thickly on the stem. The closely revolute flowers are oftener
few in number and probably twelve would be an extreme. Its
color is a clear orange very close to golden with no trace of red,
and finely dotted on the inner third. This in the type. To
the west they are orange in the center and deep crimson on
the outer two thirds. I doubt if a well grown specimen is ex-
celled in graceful loveliness by any lily.

It was discovered at an early date and then lost. Its early
discoverer attributed it to Utah which was very misleading to
later botanists although correct, for the early territory of
Utah extended to the Sierras and boundaries were very vague
in the popular mind. Its real home is in the Siskiyou Range,
a distinct range running east and west on the line of California
and Oregon in the gap between where the Sierras end and
the Cascades begin. The Siskiyou Range is one of the richest
botanical regions of America and there is a large number of
very fine species entirely confined to this area one of which
is the superb Weeping Spruce, *Picea Breweriana*.

*L. Roeslilii* grows at an altitude of from 3000 to 5000 feet in,
as a rule, exactly such soil as would suit *L. Pardalinum* or
*parviflorum* with this exception. I have at times found it in
bogs of an almost true peat, and often in an alluvial soil so rich
in humus and so wet as to be well called mucky.

It is well to say a word as to hardiness in general at this
point. The Siskiyou’s lie far enough north to have quite cold
winter weather even about their bases. Early in the winter
it may freeze quite deeply before there is much snowfall, while
later the higher elevations are covered rather heavily. These
conditions do not vary much from those we will say in New
York excepting that the air is probably much drier early in
the winter.

*L. Roeslilii* experiences all of these variations as do *L. Kel-
logii*, *L. Bolanderii*, *L. purpureum* and a number of species of
*Calochortus*, and Brodiaeas. In my garden *L. Roeslilii* does well
in a sandy loam. I do not think that there is any doubt
that the well prepared lily bed fitted for Asiatic lilies will meet
its needs perfectly.
L. PARRYII

In this the bulb has three or more joints and never produces more than a single new eye. It is therefore solitary. The stem is slender and graceful and from 2½ to 5 feet high with many light green lanceolate leaves either scattered or with a whorl at base. The segments of the perianth are 3 to 3½ inches long and form a broadly open funnel-formed flower with slightly recurving tips. In color L. Parryii is a clear solid pale lemon yellow, with some deeper and approaching golden. The dotting is not uniform, for some flowers are clear and others slightly purplish-dotted at base. The flowers are borne in racemes of from a few to perhaps fifteen at the most and are delightfully fragrant.

Eulogy cannot be well overdone with this fine subject and lily growers are willing to take endless pains to grow it well. In my own gardens I have always flowered it easily the first year yet for some time failed too often to establish it permanently but I am now doing so very successfully. They are in a sandy loam soil in the full sun but in a fairly cool situation. The soil is never wet and in the summer the first 2 inches are quite dry but below that line it is always moist with just about the degree of moisture that I prefer for Perennial Phlox or Delphiniums,—that should tell the story to a gardener. Still it would be well to prepare a bed as follows. Take two to three parts of sand, one to three parts of either peat or leaf mold, and a liberal addition of charcoal or grit. See that drainage is perfect and give a fairly cool situation either with shifting shade, or in cooler climates in the full sun. Get good bulbs and plant early. They begin rooting at once even in August.

Robert Kessler of Los Angeles, a lily enthusiast, grew the flowers from which the accompanying photographs were made and narrates his methods as follows.

A man who had been at Kew Gardens, London, gave me the method. I took Japanese flower tubs and burned the insides so that the wood was well charred and into these I first put seven to eight ¾-inch drain holes, then a lot of sphagnum moss, then about 4 inches of granite chips. Over
this I put some fine humus mixed with sandy silt, then a good sprinkle of coarse charcoal, then about 2 inches of fine river sand. On this the bulbs were planted and after being sprinkled with fine charcoal they were covered with 2 inches of sharp river sand.

