted, are continued upwards inside it. Such being the facts, we think impartial observers will consider the central axis or core to be the true *fons et origo vitæ*, emitting roots beneath, scales laterally, and last of all a stem above. This central axis we have always considered to be the centre of the life of the bulb; scales, roots, and stem, being adjuncts, and all capable of removal, and of reproduction by the action of the core itself. Whereas, in the absence of a core, neither roots or stem would live, and scales would have to reproduce an embryo bulb themselves, and perish in the act. But Dunedin, throughout his writings, discards the core from consideration, and if mentioned at all, as above, it is evidently looked upon as playing a very inferior part in the economy of bulb life.

§ 8. *Yearly Movement*—Elsewhere Dunedin has remarked.—"The bulb moves year by year in its new growth, or in the growth of the new bulb, further away in a direct line from the scars or sites of the growth of preceding years, unless unnatural growth interferes."*—*Garden, vol.* 14, *p.* 262.

§ 9. "There is another fallacy, which by long usage, has been so thoroughly engrained in the minds of many Lily growers, that I fear it will meet with much opposition before it can be completely eradicated. I mean the objection against annual lifting and transplanting. In order to solve the difficulty, it should be asked in the first place. Why annual transplanting is, at present, the exception, rather than the rule? Simply because there is a very general belief that the first year's growth and bloom after transplanting are inferior to the second, and that consequently annual transplanting would simply be encouraging a constant repetition of this inferiority. And so it would, if late transplanting is persisted in, and I admit that it would be an act of great folly to transplant the general run of Lilies annually, if we left them in the ground until 'the end of October, or the early part of November,' as a cultivator, in a book lately published, directs. But it would be the very reverse, if the transplanting took place soon after the flowers have faded. In dealing with Lilies in this country, we should never overlook the fact, that here they are under artificial cultivation; whereas, in their native places, nature has provided for them *everything*† that is requisite for their luxuriant and annual successional bloom. To those who may think that annual transplanting is an unnecessary trouble, or who may not care for superior bloom, the present system may be all in all. But, to those who would like to know that their favourites are doing well, and not left a prey to vermin, and, consequently, to retarded growth, the annual system is the best; for too well we know, that a clump of Lily bulbs, left two or three years in the ground—the dead and rotten mixed with the living and growing—is in this country quite a paradise for grubs, slugs, and every other pest that is destructive to the growth and flowering of the plant. In order, then, to sweep all such enemies out of our way, let us, about 8 or 10 days after the flowers have faded, lift the plants, and in doing so, take care of the new bulbs that are connected with the stem that have flowered, and are within

* If these movement views of Dunedin are correct, the inference drawn, logically speaking, must be that Lily bulbs are *locomotive*, and every year advance in one particular direction. This identical bulb of Dunedin's, the progenitor of which was planted 35 years ago, would be now, if it had been left undisturbed, at least a yard, perhaps two yards distant from where its progenitor grew. Is this the fact? My experience leads me to believe that Lilies are stationary, and that I shall find next year in the same spot, the plants (or if you will, their progenitors), that are now in bloom in my garden.

† Nature has in many places provided pigs and other long snouted animals to uproot the earth, &c., but I never heard it before hinted at that there was a gardening purpose in this operation, and that it was better for the bulbs to be thus uprooted and transplanted annually. Would Dunedin wish us to believe that as seeds are, no doubt, intentionally passed through the bodies of birds, and then deposited as dung in various new localities, and that thus plants are introduced into new regions: so doubtless bulbs or bulblets, passing through the intestines of pigs, are again deposited with their manure in new localities to perpetuate the race.

See also the opinion of our Indian correspondent, page 17.

the old bulbs, as that is the proof that these new bulbs are those which will flower next year. Let all other bulbs, large or small, be picked off and put aside for planting in a separate place until they also have flowered. Carefully examine the new bulbs, so as to make sure they are cleared of vermin, and when this is done, replant either singly or in clumps, in congenial soil, and leave the rest to nature. It is said by some writers that, 'Lilies are not ripe for lifting or replanting, until the growth ceases, and the stems and leaves die down,' but this is a fallacy which—whatever may be its value as regards Tulips, Hyacinths, and some other bulbous plants—is altogether inconsistent with the constitution of the Lily. I have cut down the stems when the plants were in full and fresh bloom, without in the slightest degree* affecting the growth of the new bulbs,

* Dunedin, here, pushes his theories too far.

Such Lilies as *Candidum*, *Excelsum*, *Martagon*, and in general all N. American forms, whose flower stems may be cut off, and yet leave ample foliage below for the requirements of the plants, would receive no damage from the operation of removing the flowers; but other kinds such as *Auratum*, *Umbellatum*, *Thunbergianum*, *Speciosum*, &c., whose stems are provided largely with foliage right up to the flowers, receive much injury by the ruthless cutting away of foliage, when removing the blooms for exhibition and decoration.

Compare on this head the remarks on pages 34, 47, and 87, also the following letters of Mr. Hovey, &c. :—

"We have found, after 30 years' constant experience, with thousands of bulbs of *Speciosum*, and its varieties, that the bulbs are injured or killed outright, just in proportion to the time at which cutting down is performed. If a plant be broken off in June, when 6—7 inches high, the bulb will die; if in July, the bulb will go off into divisions of small bulbs, and if in September, the bulb will be about half-size. Our autumnal exhibition always takes place about the middle of September, and we usually cut from 50 to 100 spikes, an operation which weakens the bulb so much, that they only produce a very few flowers the next year. In the case of any rare and choice kinds, we do not allow them to be cut on any account."—*C. M. Hovey, Garden, vol.* 13, p. 196.

"It does no more injury to cut away the flower stem of *Candidum*, when in full bloom, than it does to cut off the flower spike of a Hyacinth, or of a Gladiolus, the flowering shoot of an Amaryllis, or the bloom of a Guernsey Lily.

"The leaves are all left, and these are all that are needed to produce a sound and perfect bulb.

"If this were not so, it would have been discovered long ago; with Lilies, however, that have no leaves, only such as grow upon the flower stem, it is quite another, and a totally different thing. Nature points this out. If the flower stem of *Giganteum* be cut away, as soon as it makes its appearance, the leaves and bulb will increase in size; but if allowed to grow and bloom, it so absorbs the nutriment of both, that nothing but weak offsets, are the result.

"When the Hyacinth growers of Haarlem, tell us that the bulbs, are just as good, when the foliage is all cut off: or the Gladiolus cultivators of France, that cutting away the leaves does no harm or when the Amaryllis growers destroy all their leaves, I should believe that cutting down such Lilies as make no root or bulb leaves, does no harm. As to *Candidum*, when the flower stem is cut away, the bulb is greatly benefitted, just as removing the flowers or buds from any plant increases its growth and vigour; the leaves all remain, and it is these that nourish and sustain the root."—*C. M. Hovey, Garden, vol.* 13, *p.* 387.

But by the removal of the flowers only, and not the leaves, the exhaustion of the effort of producing the bloom, and of the production of seed, is avoided; consequently by leaving the foliage unmutilated, you contribute greatly to the growth and development of the new forming bulb. On this head compare the following remarks :—

"I find removing the flowers, throws the whole energy of the plant into the stem, and as a consequence, far finer bulbs are the result; this I discovered accidently, in 1865. Mr. Ray, the late Curator of the Dean Cemetery in Edinburgh, had a very fine bulb of

which, at this time, are themselves sending down roots,* by which they can gain subsistence sufficient to make them independent of the parent bulbs. Those who have carefully studied the connection that exists between the old and the new bulbs, will understand this. When lifting, I prefer leaving a portion of the stems in the old bulbs, as they make a convenient handle for moving the new bulbs about, without rubbing and breaking the scales with the hands. If this plan of lifting and replanting annually, were adopted, I will venture to say, that the result would be far better than by leaving the bulbs in the ground for some years undisturbed. It seems to me to require no science to tell us this. If we leave the bulbs in the ground for a few years, what can we expect? the offsets, instead of being removed, are growing and drawing the essential principal of life out of the expectant flowering bulbs;† and these offsets, transformed into bulbules, will also generate offsets, so that all combined to the second and third generations, will be drawing vitality from the fully-developed or flowering-bulbs; the very reverse of what we have in view in giving periodical supplies of nourishment in the shape of mulchings, top-dressings, etc."—*Dunedin, Garden, vol.* 13, *p.* 28.

§ 10. "Is a Lily an annual or a perennial, or is it between the two, a biennial? A Lily is not an annual, a biennial, nor a perennial. Then what is it? It may be said to be somewhat like two biennials joined together, but, overlapping one another in their growth; that is, one portion blooming this year, while the other is growing, preparatory to blooming next year."—*Garden, vol.* 13, *p.* 385.

Auratum, which produced seven flowers — then thought something wonderful—and, according to the usual practice, he placed it, after blooming, under a stage, and allowed it to stay there until next March, when he determined to repot it. On examining it, he was surprised to find the pot full of new roots; he gave it a good shift, without disturbing it more than he could help, but May came before there were any signs of a stem, and when one was found, it was only half as strong as that produced the previous year, and the top was deformed. This ultimately got broken off, when the stem began to thicken enormously, so that by autumn it was more like the stump of an Hollyhock, than that of *Auratum*; besides, it formed a number of young bulblets at its base, and at the *axils of the leaves*, all indicating its great strength. It was allowed to remain undisturbed that winter, and next spring it threw up a magnificent shoot 5 feet high, and produced 35 perfect blooms on that one stem. This, which was thought something extraordinary, was noticed in all the Edinburgh newspapers, and visited by the late Mr. MacNab, and I may safely say, by hundreds of others. It really was magnificent, and even now, when I have seen hundreds of fine examples, I have never seen one which I have admired more than I did that one, or one more perfectly formed. It taught me that a year's rest from blooming, gives strength, and does no harm, and finally, that *bulblets on the stem, show signs of vigour, and must be considered to be a natural method of increasing the plant.*"—*Edina, in Garden, vol.* 15, *p.* 82.

* Surely the tender ends of these new roots would be damaged and broken by the process of lifting.

† I beg again to differ. I have not found in the autumn, many offsets, either on the stem, or about the bulb, as large as a pea, without roots of their own; these offsets, as soon as they are as big as a nut, which does not take many weeks, have 3 or 4 long roots of their own, and are quite capable of taking care of themselves, without drawing the vitality from the flowering bulb, which, according to Dunedin's views is one year old, and one year bigger than themselves, and must perish itself in the following autumn. How, then, can it be deprived of vitality by the *2nd and 3rd generation?* Dunedin forgets his biennial theory; the fact, is simply this (*see* p. 14), that bulbs when at home increase and multiply, so that every 3rd or 4th year, they must be lifted, separated, and planted again with sufficient room for each bulb. More than this is nonsense.

§ 11. "The origin of a Lily bulb is a germ or seed-bud.* Nature causes this to grow or vegetate the first year, to bloom the second year, *and then it dies, leaves, stem, scales, and roots, all perish.* Such is the short span of the existence of a Lily bulb. If a bulb that has flowered is taken up, say late in the autumn, and cut in two, vertically, it will be seen that it has, within itself, three distinct generations, that is, a portion of the parent *bulb*,† which has flowered, the whole of a new *bulb*, which Nature destined to flower the following year, and a germ or seed-bud, which was intended to grow up a full-sized bulb, and flower in the next year but one. At this time, the autumn, the seed will be so minute, as not to be perceptible without the aid of a magnifying glass, but, if a similar bulb be taken up in January next, and dissected, the seed-bud will then be perceptible to the naked eye, as it will be about the size of a canary seed, and will, if the scales are picked off carefully, be found in the axil between the inmost fleshy scale and the base of the new flower stem. In February, it will be six or eight times larger, and will continue to grow, until, in the next autumn, it will be found to be as large as the new *bulb* was, at the same time in the previous year. By a very simple experiment, it may thus be proved that the old *bulb* of this year, after having flowered, and after having all the sap absorbed from its scales for the nourishment of the new *bulb*, decays and dies. In like manner, its successor, the new *bulb*, flowers the next year, decays and dies. And so on, one generation following the other, year after year, all having emanated from germs or seed-buds. Then, how can it be said with truth, that "the bulb, which has flowered, has ever flowered before?" Or with what truth can it be said that "the bulb, that has flowered one year, will ever flower again?" I cut open a bulb last month (January, 1877); it is now considerably decayed by exposure, but still may be seen the seed-bud at the base between the scales, and a portion of the new flower stem. I have also a portion of a bulb I took up only two days ago (February): it is a very fine fresh specimen, as I was careful in picking off the scales. At the base of the flower stem, which was destined to flower this year, may be seen the seed-bud, eight or ten times larger than in the preceding specimen, showing the comparatively large increase in growth which it has made in only one month. This seed-bud was destined to become a full grown *bulb*, and flower in 1878.

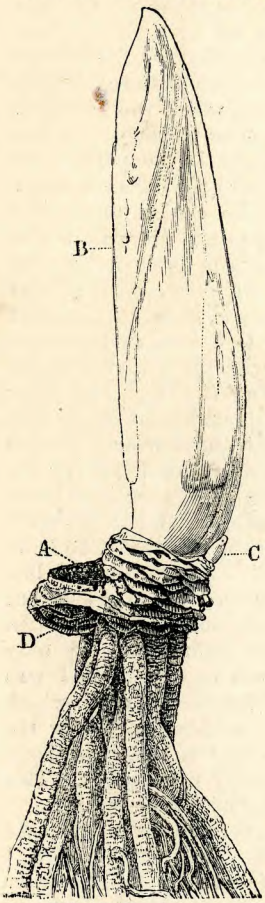
§ 12. "The plan that I adopted in order to trace the progress of the seed bud as it grew up into a fully formed *bulb* was this. In October, 1873, I lifted some fifty thoroughly matured bulbs, and replanted them in a piece of spare ground. In January, I commenced by taking up two or three, cutting the bulbs vertically in two, and otherwise dissecting them for the

* For my objection to the term seed-bud, *see* page 187.

† Dunedin has here put a too limited meaning to the use of the word "bulb." Lily growers, and the public generally, in common parlance, when speaking of Lilies, or other bulbs, flowering year after year, include in the term "bulb" both old and new growths, roots, stem, if any, sometimes flower, in fact, the whole plant. It may not be strictly accurate, but it is the case. Dunedin, however, frequently restricts the meaning of the word "bulb" to scales only, excluding roots, stem, and rhizome.

I have, therefore, italicised the word "*bulb*" wherever, it seems to me, it is used in a restricted sense, and, if my readers will, in their own minds, there substitute the word "growth" for "bulb," I think Dunedin's meaning will be made more clear.

purpose of my experiments. In this month, I found the seed bud, as I have said, about the size of a canary seed. In this manner I continued to lift two or three bulbs every month up to the following October, in flower or not, as the case might be, and noticed the progress of the seed bud until it had grown up similar in size to the one I had cut and laid open for inspection in the previous autumn. By this simple experiment, it may be proved in the most satisfactory manner, that the parent *bulb* of this year, after having flowered, and after having all the sap absorbed from its scales for the nourishment of the new *bulb*, decays and dies. In like manner its successor flowers the next year, decays and dies; and so on, one generation following the other, year after year, all emanating from germs or seed buds."



Lily Bulb, from a Photograph.

A.—The seat of the stem that bloomed last summer.

B.—The new flower stem.

C.—The young seed bud.

D —The mark where the old roots have been.

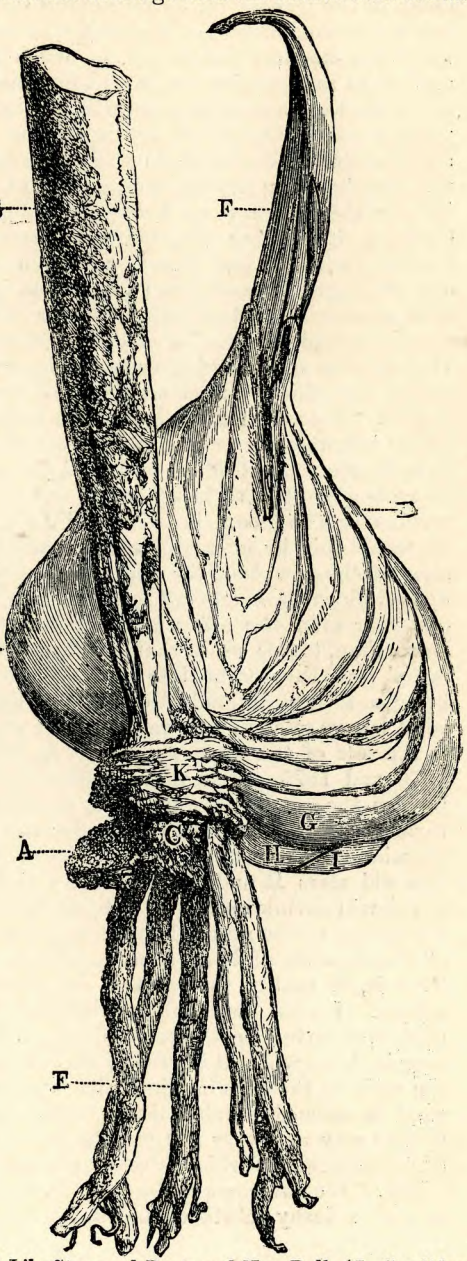
Want of space prevented the roots from being shown in their length and abundance, as in the photograph.

§ 13. The annexed illustration is taken from a photograph, one of six skeletons, the bulbs for which purpose I lifted on the 1st of January, 1878, and dissected in the presence of a Lily grower, so that there cannot be any doubt of its being a genuine representation of the underground interior parts of a Lily, exhibiting plainly the phenomenon or mystery of three generations in one, to which I have alluded. By looking at the woodcut, it will be seen that the seat of the stem which has bloomed last summer is on the left at A; the mark underneath this part, at D, will show where the roots of last summer have been, but now, both stem and roots are entirely gone. In the middle, at B, is the new flower stem that was destined to bloom next summer; and on the right, at C, is the young seed-bud that was destined to grow up and flower the following year, that is, in 1879. The healthy, strong, and numerous roots, which spring from the new *bulb*, and are here truly represented as those of 1st Jauuary, ought to convince any one that it would be ruinous to their growth, and hurtful to the plant itself, if disturbed and checked late in the season by lifting and transplanting."—*Garden, vol.* 13, *p.* 143.

§ 14. In further illustration of Dunedin's views, I have, by the kindness of Mr. Robinson, included the woodcut on next page, and Dunedin's paper thereon:—*From the Garden, vol.* 14, *p.* 237.

Through the kindness of the Editor of the *Garden*, we are enabled to make use of this woodcut, as illustrating Dunedin's ideas. Compare also the woodcut on next page.

"The accompanying woodcut is taken from a photograph, sent by me, of a bulb of *Candidum*, which was lifted out of the ground one month after it had bloomed in the present year, 1878. A, shows the scar on site of the stem of 1877; B, the old stem of 1878; C, the remains of the roots of the old stem of 1878; D D, the new *bulb*, having a large slice cut off it to lay open its interior formation; E, the roots of the new *bulb;* these were from 5 to 7 inches long, with fine, fibrous rootlets, but they were unavoidably broken off in the lifting; F, the radical leaves, peculiar to this Lily, being the precursors of the stem of the new *bulb*, which was destined to bloom in 1879. These leaves, springing up so early and so close to the remains of the old stem, now decaying, give rise to the mistaken idea that this Lily is an evergreen. G H I, are scales of the old *bulb* which were left in dissecting in order to show how the new *bulb* sits in the midst of them until they decay and wither off; K, shows the remains of the scales of the old *bulb* which were picked off to uncover the new *bulb*. As to early lifting and replanting, that is to say, early after blooming, I would direct attention to the progress which this Lily has made in only one month from the time when the flowers of the parent *bulb* had faded. The new roots had penetrated from 5 to 7 inches into the soil, and, as seen in the woodcut, the radical leaves had grown 2½ inches above the apex of the new *bulb*. Even at this early period the roots were broken in lifting the bulb out of the ground.