The tub was then filled with humus and the top dusted with fine soot. The tallest were 5½ feet with fifteen flowers.

The above I think well worth reproducing as it at once gives a most successful method of growing this particular lily and the methods used by very successful experts with many other difficult lily species. It is well to call attention to the very careful guarding against those molds which kill some subjects, to the perfect drainage, the sharp sand about the bulbs and to the top humus which is most excellent to keep moisture well to the top. While innumerable lilies can be grown wonderfully well without any such care I do not doubt that the above described method would produce show specimens that would be surprisingly fine. In application it is not so very different from my conditions of perfect drainage, constant moisture a little below the surface and a soil rich with lime to insure sweetness. And let me again emphasize the necessity of careful handling of the bulbs themselves.

L. PARVUM

In this lily the bulbs are small with three or more jointed scales. The stems are slender and in most instances few flowered and a foot or two high, but this is not a specific point, for in the deeper meadow soil I have seen them growing with *Aconitum Fischerii* 5 to 6 feet high and many flowered. In small plants the lanceolate leaves are all scattered while in fine plants they are in part densely whorled. The small funnel-formed flowers ascend or are semi-erect and have recurving tips. The color scheme is of a dotted central orange with red tips. The true *L. parvum* is of one type and varies little. It is a near relative of *L. canadense* of the East and with us is almost an alpine. I think that it is never found below 6000 feet altitude and may reach an extreme of close to 10,000 feet
in a region of very deep snows. Not infrequently its snow
covering has not melted in mid July.

It is found from a little north of the Central Pacific Rail-
road to the Yosemite Region in California, a region not over a
hundred miles in length and very narrow. All of this is where
glacial action was the great factor in making the soils and shap-
ing the country and it is in the little glacial meadows bordering
glacial lakes that this lily is oftenest encountered. The soil is
a granitic sand mixed liberally with humus. Melting snows
supply moisture liberally after the mountain spring comes but
toward fall this is gone and the bulbs may become quite dry
although never dry enough to wither them. The drainage is
always good, the soil sweet and moisture at growing time
plentiful. A multitude of alpine plants accompany them,
none of which are in the least bog plants. They are oftener
in the full sun but at 6000 feet this does not imply the same
in cultivation.

It is neither easy nor hard to cultivate this lily. It is not
a lily for popular culture nor is it a lily in the least to baffle
the trained gardener. The treatment and soil recommended
for Parryi or parviflorum meets its needs.

* Lilium parvum luteum.* This can be described as a major
form of the last described species, with clear orange flowers
dotted on inner third. It is a good lily.

A striking feature of the distribution of lilies in the Cali-
ifornian Sierras is the fact that they lie in strata if we may so
call them at different altitudes. Thus at the summits and
high up on the peaks we have the alpine *L. parvum.* Where
that ends going down and following stream courses we have the
*luteum.* This would be found in the Central Sierras at
from 4500 to 6000 feet altitude. At its lower edge it would
approach but not mingle with *L. Pardalinum* while *Lilium
Washingtonianum* would be almost coterminous with it.

Below this line would be *Lilium Pardalinum* and *Hum-
boldtii* in the Mid Sierras, *L. parviflorum* and *L. Humboldtii*
in the Northern Sierras while *L. parviflorum* would go on south
and partially replace *luteum* farther South.
LILIUM PARVUM, A MOUNTAIN LILY FROM CALIFORNIA
As far as I have been able to trace it *Lilium parvum luteum* varies but little and does not extend farther either north or south than does *L. parvum*. They do not however intermingle.

**L. MARITIMUM AND L. OCCIDENTALE**

All of the Bog Lilies that I have so far described are mountain lilies but the two species that I now come to are strictly seaside. None are found at an elevation greater than 300 feet above the sea nor at a distance greater than a few miles from salt water.