Old Lily Stem and Roots and New Bulb *(L. Candidum)*.

§ 15. "Let me now add one or two remarks on the annual decay and death of the plant. M. Max Leichtlin says: (*see* page 205) 'If 'Dunedin' has a correspondent in California who can send him a bulb of *Washingtonianum* carefully taken out, he will observe that his theory cannot be applied to that species, for he will find inserted in one long sideway-growing bulb the accumulated growth of eight or ten years.' Now, to me, there is nothing extraordinary in this, for the climate and soil of California are peculiarly favourable to the preservation of the phenomena alluded to. Compare the equable temperature of California with the land we live in. In this country we have the temperature of summer and winter differing by 50° or 60°, liable to great extremes, such as long and variable winters, and short, uncertain summers. Yet with all these disadvantages I have found Lily bulbs in my underground explorations with an accumulated growth of four or five years upon them. (? ?) As to the "sideward growth" of *Washingtonianum*, which seems to have struck M. Leichtlin as something remarkable, he will yet find, on close examination, that this is characteristic of all true Lilies.

§ 16. "Let your readers look at the woodcut (page 195). We have at A, on the left, the scar or site of the stem of 1877; on the right side of it we have B, the stem of 1878; and at C, immediately under K, the remains of its roots. On the right side of B and C we have D, the new *bulb*, which was destined to bloom in 1879; and if the new *bulb* were further cut away, we would find by microscopic observation, on the right, but close to the stem of the new *bulb*, the germ or seed-bud which was destined to grow up and bloom in 1880—all moving by a 'sideward growth' to the right, one year after the other, as M. Leichtlin describes *L. Washingtonianum*. Here, then, before us in that woodcut we have an accumulation of three years' growth presented to our view at one glance, the germ or fourth being unseen by the naked eye. Now let the reader picture to his mind what I have seen in my underground explorations, namely, an extension to the left of two more scars like A, being the sites of the old stems of 1876 and 1875. This would make in all five years' distinct growths, besides the germ, all moving in a 'sideward-growing' direction to our right. Before, however, the reader can realise this satisfactorily, let us examine the composition of that part of the plant which we see before us. The old stem B and the old scales G H I (the old roots being already gone) will shrink up and be entirely lost in our cold and damp soil before the spring comes round, leaving no traces behind but the site in the core of the old stem of 1878, as at A. Then, what becomes of the core itself? This is, in reality, the question in difference between M. Leichtlin and myself. I need not explain, what the stem is composed of, as it can be seen, that during September, it has been fast hastening to decay, especially near its base, where it is greatly shrunk up. With respect to the old scales, the walls of the cells in which the sap has been stored being composed of what is termed cellular tissue, resist for a time, but even these have to give way in a very few months to the all powerful effects of decay, the commencement of which is easily recognised on the points of the scales.

§ 17. "We now come to the core. In the new *bulb*, the core has the appearance of a fleshy substance, but in the old *bulb* it resolves itself into a kind

of woody fibre, and then it becomes almost fossilised, somewhat like the hardened root-stock of the Common Ginger. The scar A was left on the core in 1877, more than twelve months ago, but a double one I met with three weeks ago, in the presence of a friend, showed that the outer one must have been the scar of 1876, left there more than two years ago. If, then, in our own country, we sometimes meet with four or five years' growth ranged sideways—and this is the invariable rule with all Lilies—malformations excepted—is it anything to call forth wonder, that in a land so highly favoured as California, there should be found inserted in one long, sideward-growing bulb (successional *bulbs*) the accumulated (successional) growth of eight or ten years.*

§ 18. "There is sometimes more than one seed bud, which grows out of the new *bulb*, altogether independent of the parent *bulb*, and this gives rise to the phenomenon of what is properly called twin bulbs. As an illustration, I have a *Speciosum* bulb which I took up last October and cut in two. It is now shrivelled up by exposure to the atmosphere, but still I can see two finely formed twin *bulbs*, and behind, and entirely distinct from them, is the decayed stump of last year's flower stem. These *bulbs* are equal in size, and show each the rudiments of a new flower stem, and had the parent *bulb* been left in the ground or replanted, these bulbs would doubtless have both flowered this year. If the parent *bulb* had been allowed to remain in the ground, these twin *bulbs* would have been much larger than they are now, and the remains of the parent *bulb* in the ordinary course of nature, would have been dead and gone by this time. Then, how can it be said with truth, that the *bulb* that has flowered, has ever flowered before? Or with what truth can it be said that the *bulb* that has flowered one year, can ever flower again? I have said, that if a bulb that has flowered, be taken up late in the autumn and cut in two vertically, it will be seen that it has within itself, three distinct generations; to this it may be important to add, that at no other time in the year do such phenomena appear. If this, then, be steadily borne in mind, many points which at present, appear to be wrapped in obscurity, may easily be resolved. Hitherto, it has been the habit to call a bulb taken up in October, the parent *bulb*, but this is not, physiologically speaking, strictly correct. The parent *bulb* at that time is the new *bulb*, which is within the old one, as the new *bulb* has just then given birth to a young one in the form of a germ or seed-bud, while the old *bulb* itself is on the eve of dissolution. The old *bulb*, so often called the parent *bulb*, has no immediate connection with the young seed-bud; the old *bulb* gave birth to the new *bulb*, and it is this new *bulb* that has given birth to the young seed-bud, which will grow up and flower the year after its own parent has bloomed. There is no genus in which the position of the seed-bud varies so much as

* It seems to me, here, that Dunedin contradicts himself. He has before, stated that the bulb after flowering disappears entirely, leaving a new bulb growing out from its centre to take its place. He here speaks of the accumulated growth of eight to ten years in California, and of four to five years' growth found in his own explorations, and in the woodcut figure he shows the core of the previous year 1877; and speaks also of those of 1876, and 1875, thus, clearly acknowledging that the core in part, at least, does not disappear every year.

My own views in full on these points are given on page 203.

in the Lily, the greater number originate low down in the centre of the new *bulb*, within less than a ¼ of an inch of the base of the *bulb*; some originate further down the centre, and others are formed at a distance from the parent *bulbs*, to which they are attached by an underground or creeping axis.

"All, however, spring from a familiar source, that is, from germs or seed-buds, and these in October, are of so delicate and tender nature, as to be in the highest degree liable to injury from drying, exposure, or other adverse circumstances.

§ 19. "Newly imported bulbs are not worth a tenth part of the value of bulbs 'freshly taken up' out of a respectable nurseryman's grounds, and guaranteed by him as having flowered the previous season. It is comparatively of little consequence what the quality of the bloom may have been, provided it was healthy, and that the leaves and stems decayed and died down gradually in the ordinary way, for it is the new *bulb* within the old one that is now to be depended upon, and that, and its successors, may go on gradually rising in the scale of perfection, through judicious culture.

§ 20. "Cutting off the roots is the source of more evil than can be foreseen or imagined; in such a case, let me again remind your readers, that a Lily bulb, in the autumn, has, within itself, three distinct generations, and that the third generation is the germ or seed-bud, which is intended by nature to bloom during the second season. At the time for lifting and re-planting, the seed-bud, as I have shown, is very delicate and tender, and so minute, that it cannot be seen without the aid of a magnifying glass. I have also shown, that in some bulbs, its position is within less than a quarter of an inch of the base of the *bulb*. If, therefore, the roots, young as well as old, be cut off, the tender seed-bud is exposed to the drying effects of the atmosphere and other evils, the result of which is that, in nineteen cases out of every twenty, its vitality is destroyed. The new *bulb*, or second generation, may bloom, though not strongly, as it has to make fresh roots; but any chance of future bloom in the seed-bud is completely gone. It is thus that so many complaints have arisen about imported bulbs; some bloom once, though weakly, and some do not bloom at all. How can they, if kept dry all the winter, and planted as late as January or February?"—*Garden*, *vol.* 11, *p.* 175.

§ 21. It will be seen from the subjoined extract that Dunedin not content to apply his seed-bud theory to full grown bulbs, pushes the application of it to bulblet offsets, and seedling bulbs from the first year of their existence, contending that even these little bulblets perish every year, and are replaced by larger successional growths. "There is not one in fifty Lily growers but believes that the same identical offset or seedling goes on year after year growing larger and larger, until it becomes capable of developing a flower-bearing stem. Now, this is entirely erroneous, and clearly contrary to facts; experimental researches have proved beyond a doubt that there is no such thing as a two or three-year-old offset or seedling, the existence of an offset being comprised within the first season of its growth, after which it decays and dies, having thus fulfilled what Nature had destined to be its office. In the

meanwhile, however, a successor is growing up within the original offset in the same manner as the legitimate seed-bud or bulbule is growing up within a fully developed adult bulb, with this exception, that, every season, Nature clothes the succcessional offset bulbule with new and more numerous scales, the original offset not having had a covering of more than some six or eight scales, according to the class of Lily to which it belonged. The first appearance from the offset above ground is not a stem, but generally one or two leaves attached to a long slender stalk or petiole. If lifted out of the ground, the offset will be found to be possessed of slender rootlets, these having been protruded from the base of the offsets before the leaf and its stalk began to rise, or, indeed, before there was the slightest appearance of their rising. The next season we see in a bed that has been originally planted with genuine offsets a very slight stem shooting up, furnished with a few leaves. This is a sign that a germ in the centre of the original offset has vegetated into a seed-bud; for without the presence of a seed-bud there can be no real stem. The next season the stems will appear larger and more fully developed, and the bulbules, if dug up, will be found to be also larger, with more scales, and with new and more numerous roots—the site of the decayed stems and roots of the previous season being distinctly visible on all the bulbules. This process goes on year after year until the bulbule, which may now be called a fully developed bulb, produces a flower-bearing stem. All this is, to the Lily grower, worthy of the most attentive study, as the first thing that must strike the reflecting mind, is the harmony that exists, in what we are permitted to contemplate in the Lily, namely, the singular similarity in the organisation of all the kinds that are really true Lilies. With respect to the little bulbs, while only small offsets, they have by some been called side-buds by way of contra-distinction, and have also been called the principal reproducers of their class. Now, some of them may be called side-buds, though more properly small offsets, but they all differ widely from the true legitimate reproducers—the central seed-buds. The central or legitimate seed-buds are growing up, not at the side, but in the very centre of the parent *bulbs*, and will, most certainly, without changing their identity, flower the season after the parent *bulbs* have bloomed, unless something unforeseen should happen to them; that is, they will germinate, grow up, bloom, decay, and die, all within two years; while the side-buds or little offsets, which have no fixed place for their appearance at any time, will change their identity, by being transformed by a new creation every year, and will not take less than three or four years before they can, through their transformed successors, develop flower-bearing stems. These side-buds or little offsets are the means which Nature has placed in our hands for the purpose of propagating and multiplying the species, but not for the purpose of reproducing that which is lost, namely, the parent *bulb*, or the *bulb* of the previous season. The reproduction of that *bulb* is due alone to the central seed-bud; for this bud, the instant it has germinated, is provided with all the organs of vegetation that the full-grown Lily possesses, and is, in fact, a miniature resemblance of an adult bulb. This should teach us that if we desire to ascertain whether a plant is a true Lily or not, we should carefully examine the organic

interior structure of the bulb, as well as the flower itself. These side buds, though they have been made a great deal of by some writers, cannot be placed under any other category than that of 'adventitious buds,' for they present themselves without any order, and the exact spot where they may present themselves cannot be foreseen. It will, therefore, be seen that those who deal with the propagation of the Lily by seed, bulblets, or buds in the axils of the old scales entirely overlook the marvellous organ and its functions which Nature has provided for carrying on the hereditary reproduction of the plant, for the central seed-bud alone is all-sufficient to continue to reproduce annually the Lily and its bloom, even if seeds, bulblets, and all sorts of adventitious buds were never to have any existence. In fact, we every year see this result in our gardens, though we never dream of searching or looking for the cause.

"As a practical, and almost tangible, illustration of the truth of what I have said, I annex a photographic representation of the interior and reproductive organs of offsets, bulbules of one, two, and three years' growth, and fully developed bulbs, collected during the first two weeks in May last from clumps of a dozen or more distinct species of Lilium proper."—*See* paper and woodcut in *Garden, vol.* 14, *p.* 60.

REPRODUCTION OF LILY BULBS.

§ 22. "The act or process of reproducing that which has been destroyed is, with respect to the cultivation of the Lily, well worthy of the careful consideration of all Lily growers, more especially as we see at the present time that opinions differ most widely with regard to the wonderful operations of nature in the reproduction and increase of these deservedly popular plants. We are told that a new bulb, whether grown from seed or bulblets, takes not less than three years, under the most favourable circumstances, before it developes a flower-bearing stem. We are also told that raising seedling Lilies is a long process, as one must wait from three to ten years ere they bloom, and we are moreover taught to believe that it is this very same seedling or bulblet that grows year after year larger and larger, until it becomes a flowering plant, and that the bulb goes on then living for an indefinite number of years, sending up each year a flower stem from its centre. This may appear to many to be a very plausible doctrine, but how it has become the belief of so many Lily growers is difficult to understand. If we lift a clump of Lily bulbs we often find a whole colony of small bulbs, popularly, but without discrimination, called offsets. When we carefully examine them, however, we find they are not all real or genuine offsets, but that they consist of offsets and the offspring of offsets, properly called successional bulbules. A genuine offset is not furnished with all the characteristics of a fully developed bulb, but, though deficient in some respects, it is possessed of this important function, namely, the power of generating a successor in the shape of a bulbule or small bulb. With respect, therefore, to the powers of reproduction, it is important to bear in mind that no plants or animals come into existence without a parentage. An offset no larger

than a pea may during the ensuing summer send up above the soil a slender stalk a few inches in length bearing what may be called a seed-leaf, but this identical offset will never send up another stalk; this becomes the duty of its offspring, the successional bulbule. Nature causes this operation to be repeated season after season, each successional bulbule growing larger than its progenitor, until a fully developed flowering bulb is the result. If any of the successional bulbules be carefully examined it will be seen that the stalks or stems of the preceding season did not emanate from them. De Candolle has said, 'If we desire to know more of the plant life in its higher bearings, we must live with, and observe the cycle of plant growth in all its stages, from the germination of the seed to the full development of the fruits.' For myself, I can truly say, that I have almost literally complied with this injunction. For many years I have lived with, and have been in the habit of watching the underground life of the Lily, from the most minute seed bud, and the smallest offset, to their full development as flowering bulbs, and even after that. In order to do this satisfactorily, I have planted, from time to time, in distant places, hundreds of offsets, as well as fully developed bulbs, and have watched their progress, winter and summer, by taking up a portion now and then for examination by dissection or otherwise. *The result of this has been to me full confirmation that no individual offset, bulbule, or fully developed bulb lives for another season after having once sent up a stalk or a flowering stem.* Take a bulblet in the autumn that has been produced on a bulb bearing stem, and carefully cut it open, at the very core will be found a seed-bud, in every respect similar to one that will be found in a flowering *bulb*, in the axil formed by the inner scale and the base of the flower stem. In the case of the bulblet it will take more than three years before its successional bulbule is sufficiently developed to throw up a stem that will bear even one flower. In the other case, the seed-bud, which is contained within the flowering *bulb*, will not take more than twenty months before it blooms, possibly more perfectly than its parent did before it. How is this? The seed-bud in the fully developed *bulb* is nourished by that *bulb* as its parent, and its growth is consequently so stimulated that in eight months from its germination it is shooting down strong healthy roots, 3 or 4 inches in length, mixed up with those of its parent, and through these, its own roots it receives additional nourishment, while the parent *bulb* continues still to nourish its offspring for some time longer. All this time the little bulblet is left to starve or provide for itself. What can it do, for it is still alive? In order to preserve its life nature directs it to send down two or three slender feelers in the shape of thread-like roots, in search of such food as the soil can supply, and such as is fit for it in a young state. Its further progress, until not it, but its successional bulbule, has arrived at a state of full development, I have already described when treating of the progress of an offset, for an offset, if carefully dissected, will also be found to be possessed of a similar seed-bud. It is from a careful study of this part of the subject that we learn that an offset or bulblet has to go through a distinct and different stage or transformation every year for a length of time, before it can arrive at the

stage of being a fully developed flowering *bulb*, whereas the seed-bud in the flowering *bulb*, which is graduated in the autumn, will in eight months be sending down strong roots, in two months more it will be nearly of adult size, and in six weeks from this time it may safely be detached from the decaying remains of its parent, and transplanted, if necessary, where it will bloom next summer. The rapidity of growth in the new *bulb* is not generally known, and has, therefore, given rise to very mistaken notions on the part of those who dip little deeper than the outward appearance of the bulb."—*Garden*, *vol.* 12, *p.* 505.

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§ 23. "I cannot agree with Dunedin in all his views, yet considerable weight must be attached to the statements of a Lily cultivator, who, in his own words, 'has for many years, lived with, and been in the habit of watching the underground life of Lilies, from the most minute seed-bud and the smallest offset, to their full development, and even after that; and who has planted, for this purpose, hundreds of offsets, as well as fully developed bulbs, and has taken up a portion, now and then, for examination by dissection or otherwise' My own views are as follows; that new growth (*see* page 14) takes place every year from a bud or buds at the base of the (flower) stem. I do not always find these situate in the exact place pointed out by Dunedin in his woodcut (*see* page 194).* I found, in March, in several bulbs of *Umbellatum*, the base of the old stem alive, and pink-coloured, and with a bud between it and the new stem, and, it is quite evident, that in many Lilies there must be numerous buds started into growth, as we frequently find three, four, and sometimes five, or even more, new growths starting from the centre of a bulb, numerous bulblets, arising from injured scales, and also from the side of the central axis, even to the number of fifty or more, and this always takes place, more or less, when a bulb breaks up, or in other words, happens when its stem-growth has been destroyed, either by cutting down wilfully, as 'Amateur' did (*see* page 57), or by accident, or by sharp spring frosts; therefore, I cannot lay the stress that Dunedin does on the germ of the future growth being *always found in one and the same place*; in fact, he states (page 197) that 'there is no genus in which the position of the seed-bud varies so much as in the Lily.' It is much to be regretted that Dunedin did not always state on what kinds of Lilies he had experimented. It is quite clear that *Martagon* growth is very different from that of the *Archelirion* group, to which latter, I should suppose his remarks chiefly apply; while the growth of the Rhizomatous section, such as *Pardalinum* and *Superbum*, and that of the *Thunbergianum* section, have each special differences; the habit of *Giganteum*, again, is peculiar. This Lily, *Giganteum*, either when grown from offsets or seed, builds up its bulb, year by year, larger and larger, making fresh internal growth until it arrives at a flowering size, in from three (from offsets) to five years (from seed); during the process of flowering, the old bulb then and there disappears, seemingly drawn up and absorbed in the gigantic stem-growth, leaving from 3 to 5 or more offsets, about the size of a large

* In *Garden*, *vol.* 11, *p.* 260, Dunedin writes "the true or legitimate seed-bud has a predetermined or settled position in the parent *bulb*, namely, on the opposite side of the old flower stem, the new flower stem being always between them."