The rhizomatous bulbs are densely covered with single jointed scales (articulated only where they join the core of the rhizome.) They would differ from the ovate bulb in that in the latter the scales are not articulated. The stems are well furnished with dark green lanceolate leaves which are often scattered. The stems are also dark green. Ordinary plants are from 1 to 3 feet in height and from one to three flowered but exceptional plants approach 6 feet with perhaps a dozen flowers at the most. It is rather a dangerous thing to say just how tall or floriferous a lily may become for under exceptional conditions they may surprise one.

The open funnel-like or campanulate flowers of *Lilium maritimum* have recurving tips while in *Lilium occidentale* the flower is distinctly of the *Pardalinum* type and closely revolute. In both lilies the prevailing color is a deep crimson with the narrow throat reddish orange and somewhat spotted. Neither is fragrant. *L. occidentale* occasionally runs to more yellow at center and a lighter red at outer section.

Along the Californian Coast at intervals there are raised sea beaches at an altitude of from 50 to perhaps 400 feet above tidewater. These areas face the ocean and have a soil either with a sticky clay subsoil and a peaty top or the same with a deeper soil of ocean sand mixed with humus. Not infrequently there are bogs with quite a depth of peat.

The frequent and heavy fogs and the consequent cool and equable climate, and the soils have made a fit home for dense
growths of maritime pines and ericaceous shrubs. The Western Rhododendrons (R. Californicum) are there in endless numbers while such heathy plants as Arctostaphylos, Vacciniums, and Ledums form dense growths in the barrens. The bogs are full of Ledums and on hummocks among their interlacing roots L. maritimum is largest. The soil would be a pure vegetable peat, the drainage although in a bog, perfect, and the roots would go to perpetual moisture. But far more frequently it is found in ocean sand in the barrens away from bogs. To be sure the poor soil makes poor plants but they are quite happy unless the endless shrubs rob them, and, after a brush fire gives them more room when they are very fine indeed. L. maritimum is found from a little south of San Francisco to Northern Mendocino. Doubtless it grew on the site of San Francisco.

L. occidentale replaces it in exactly the same class of maritime country from the Eel River north to the Oregon Line near Crescent City. I would suspect its presence farther north along the Oregon Coast but botanical material has not been available from that region.

In my own garden I have given Lilium maritimum a boggy soil but claim no success. It ought to be grown well in the Rhododendron Lily bed and I think has been so grown in England. Climatic conditions in Southern England should be very favorable. In the eastern United States experience will have to be bought.

L. maritimum Var.—In Western Sonoma County in California an interesting variation of this lily is to be found in a series of little bogs with very sandy surrounding country. This is about fifteen miles from the ocean and is rather foggy. It is the region so commercially successful with the Gravenstein apple. These forms are rather reddish in color and unnamed.
Résumé of Native Conditions of Western Liliums

It will be noted that all of the lilies of the *Humboldtii* and *Washingtonianum* groups are either from woodlands or grow amongst shrubs at higher elevations. That is in woodlands, they are always in the open woods where the lights are shifting and that if the woods thicken the lilies languish or disappear altogether. Where a fire goes through this open timber and kills the brush and some of the trees the lilies grow much finer and where areas of timber land have been cleared and the soil brought into not too deep culture the lilies have done better than they ever do in the natural state.

Again it is to be noted that in western forests the soil is almost always of fair depth with, we will say, 18 inches as the shallowest. Underlying this soil there is in much of the western forests a clay which is often impervious to tree root growth. In the Sierras and Cascades however the soils may be very deep.

Inasmuch as the same species thrive both in the shallower and the deep mountain soils it is certain that great soil depth is not a necessity or even particularly desirable. The indications in nature are unmistakable that the rhizomatous lilies which are rather shallow growing like a cool surface. The fact that they grow so well through shrubs and that a coat mold is often present rather indicates a love of cool surface.