walnut, clustered around its base, but, in November, the parent bulb has disappeared. *Canadense* and *Superbum*, on the contrary, present a different type; from a horizontal rhizome, a fresh bulb or bud-like growth is annually put forth (*see* page 82) to flower the succeeding year, and disappears the following (third year) quoad its scales; but I have not been able to satisfy myself that the rhizome dies then; I believe it puts forth new buds to form the successional growths, and this leads me to point out where I think Dunedin has overstated his case. We may lay it down as a general rule in Lily bulbs, that a fresh central scale growth occurs normally every year, starting probably from one or more central buds at the base of the flower stem; but that other lateral buds may likewise be developed and forced into action. This central growth, known by its fresh light colour, pushes and widens out the old scales, some of which, after a time, decay, or are fed off, or are detached and form new bulbs, or may be absorbed; within this new growth, is developed the flower stem of the succeeding year, and likewise the germs of future growth; and, so far I agree with Dunedin, that, without new growth in the preceding year, no flower can be expected. But—and Dunedin says nothing about this—what becomes of the central axis? The root stock or main axis, vertical in the case of the squamose perennial bulb, such as *Dalmaticum* and *Wallichianum*—horizontal in those of *Puberulum* and *Superbum*—oblique, as in those of *Humboldtii* and *Washingtonianum*, is an important factor in the problem; from Dunedin's statement (*see* page 196), I infer that he believes, that this perishes annually; my observations have led me to believe, that, whereas the scales may perish and are renewed from time to time, the central axis or root-stock is just that part of the Lily that maintains its growth for a much longer season, putting forth new buds each year, to perpetuate its form, but justifying the common remark, so strongly repudiated by Dunedin, that the same Lily continues to flower year by year.* In *Giganteum*, I think we may safely infer that root-stock life is limited; the prolongation of the bulb into that stout gigantic stem, seems to absorb the strength of the plant, and only a few lateral buds start into action; but, until the flower stem is thrown up (and I think that we may

* "Some Lilies, notably *L. Pardalinum*, are so markedly rhizomatous that, while the scales decay after one year, the root-stock and base of the decayed scales remain for at least three years (I have not observed this bulb for a greater length of time). In one instance the root-stock, growing horizontally, divided into two equal parts, the two ends clothed with scales being still joined by a fresh and succulent stem.

"This Lily then (*Pardalinum*), is neither a simple bulb nor does it die and renew itself entirely even in two years. On the other hand, only last week I found the young growth from a bulb of *Testaceum* actually growing up inside the decayed flower-stalk of last year, and blanched in consequence. This points clearly to the upward and unbroken growth from the core of last year, which was so exactly under the flower stem of last year as not to have swerved in the least from one side or the other. In this hybrid the scales of more than one season's growth are visible in autumn very distinctly, if a bulb be mutilated one year, and examined the next autumn. In a third instance there appears to be a total change both of scales and core in a year's time. The different ways of reproduction in Lilies are so marked that it alone would afford subject matter for endless remarks and controversy. I venture, therefore, to suggest that, in default of a better word, the term rhizomatous bulb might best explain the somewhat contradictory characteristics of what have been hitherto called Lily bulbs."—*E. H. Woodhall, in Garden, vol.* 15, *p.* 227.

say this also of all offsets and all seedling Lily bulbs), a continual growth of this axis takes place, and from it are developed fresh scales and buds; but that after flowering, the core degenerates more or less, and requires renewal. I do not, therefore, agree with Dunedin (*see* pages 198 & 201) that bulblets (even when seedlings) die year by year to be replaced by fresh growth, but, I hold that the centre of life resides in the axis, and that this developes scales and buds, growing year by year, till at length new growth has been developed strong enough to throw up a flower stem; at the base of this flower stem, the axis originates a bud or buds, clothed with scales, which, remaining connected with the axis, is developed into a growth, destined to prove the flowering crown of the succeeding year, and that this process is continued year by year, by the same root-stock, and, if this be true of the squamose type, I think it will be more plainly seen, as I have before hinted at, in the rhizomatous bulb of *Superbum*, and in the oblique bulbs of *Humboldtii* and *Washingtonianum*. I am also pretty certain that the old scales disappear at varying intervals in different Lilies, thus, in *Giganteum*, the old bulb scales are gone after flowering in the autumn; in *Superbum* and other rhizomatous kinds, they are to be seen there in March, and probably, for some months later; in *Speciosum* and *Auratum*, I have seen old scales in October and November; while, in the *Martagon* group, I have seen scales that were, in my opinion, certainly two years old. Therefore, I cannot accept, in all its entirety, as applicable to all Lilies, Dunedin's statement of a yearly renewal of the whole Lily bulb.

§ 24. I would rather again quote Mr. Baker's definition;—"Throughout the tribe the bulbs are strictly determinate and monocarpic, the main axis elongating into a flower bearing stem, and the bulb, the cycle of existence of which is from one to three years, either dying or remaining, but in either case developing a new bulb in the axil of one of its scales (or at the base of the flower stem). In a perennial squamose bulb the old scales remain, and a new bulb is developed into a flower stem in their centre, and all the numerous flattened scales of the bulb possess potentially, the power of developing new bulbs in their axils, and will do this in some species at any rate under cultivation. But in a state of nature there is only one new flower bearing stem developed each season from the centre of the bulb, and a few from the axils of the decaying outer scales. A new bulb, whether grown from seed, or from bulblets, developed in the axils of the above ground leaves of the floriferous stem, or produced in the axils of one of the bulb scales, takes not less than three years under the most favourable circumstances before it developes a flower bearing stem. After that, if nothing untoward happens, the bulb goes on living for an indefinite period, sending out each year a flower stem from its centre, and shredding off old scales with bulbs in their axils, more copiously in some kinds, less copiously in others, from the circumference all round."

§ 25. In concluding this subject, I beg to add M. Max Leichtlin's opinion as given in the *Garden*, *vol.* 13, p. 252, which seems to me to agree exactly with what I have previously stated:—

"*Lilies of various sorts* form their bulbs *very differently*, therefore, *no general theory can be applied to every species.* As to *Thompsonianum*, now

classed among the *Fritillaries*, the old bulb annually dies, as I know from having carefully experimented upon it. On the other hand, it has no side bud at all; but merely a central one. The leaves growing from that central bud, form each a scale of the newly forming bulb.*

"The scales outside are of a very watery consistence, and decaying, help to nourish the newly forming bulb. As to *Giganteum* and *Cordifolium*, I must openly say, I have made no dissections in regard to them; but from studying these plants in the shape of hundreds of bulbs, so far as growth is visible, it seems obvious to me that these species do not produce annually a new bulb from a side bud, but that the old bulb is enlarged annually by the scales growing larger through the growth accumulating from a central bud, and that during summer, when vegetation is active,† another central bud is developed to grow next year. This goes on during five or six years, when the bulb arrives at mature age. It then flowers, and clearly dies, the entire bulb being exhausted by the flower stem which it has formed. In the meantime, the growth of the first and second year's existence of the bulb has decayed, either through pressure from the stronger scales of succeeding year's growth, or through general weakness. The year before flowering, one or more offsets make their appearance, which apparently spring from the *root stool*, and not from side buds in the interior base of the old bulb. If Dunedin can have sent him from California, a large bulb of *Washingtonianum*, carefully taken out, he will observe that his theory cannot be applied to that species, for he will find inserted in one long sideward growing bulb the accumulated growth of eight or ten years. As to the majority, or perhaps as to all Lilies of the 'Old World,' Dunedin's theory seems to apply exactly *as far as the formation of the next year's bulbs from side-buds is concerned, but not in relation to the entire decay of the old bulbs. Every year some scales decay, not those*

* Herein lies, I think, the explanation of all *normal* Lily scale growth, exemplified most simply in a bulblet or seedling Lily, or as in a full grown *Catesbæi*. The base of each leaf stalk is developed into a scale, and on the well doing of the leaf depends the vigour and health of that scale. Extend this rule a little further, and interpose a stem between the foliage and scales, and you find new scale growth developing at the base of the stem, continuously with the development of foliage, and I go further, and say, that experience shows me, that unless the foliage is healthy, the new growth will be scanty and stunted, and this, I think, may be taken as a reply to those who advocate cutting down Lily stems in full bloom, as not injurious. It is most decidedly injurious, in the way I have pointed out, viz., in checking new growth—unless it be done at a period when growth is nearly over—and unless at least two thirds of the foliage are left on the plant.

I say normal scale growth. *I have mentioned an exception amongst the Martagon group (see p.* 86*), but in these cases, my experience leads me to believe that new scale growth does not appear, but only the old growth of the last season is amplified and hypertrophied; so that a larger heavier bulb is produced. I have also noticed, that in Auratum, Speciosum, and other kinds, if the flowering portion of the stem be broken off while in early bud, the leaves below, become much larger and broader as if to compensate for the damage done above.*

† I think here, Max Leichtlin theorises erroneously: not having dissected, he does not adduce any evidence to show that during the summer another central bud is developed to grow the next year. No stalk is developed in *Giganteum* until its time to flower is come, only a tuft of leaves; and *Giganteum* will go on developing its one bulb till the flower stalk shoots up; the root stock or central axis being the vital motive force in development.

of last year's growth, but those of three or four years' of age. I AM OF OPINION THAT THE OLD BULB DOES NOT DECAY EVERY YEAR. I cannot now, from want of careful investigation, say much about the mode of vegetation of ther Rhizomatous group, but I may state, that even among these, a different mode of vegetation takes place."—*Garden, vol.* 13, *p.* 252.

§ 26. I cannot understand how—if it be true, as Dunedin asserts, 'that Lily bulbs are all annual in growth, and that each year, the old bulbs disappear entirely, and new bulbs succeed—large bulbs are built up.' We import from Japan, every year, hundreds of bulbs, measuring 12 to 14 or 16 inches in circumference, many weighing a pound each. In many of these is plainly visible a hole, wherein the base of the old stalk has been attached; this is generally situated, not in the centre, not outside the bulb, but having, say, one-third of the bulb on one side, and two-thirds of the bulb on the other, I can detect no difference in appearance in the scales, in the majority of these bulbs, they all look equally fresh, plump, and healthy. Is it possible, that these are entirely new bulbs, embracing—Mark! not lying to one side of—the old flower stem; if so, how did the new growth manage to encircle* the stem, and what has become of the old bulb? N. B.—The bulbs of *Auratum* which are imported into Europe, are dug up in Japan, mostly in the months of October or November. The same remarks will apply more or less, to the production of all large bulbs.

* Compare the figures of *Hansoni* and *Speciosum*, pages 109 and 110.

CHAPTER XII.

ON COLLECTING AND PACKING LILY BULBS.

The time to collect Lilies is when the flowering season is just over, the leaves then turn yellow and fall off, and the stems die down. It is true (*see* p. 9) that Lilies, even when in flower and full growth, may be moved carefully and safely from one spot to another; but then they must be planted at once, and encouraged to finish their growth; this might be safely done by collectors, if anxious to obtain decisive information as to any unknown species, by flowering a few roots more conveniently at a subsequent date; for in this way, bulbs may travel safely some distance, be replanted, and subsequently bloom. But it would not answer to collect Lilies thus in bulk, with a view to sending them a long journey; they might, perhaps, travel this way for a week without much damage, if carefully planted out afterwards and well watered; but a longer journey would endanger the flower, and probably do damage to the future growth.

Bulbs that are to be sent a month's journey and upwards, must be taken up when ripe as aforesaid, dried, but not to such an extent as to become flabby: the soil between the scales should also be dry, and therefore it is of importance, that the weather should be dry, when the bulbs are dug up; *they should be handled tenderly to avoid bruises, as these are a very fertile source of loss.* It is well also, to expose the bulbs to the sun for a few days only, thoroughly to ripen and dry them; they then acquire a tinted colour, varying from yellow to purple. The roots and stems should be cut off close to the bulb, and a dry material prepared for packing.

For a month's journey, sawdust, dry sphagnum moss, cocoa-nut fibre, or a mixture of these, with powdered charcoal, or other dry material will answer well, but for a two months' journey or upwards, this mode of packing is not safe. One object being to exclude light and air, and thus paralyse, so to speak, the bulb and deprive it of all vital action.

With this view, earth thoroughly dried (or charcoal) has been often used. A yellow volcanic earth has been much used in Japan by packers, but we prefer the cooler natural light soil, as we think the bulbs arrive in better order when packed in this. Charcoal has the objection of being very dirty, and of disfiguring the bulb greatly. We have unpacked bulbs in splendid order after two months' journey, which had been packed in coarse oak sawdust, smelling very strongly

of tannin; but a second consignment from the same hand, packed in pine sawdust, finer in character, heated on the journey, and many of the bulbs were destroyed, the contents being quite hot when turned out.

Packing cases should be made of wood 1 inch thick. Cases 2 to 3 feet long by 12 to 18 inches wide and 12 to 16 inches deep, are preferred by Japanese packers, and will hold from 200 to 250 *Auratum* bulbs of moderate size; packed in balls of clay, they of course require a larger space.

It is a good plan to line the joints inside with paper, so as to prevent leakage, tier after tier of bulbs is then put in, and dry earth (or some other medium) poured in between, and the box well hammered to settle the earth thoroughly and tightly, it being a matter of great importance that there should be no empty space inside to allow of the bulbs shaking about and getting bruised: bulbs so packed will travel in safety for from two to two and a half months. If, however, one bulb be bad inside when packed, it will not only soon rot, but will affect the others, and in this way the whole contents on arrival may be a stinking rotten mass. Thus, during the season at Messrs. Stevens, Covent Garden, thousands of *Auratum* are frequently unpacked rotten, at a great loss to the importers. It is of importance at the end of a journey that not a day should be lost in opening the boxes and separating the sound bulbs; similarly it is important and even economical to choose the quickest route when forwarding bulbs, even if it be at first sight more expensive, since after two months, every day added to the length of the journey, deteriorates the bulbs and increases the number of diseased ones. In sending over new or unknown sorts, it is very desirable to send a drawing or dried flower by post, as a guide to the determination of the species. Lilies should be sent off as soon as possible after their stems have died down, and the bulbs are ripened. If bulbs have begun to grow before packing, there is great risk in sending them; better wait if possible another season.

In sending more sorts than one in the same case, it is well not to trust to partitions, as some of the Japanese packers do; the partitions often get shifted, and bulbs escape from one to another compartment. It is far better to pack each sort in a separate box, with a label, and enclose these separate boxes (slighter in build) in a large outer case. Small sized bulbs, such as those of *L. Concolor*, *Pulchellum*, &c., can be safely sent long distances by post, packed in tin or wooden boxes, with cocoa fibre or sphagnum, slightly moist; but, in this case, the Post Office regulations, as to weight, stamps, &c., must be strictly adhered to, and the sharp edges of the tin boxes protected by some kind of cover, otherwise they may be refused by the Post Office authorities as likely to damage the contents of their bags, and thus cause disappointment.

The overland route, viâ San Francisco, is far preferable to that viâ Suez Canal, if used before the month of December, when severe cold sets in.

But for large bulbs, by far the best mode of packing, yet discovered, is to seal hermetically, in lumps of mud or clay, each bulb, if large, or three or four together if small. Some years since, finding that our bulbs from Japan came over in bad condition, and learning that even Camellias and other plants in leaf had been sent out to the Cape and elsewhere with perfect success, having a coating of clay on each leaf and stem, we sent out instructions to our agents in Japan to make trial of this process, which, proving eminently successful, has now been universally adopted by the packers in that country. They prepare, in the autumn, a large quantity of soft puddled clay or mud, and coat each *Auratum* bulb with it, to a thickness of about ¾ inch, smaller bulbs, such as those of *Thunbergianum* and *Krameri*, with a thickness of a ¼ to ½ an inch, while of small bulbs, such as those of *Coridion* and *Concolor*, they put three or four in a lump; they then wrap up each lump in a piece of fine paper, to keep all together; and when slightly dried, which is soon effected by exposure to the sun in that country, they are placed in a case, and the interstices filled in with dried soil, sawdust, or other light material, the bulbs thus hermetically sealed, are kept cool during the journey, and remain in a quiescent state.

Nevertheless, it has been found that like all other modes before tried, this sometimes fails, and that rot invades the cases, spreading from bulb to bulb, till all are affected. And this leads me to another point, which is well worthy of further investigation. Bulbs invaded in this way by rot, turned out of the clay on arrival, and set apart, become covered in a few days with the Mycelium (growth), of a long silky-looking fungus, smell very disagreeably and rot rapidly. Similarly, bulbs *apparently sound and in first-rate condition*, when imported and turned out of their mud envelope, will, if left a few weeks unplanted, become covered with the same fungus, and be found in a soft rotten condition. This we have often experienced to our loss and discomfort, especially with bulbs purchased in the auction rooms for planting, and laid aside for a while, if the weather was too wet or frosty for planting, or our men otherwise occupied; we have likewise experienced grave complaints from our customers to whom we have sent bulbs, apparently sound, but which have rotted some time afterwards; and we have thus got into great disgrace, when the fault lay in the subsequent treatment by the purchaser, and not in our carelessness in selecting bad bulbs. We remember well, some years since, sending 50 bulbs to the Curator of a celebrated Botanic Garden, and receiving from him some months afterwards a demand to replace these, because, wrote he, "they had all rotted away, he had placed them," he said, "aside in a box, and watched them carefully,

every week some of them rotted, he wrote to tell us when the last was gone." Not knowing better then, we replaced the bulbs, but now we know that they were bound to rot under such treatment. *Imported Lilies must be planted as soon as possible;* if, owing to frost or wet weather, the ground is not in a fit state for planting, they must either be coated with mud, or kept covered in soil in a box, till they can be planted; air must not be allowed access to them, to dry them, or to permit the development of fungus.

It must not be forgotten that in collecting bulbs for packing and exportation their scales are more or less bruised, thus readily permitting the invasion of fungus germs; furthermore, that in all probability the collected bulbs will be massed in a heap in some outbuildings; that in Japan the packing for Europe is made a regular business of, and certain firms every year pack and send thousands of bulbs over to Europe and elsewhere, consequently bulbs coming in from the interior some miles, will be first jolted and bruised in the country carts, and then shot down in masses to wait their turn to be packed, and that this process goes on year after year in the same warehouses. What wonder, then, that fungus germs are rife on these premises.

Dunedin's remarks on this point fully coincide with my own suspicions.

"In my opinion the cause of so much loss in imported Lily bulbs is a parasitic fungus, constituting a kind of mould of foreign origin, of a most destructive character, and hereditary, descending from parents to offspring. The minute microscopic root-like filaments of the mould-like fungus that I have observed, insinuate themselves into the epidermis of the bulb, and, acting as parasites, draw nourishment from its tissues, and ultimately poison the plant. The minute germs of this fungus are dispersed everywhere throughout the atmosphere, and are ready to alight on any substance in which they can find a nidus. The tender scarf skin of the Lily bulb, freshly lifted out of the soil, is particularly favourable to their growth."—*Garden, vol.* 13, *p.* 142.

If, then, we are correct in attributing to a virulent fungus this rot of imported Lily bulbs we need not be slow in applying a remedy. The process of Antiseptic Surgery recently introduced by Professor Lister, with such remarkably favourable results, can easily be applied to the preservation of bulb life. This process consists in preventing the access of all poisonous and ferment germs (which are microscopic in their nature) to recent wounds, by, (1) washing in a solution of carbolic acid, of the strength of one part of acid to forty parts of water, all instruments, ligatures, &c., employed, likewise the hands of the operator; (2) in directing a current of spray of a similar solution during the whole of the operation over the part operated upon; and (3rdly) in covering the wound afterwards with lint, cotton wool, or gauze steeped in a similar solution, it being found impossible that

fungus germs, can live or be propagated in these antiseptic solutions. Hence it is evident that if the Japanese would, just before packing, steep the bulbs in a bowl of water containing one part of carbolic acid to forty of water, the germs then attached to the bruised Lily scales would be either destroyed or rendered innocuous, and the bulbs would arrive safe. Similar treatment should be adopted on arrival. It is clear that the exclusion of air on the voyage by means of the mud coating is of material benefit in keeping the bulbs cool, and preventing fungoid growth during that period, but that it is not in itself all-sufficient, is evident from the fact that bulbs do decay on the voyage, and that rot, the result of fungus, probably contracted in the Japanese packing sheds, spreads from bulb to bulb and from case to case.* Even after arrival we have found the benefit of these mud envelopes, for whereas bulbs once turned out will not keep more than a very few weeks, even if covered with dry soil, kept unbroken in their mud balls we have found them perfectly sound two months after arrival. To carry this point further still, we recommend all buyers of imported bulbs to purchase only those which are still in their mud coats, or only just turned out, and to plant them at once, covered with several inches of the best antiseptic of all—mother earth. No fungus germs will then attack them; if left uncovered, they will rapidly deteriorate.