The indications that such lilies as *L. Humboldtii*, *Bolanderii*, *Washingtonianum* or *rubescens* care at all for a cool surface are lacking. Surely a lily which will thrive in Californian sun with a shade temperature up to 110° above zero and not a drop of moisture from April till October does not have any particular objection to surface baking. I think that the same facts obtain with the lilies of the Chinese highlands. But with this surface baking we have well established bulbs very deep seated where the soil retains considerable moisture throughout the summer. As to why in nature lilies are seldom in the open see page 500 in writing of *L. Humboldtii*. 
A résumé shows that our lilies thrive in a great variety of soils but that drainage is an essential. In clays and gravels, in sandy loams and in broken down masses of rocks, and even in sticky black clays (*L. Humboldtii*) they are to be found growing to perfection.

In some of these soils there is a moderate amount of humus but that cannot be considered a characteristic of our lily soils for these two groups, for as a rule Californian soils are deficient in humus and the constantly recurring forest and brush fires which date back to time immemorial prevent any material accumulation of leaf mold in any but our coastal woods. But these same fires insure an abundance of potash. Western soils are all well supplied with phosphates and I think that without question the use of bone meal with lilies is always desirable.

Eliminating what appears unessential and averaging conditions it would appear that the lily bed for these two groups should have a sweet soil and be made at least 18 inches in depth; shelter from harsh winds; a fair supply of potash and an addition of phosphates; either a well cultivated surface or that the moisture level below 3 inches should insure moderate dampness.

While full sun may be all right yet a shifting shade rather light at that, would be more likely to be a safe general rule. Beyond this take into consideration the fact that few lilies are able to reëstablish a full system of basal roots the first year after being moved and it will be apparent that more care as to moisture is necessary in the newly planted lily bed than afterwards.

**CULTURE OF GROUP III**

To a degree the remarks in regard to the first two sections apply to these as well. For instance forest fires are common where *L. Parryii, L. Pardalinum* and *L. parviflorum* live and are unknown in the homes of the others. They are always followed by unusually fine growth in the lilies affected. Also by
unusually large and healthy bulb growth. This would rather indicate that the leaf mold cover is not so essential as we might have supposed and that in well established lilies the protection of low shrubs through which they grow is rather a hindrance than a help. A rather revolutionary sequence yet it seems to be consistent with facts observed in countless instances.

It will be noted:
1. That they are either at fairly high altitudes or in a cool coastal climate.
2. That the soils are far more frequently a sandy alluvium and that as the mountain slopes are usually steep there is almost sure to be an addition of silt and charcoal as well as ashes to these alluvial deposits.
3. That they are shallow growers with 3 to 5 inches the usual rooting depth.
4. That while the surface soil may be even quite dry, moisture is always present within easy reach of the roots and that the very finest specimens of each species are found where the bulbs are in well drained soil, and the roots reach living moisture.
5. That while they are often very fine when growing amongst low shrubs they are better when a fire has burned those hosts and that while growing in open timbered canyons they languish when the timber becomes dense.

There is nothing to indicate that the natural soils are always rich in phosphates yet their use is safe. Climatically their hardiness throughout the East is to be supposed from their native habitats and has been abundantly proved in trials.

Summing up all indicates that the usual preparation of the lily beds approximate their needs. A soil rather loose and workable, composed of sandy or open soils either loam or light gravels with a good component of humus and of a depth of at least a foot and better 18 inches. Perfect drainage yet abundant moisture, a drainage layer of gravel, grit or broken stone leading into tiles would give this result in a well prepared lily bed. The bed might be in full sun in a cool climate yet ordinarily should be lightly shaded at least in the afternoon.
A mulch of leaf mold will keep the soil cool and equalize moisture yet the lilies will thrive better if its situation makes this unnecessary and the surface is kept mellow.

The bulbs should be planted from 3 to 4 inches deep and with the exception of *Lilium Pardalinum*, which in time becomes too dense, it is better to leave the plants undisturbed for a long time. At the most a protection of leaves should be given for the winter. Those who wish to try for the finest flowers would do well to follow the methods of culture given for *L. Parryii*. 