"I have dissected many imported bulbs, and have found colonies of little voracious thread-like worms, about $\frac{1}{8}$ inch in length, feeding on the base of the young stems, so that subject to such attacks it would be impossible that these tender stems could live and thrive. I have put small fresh pieces of the stems into wine glasses, with seven or eight of these worms into each glass, and have found that they each consumed more in a day than was equal to the bulk of their own bodies. There cannot be a doubt that the parent insects (worms?) must have laid these eggs (?) on the bulbs during the ten to fifteen days they were exposed to the atmosphere before packing for exportation. I have also seen in many cases that these worms had consumed the young seed-buds; nothing else in my opinion can account for the wholesale destruction of bulbs, which is a common complaint, in consequence of the non-appearance of imported Lilies during the second season."—*Dunedin, in Garden, vol.* 15, *p.* 83.

The above remarks of "Dunedin" we are unable to corroborate, never having met with any worms in our *Auratum* bulbs. If, however, he refers to the thread-like worms (Gordius) found in this country in diseased potatoes and other decaying vegetable material, we can only remark that these worms do not attack healthy bulbs, but are found only in unhealthy and decaying roots and bulbs of all kinds, and are the "post hoc" not the "propter hoc."

* It is somewhat confirmatory of the correctness of these ideas, that we have as yet found in *no other bulbs, except in those coming from Japan*, evidence of this long silky fungoid growth, so destructive to bulb life.

CONCLUDING REMARKS.

It has been my object throughout this little work—

To obtain a correct nomenclature of all the Lilies, added to such descriptions as may enable amateurs at once to recognise the principal forms and varieties.

To give such instruction as to culture, both general and particular, as may enable Lily growers to contend successfully against the peculiarities of the soil and climate of their respective localities.

To impart such information about Bulbs, their reproduction, disease, and growth, as may enable and encourage cultivators to make further observations on points which are yet obscure, but which, when cleared up, will afford valuable assistance to Lily growers.

To encourage the collection and expedition to this country of new and rare forms, and the production of new varieties.

To attain their ends, I have thought it best not to put forward at length my own views and opinions, which, being formed from a few years' practice on the light and heavy soils of Colchester, must necessarily be somewhat limited, but rather to describe the modes of culture practised by numerous successful Lily growers in various parts of Great Britain and elsewhere, and to quote their opinions, interspersing a few remarks of my own, more especially citing the manner in which certain difficulties in soil, aspect, and locality have been evaded or overcome. Hence, though it will be remarked that the portion of the work which has been written by me bears but a small proportion to the whole, my excuse for this is, that as no two Lily growers have precisely the same soil and difficulties to contend with, they will be best instructed by perusing the varied experience and opinions, of a large number of observers, in many parts, and of learning the different views held by different authorities, rather than by being led by the *ipse dixit* of one individual.

I am under obligations, which I am glad here gratefully to acknowledge, (*a*) to Professor Baker, of Kew, whose valuable labours I am permitted to reproduce in the form of The Synopsis, chap. ix., by means of which any Lily may at once be referred to its proper group and place; and through whom the difficulties of incorrect nomenclature, which at one time seemed insuperable, owing to so many names having been given sometimes to one form, sometimes to another form, without discrimination, by popular authors, have been cleared up, and a clear chart left for us to work by; (*b*) to Mr. Burbidge for his valuable paper on Bulbs and their delineations, by means of which much light has been thrown on a subject, which to many was excessively obscure, but which now may easily be mastered, and by the help of the numerous woodcuts, made familiar to every

cultivator; (*c*) to Dunedin (whoever he may be) for his "Fallacies," for though I cannot agree with all his remarks, and though I think he is often inclined to push his conclusions a great deal too far, cultivators must all feel greatly obliged to him for turning the light of his lamp on their practices, and compelling them to look at their doings through his spectacles, the result of which must be to make them walk more warily, to observe more closely, and get more correct views of Bulb life and reproduction; (*d*) to numerous Foreign Correspondents who have favoured me with so much highly valuable information as to the growth of Lilies in their native haunts, and the modes of cultivation practised in distant climes—the letters on Californian and Himalayan Lilies being especially valuable to us stay-at-home people; (*e*) also to Dr. Masters and Mr. W. Robinson, the respective Editors of the *Gardeners' Chronicle* and the *Garden*, for their kind permission to use many woodcuts, and to reprint various valuable communications.

Lastly, kind reader, excuse the many faults and omissions of this little work, most especially the unworthiness of many of the woodcuts to represent some of the most beautiful flowers in creation—take for example those of *L. Szovitzianum, Excelsum, Candidum*, &c.; to my mind most meagre and poor caricatures of the reality (stout tall stems, adorned with numerous flowers, fine, perfect, and symmetrical), as grown in full beauty by many a cultivator. Yet it is not easy, in the limited space at hand, to pourtray on paper, so as to convey an accurate idea, a Lily stem with numerous flowers; and it is more to the purpose faithfully to outline a stem, foliage, and two or three flowers, so that the chief characteristics are truthfully preserved, than to give a blurred heavy mass of foliage and flowers, beautiful perhaps as a whole, but too indistinct for precise identification.

If, reader, you have patiently borne with me thus far, one word of advice more before we part. Cultivate Lilies for their purity, gracefulness, and because they so abundantly reward the patience of the persevering cultivator with ever-increasing stateliness of form, and luxuriance of growth; and may this little work help you to enjoy to your complete satisfaction the fruits of your labour.

"In tenui labor, at tenuis non gloria, si,"
"ridet Fortuna."

CHAPTER XIII.

MR. BAKER'S PRIMARY DIVISION OF THE GENUS LILIUM.

No one who will once take the trouble to master the characters of these five groups and thoroughly understand them by the aid of living specimens, will find any difficulty in referring any flowering specimen to its proper position.

SUB-GENUS I. CARDIOCRINUM.

Perianth,* funnel-shaped, with oblanceolate segments, falcate only at the apex.

Leaves stalked, heart-shaped, ovate—

1, *Cordifolium*; 2, *Giganteum*.

SUB-GENUS II. EULIRION.

Perianth, funnel-shaped, with oblanceolate segments, which are falcate only at the apex; leaves linear or lanceolate, sessile, or nearly so.

Tube scarcely widened from the base to the middle—

3, *Philippinense*; 4, *Wallichianum*; 5, *Longiflorum*; 6, *Neilgherrense*.

Tube gradually narrowing from the base to the neck; leaves scattered—

7, *Odorum*; 8, *Brownii*; 9, *Krameri*; 10, *Nepalense*; 11, *Candidum*; 12, *Belladonna*.

Leaves in whorls—

13, *Washingtonianum*; 14, *Washingtonianum-Purpureum*; 15, *Parryi*.

SUB-GENUS III. ARCHELIRION.

Perianth, open, funnel-shaped, with deeply spreading segments, which are broadest below the middle; stamens diverging from the curved style.

Leaves sessile—

16, *Tigrinum*; 17, *Oxypetalum*.

Leaves shortly-stalked—

18, *Speciosum*; 19, *Auratum*.

* Perianth, for the information of my less learned readers, is the botanical term for the flower.

Sub-genus IV. ISOLIRION.

Perianth, erect, with segments, which are falcate in the extended flower, but not revolute; stamens diverging on all sides from the straight style.

Leaves in whorls—

20, *Philadelphicum*; 21, *Medeoloides*.

Leaves scattered—Style shorter than ovary—

22, *Concolor*.

Style longer than ovary—

23, *Bulbiferum*; 24, *Croceum*; 25, *Davuricum*; 26, *Elegans*; 27, *Catesbœi*.

Sub-genus V. MARTAGON.

Perianth, cernuous, with the segments very revolute; stamens diverging on all side from the curved style.

Leaves in whorls.

American species; bulbs, annual, bearing rhizomes—

28, *Canadense*; 29, *Pardalinum*; 30, *Superbum*; 31, *Lucidum*; 32, *Roezlii*; 33, *Columbianum*; 34, *Humboldtii*.

Old-world species—

35, *Martagon*; 36, *Avenaceum*; 37, *Hansoni*.

Leaves scattered.

Leaves lanceolate—many nerved—

Perianth, falcate above the middle—

38, *Monadelphum* (*Szovitzianum*).

Perianth, revolute to below the middle—

39, *Polyphyllum*; 40, *Ponticum*; 41, *Carniolicum*.

Leaves narrowly linear—with one or few nerves—

Segments of the perianth, from six to twelve lines broad in the middle—

42, *Testaceum*; 43, *Leichtlinii*; 44, *Batemanii*; 45, *Pseudo-tigrinum*; 46, *Wallacei*.

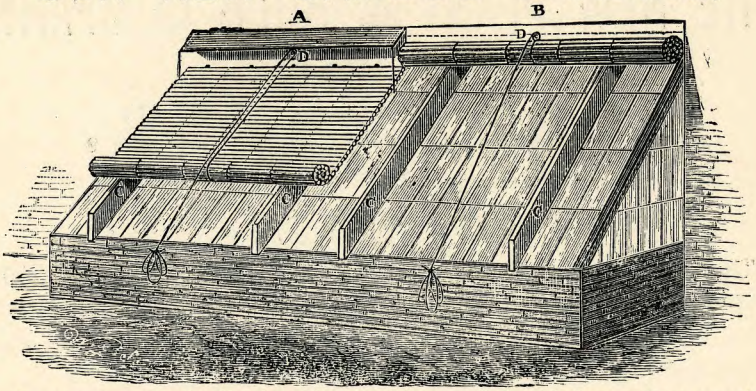
Segments of the perianth, from three to six lines broad in the middle—

47, *Pomponium*; 48. *Chalcedonicum*; 49, *Callosum*; 50, *Tenuifolium*.

Note.—The *Notholirion* group (Himalayan Lilies), with tunicated bulbs, stigma cleft into three subulate hooked divisions, are now referred by Mr. Baker to the *Fritillarias*. *See* page 184.

FINIS.

OUR NEW BAMBOO SHADING.



In A compartment—the Bamboo Mat partially unrolled, with box and top complete for its protection—the mode of rolling up—the staples, at the bottom of the box inside, to which the upper edge of the Mat is attached by stout twine—are shewn.

In B compartment—the cover of the box has been removed to shew the Mat rolled up when not in use.

CC are the wooden bearers upon which the Mat is supported, 10 to 12 inches above the level of the glass ; iron rods may be used for the same purpose.

DD, the screw pulleys round which the cords run to pull up the Mat.

To let down the shading, loosen the cords which have been fastened to the hooks placed in the front wall below the glass, the Mats will fall down by their own weight. In rolling up again, see that the cord hangs straight down the middle of the Mat, then pull up steadily and fasten.

The Mats are fastened above to 5 or 6 staples, firmly driven in at the bottom of the box cover inside, by tying to them the thick bamboo at the end of the Mat, with strong twine.

It is as well to have a wooden roller tied by string to the lower end of the Mat, to make it roll up more easily.

In our variable climate, even during the spring and summer months, although one day may be bright and cloudless as in the tropics, yet the chances are that in the next we may not get a glimpse of the sun, and this fitful condition alike holds good from hour to hour. This points to the necessity of whatever shading is used being of a moveable description, for when fixed, not only is it there intercepting the light from the plants on the very many days which we get through the spring and summer, wherein the sun never makes its appearance, but even in the brightest weather it is over the plants for many hours from morning dawn to the dusk of evening, when it is not only not required for the purpose of warding off the sun, but is inflicting a positive injury by reducing the amount of light. The same holds good with all sorts of compositions with with which the glass is smeared.—*Gardeners' Chronicle, vol. x., p.* 492.

OUR NEW BAMBOO SHADING consists of light bamboo rods, a little stouter and stronger than reeds, varying from 3-16ths to 3-8ths inch in diameter, the smaller size alternating with the larger size, while stouter rods, ¾-inch thick, are interspersed here and there to strengthen the whole, interlaced about every 9 inches apart with a coarse strong and durable twine made from the outer husk of the Cocoa-nut, in widths of from 8 to 10 feet, and in lengths as ordered. The rods when put up run horizontally, the Mat being perfectly flexible and very light, can, when in use, be easily rolled up by a cord fastened above, passing downward and beneath the Mat, round the roller of the Mat at its lower margin, then up again to the top, whence passing over a screw pulley, the cord descends again to the bottom of the Mat, where it is within reach of the manipulator.

THE NEW PLANT AND BULB COMPANY,
LION WALK, COLCHESTER.

Bamboo rods are nearly as light as reeds, therefore there is no fear of glass breakage, yet are too substantial and stiff to allow of the wind getting beneath and doubling them up. Bamboos being coated externally with a polished siliceous glaze are strengthened, stiffened, and rendered waterproof and durable. A water-tight covering is, however, necessary to protect the mats from wet *when rolled up*, which, though it would not damage the rods, would in time rot the fibrous interlacing twine, which, however, is very wiry, dries easily, and will stand a great deal of wet before rotting. Each rod is kept a little apart by means of the twine, hence there are little interspaces varying from 1-16th to 1-8th-inch between each rod, allowing a small portion of the sun's rays to pass inside, whilst others are broken up and somewhat reflexed by the glossy sides of the rods; *thus scorching is done away with, whilst a large amount of diffused light is admitted.*

The material is very durable, with the exception of some little fraying at the ends of the rods there is no perceptible difference between the condition of the Mats now in use by us and that when first put up, 4 years ago.

They cannot be doubled up by the wind. Being light they are easily rolled up, and in consequence of their stiffness, wind up easily on a couple of bearers, 12 or 18 inches above the glass, thus admitting a cool current of air between Mat and glass.

They can be supplied for a little less than 4d. a square foot, thus adding another advantage, that of cheapness.

All the fittings they require are a box at the top to keep away wet, staples screwed in above to hold them up, a screw pulley, and a wooden roller.

In case of hailstorms, if unrolled, they would afford complete protection to the glass, and owing to their elasticity would receive little or no damage.

When used out of doors, as shading for Lilies, our children have slung their hammocks beneath, luxuriating in a pleasant cool retreat from the blaze of sunshine. A very agreeable temporary summer house might be extemporised out of a couple of Mats placed slanting at an angle of 45° facing south, with a portion of the Mat overlapping for a roof.

From spring frosts, these Mats, suspended in front of and a little distance from the wall, form an admirable protection for wall fruit blossom.

In full summer they may be used again as a shade to protect, out of doors, tender plants from scorching sunshine or sharp keen winds.

When used outside walls and windows, facing south, they form an admirable shade in summer tropical weather, where the full sunshine would render the interior of the apartments inconveniently or injuriously hot or light, with, however, this advantage, that, while conferring a delicious coolness, they admit a subdued light and give a pleasing brightness far preferable to the gloom and shade of closed shutters and darkened windows.

For Orchid culture, we have no hesitation, having used the shading for the last 3 years, in asserting that it fulfils the required conditions better than any other shading we know.

It is easily and quickly pulled up or let down; it is light, durable, and economical; it cannot be doubled up by wind; protects from hail. It admits an agreeable, broken, diffused light, such as prevails in nature when the sun is observed shining through the foliage of a single branch of a tree. There is no scorching, nor on the other hand are plants drawn up beneath its use.

We have supplied this Bamboo Shading to several celebrated Orchid growers, who have been pleased to express themselves *well satisfied* with the results.

BAMBOO MATS can be supplied in prices and sizes, only as below.

No. 1 size	... ...	10 ft. by 8 ft.	... ...	at 25*s.* the piece.	
,, 2 ,,	... ...	12 ft. ,, 8 ft.	... ...	,, 30*s.*	,,
,, 3 ,,	... ...	10 ft. ,, 10 ft.	... ...	,, 31*s.*	,,
,, 4 ,,	... ...	12 ft. ,, 10 ft.	... ...	,, 37*s.*	,,

(Or at about 3¾*d.* per square foot),

BY

THE NEW PLANT AND BULB COMPANY,

LION WALK,

COLCHESTER.

Dr. WALLACE

ON

SILK CULTURE.

The experiments of Mrs. Whitby, at Lymington, in 1836 (see her *Manual*), and of Capt. Mason, at Yateley, near Farnborough, in 1866-70 (see *Society of Arts Journal*, Nov. 26 and Dec. 31, 1879), of Dr. Wallace, 1870-76, and others, show clearly that in all parts of Great Britain where the Mulberry Tree thrives, and is not cut off by early spring frosts, the cultivation of its silkworm, the Bombyx Mori, may be advantageously carried out.

Of all crops, that of silk is the most valuable, producing from £70 to £100 per acre, and at the present price of grain (eggs), viz., 21*s.* per ounce, from £100 to £500 may be obtained from a single acre in one season.

One hundred ounces of grain may under successful cultivation be obtained from moths, the produce of one ounce, in a single season.

Owing to disease, the silk producing districts in Southern Europe and Asia are unable to reproduce healthy grain (eggs or seed) year by year. This necessitates their obtaining from fresh countries a change of seed annually: a few years ago they sent to Japan a million pounds sterling per annum to purchase grain; but now the resources of Japan are exhausted. The market is, therefore, open for English and Colonial reared grain, which, when properly prepared and introduced, will be heartily welcomed by silk producers in Southern Europe: but in truth, England may easily, aided by her cool temperate climate, *produce healthy grain for the world;* for Australia, California, South America, the Cape, and other similar countries, have at last discovered that blessed as they are with an almost perpetual summer, they can produce silk in successive crops all the year round; and that for this reason they can compete most favourably with Southern Europe in the production of silk as a raw material; leaving to England *the production of grain for the whole world.*

The MULBERRY TREE may be cultivated in *all* countries and localities where the vine succeeds, and the MULBERRY SILKWORM, *Bombyx Mori*, may be reared in *all* countries, where the Mulberry Tree flourishes, as easily as in the South of France and Italy.

The Morus Alba, or White Mulberry, and its varieties, are generally preferred in silkworm culture to the Morus Nigra or Black Mulberry, because—

1st. The silkworms like it better, and feed on it more ravenously.

2nd. Its leaves are softer and smoother for them to eat.

3rd. Its growth is more rapid and luxuriant in this country, shoots five to six feet long in ordinary seasons on good soils being easily produced by the best varieties.

4th. The silk obtained by feeding the worms on the White Mulberry is of a finer and richer quality than that obtained by using the Black Mulberry.

But for "Grain" production, that is where eggs only are required as a crop, the Black Mulberry may be used, where obtainable, with advantage.

The Mulberry Tree succeeds best in situations sheltered from the east and north winds; slopes lying to the south or south-west are especially suitable; light loamy deep well-drained soils are the best; light and poor soils, if warm, are also highly suitable; heavy soils, if sloped, well drained and exposed to the sun, produce a large crop of excellent leaves; but in damp low-lying valleys, subject to frequent fogs, the leaves get rusty, and unfit to be used as food for silkworms; heavy, cold, undrained soils, especially those with a retentive clayey subsoil, are unsuitable.

The Agricultural prospects of Great Britain, at present so much clouded by adverse seasons, ought to include the cultivation of silkworm "grain."