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A
MONOGRAPH
OF THE
GENUS
LILIUM
BY
HENRY JOHN ELWES. FLS. FZ.S.

ILLUSTRATED BY
W.H. FITCH. F.L.S.

Mo. Bot. Garden
1887.
1880.

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TO

MY WIFE

WHO FIRST LED ME TO THE CULTURE OF PLANTS.

AND WHOSE

LOVE FOR LILIES SUGGESTED TO ME THEIR STUDY.

I DEDICATE THIS BOOK,

In Memory of

THE HAPPY DAYS I HAVE SPENT IN ITS PREPARATION.

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ERRATA

Under *Lactuca nemoralis*, line 24, for 3-13, read now 3-11.
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INTRODUCTION.

BEFORE attempting to give a general sketch of the tree-fishes, I must inform my readers that this work is not the work of a scientific journey, but is merely the result of a few years' horticulteral study, during which I have endeavored to bring together all the information which seemed likely to contribute materially to some of the difficult questions which are met with in the study of these fishes.

I confine myself to such fish as are chiefly of a horticulteral nature, which must be mentioned before we can have an adequate view of the tree-fish, as I intend to give some of such sorts in illustration, and as I have never had the opportunity of acquiring a positive opinion. I do not suppose that I have any right to call this a monograph, for I do not intend an exhaustive account of any one branch, save on the subject of horticulteral, and history of this subject is given. It is somewhat curious that one beforehand, however great may be his acquaintance, is able to understand thoroughly the different kinds of fishes of orders, and particularly of such orders as *Liliaceae*, *Asperulaceae*, *Cruciferae*, *Convolvulaceae*, *Malvaceae*, &c., unless he has the opportunity of studying the living plants. The same is true of the study of a horticulturist, or must have the assistance of a gardener whose mind is not so much occupied with the cultivation of the common standards of the art.

I think it is not yet fully recognized how intimately the two sciences of botany and horticulture are connected. No horticulturist can afford the leisure to devote his whole time to the study of his science, knowledge of botany, and horticulture can be said to be more than half-master of his subject when he has been confined to the study of the horticulture.

For this reason we find that such men as HENRIE, LINDLEY, WALLACE, SIR WALTER and SIR JOSEPH Hooker, REICHBART, THOMAS, and ASA GRAY have attained a permanent distinction as well as being noted for the scientific knowledge of horticulture, and that the horticulturist who is not acquainted with the science of botany is not a horticulturist in the true sense of the word, but a mere gardener.

No one who has attempted to compare botanical descriptions of Monocotyledonous plants with horticultural ones have failed to meet with various difficulties in comparing them, and the horticulturist who is not acquainted with the science of botany is not a horticulturist in the true sense of the word, but a mere gardener.

The horticulturist of years is a subject that would require much space even to touch upon, but I have not time to do so, and I have not the opportunity of doing so, and I have not the opportunity of doing so.

the remarkable paper at the end of his work on the *Amorcanian*, on "Crosses and Hybrid Isolates among Vascular Plants," that the true way to test the validity of a so-called species is by propagating it from roots, which the tendency to vary possessed by the species will be made manifest and the varieties produced will show the observer how far he may rely upon certain characters in separating the species from others. In the same way I think that the surest way to test the validity of a genus is to attempt to hybridize the members of it with other plants, when, if we find that they will cross readily with another belonging to an apparently different genus, it affords a strong presumption of the identity of those species.

This subject, however, is surrounded with such a multiplicity of difficulties that it requires the judgment and a sort of observation of a Darwin to investigate it with *strict accuracy*. Let it suffice to say that I know of no case in which a *Lily* has been crossed with a plant belonging to any other genus, and that the numerous attempts at hybridizing the true *Lilies* now so hard met with very little success.

If one of the conclusions I have arrived at, as to the classification of the genus *Lilies*, are not in accordance with the views that have been expressed by others, I can only say that I have in all cases endeavored to establish facts only, and have no preconceived theory, or desire to favour the theories of others.

It may be that, as horticulturists continue to multiply, and our knowledge of plants in a state of nature extends, many new facts bearing on the question will be discovered, and I can easily believe that some of the plants which now seem to deserve specific distinction may be reduced to the rank of varieties. But in other cases may be proved worthy of specific rank. In this case I can only say that I shall welcome any well-founded suggestions that may be introduced into the genus, as no one can be more anxious than myself of the improvement of my work, and so one can feel more strongly than I do that scientific truth is the first object which every worker in the great field of nature should hold up as the aim of his studies.

With regard to our present knowledge of the genus *Lilies*, I can say that I do not think many new species remain to be discovered. For though I have used every means to procure plants, living or dead, from every part of the world where *Lilies* are known, or are likely to occur, not more than three or four species have been added to the genus in the last four years.

The only regions from which much novelty can be expected are the Eastern Himalayas and the immense tract of unexplored and difficult mountain country which surrounds our Indian empire on the north and east, and which are round the head-waters of the Irrawaddy, the Brahmaputra, and the Yang-tze-Kiang. Many years must elapse, however, before these (to the naturalist and ethnologist) most interesting mountains can be even partially explored, as the extreme difficulty of the country, and the extreme jealousy and barbarism of the tribes which inhabit it, make this region more difficult of access than perhaps any other part of the world.

The Caran peninsula may also produce some new species of *Lily* but though the flora of that country is absolutely unknown to us, it may be expected that any indigenous plants of great beauty or horticultural merit have already found their way into the gardens of Japan.

Having found by experience that drawings of plants made from dried specimens frequently fail to give a good idea of their aspect and character, I have made it my object to procure living plants of every species which it was possible to obtain, and have had under cultivation in my own garden every known species of *Lily* excepting about four. Whenever I have been obliged to resort to dried specimens, or to drawings as material for my illustrations, I have mentioned the fact in the accompanying descriptions. It has been objected by some botanists that plants drawn from highly cultivated garden specimens do not give a good idea of the plants in a state of nature, and there are, no doubt, cases in which this is more or less the fact.

Experience, however, teaches that the state of perfection to which any *Lily* may be brought in cultivation, is not greater than the plant is capable of attaining under thoroughly favorable conditions in a wild state, and in proof of this I may say that the genus of *L. adjectum*, *L. warburgianum*, *L. widdowsonii*, and others.

which are taken from the finest specimens I could procure, and which are no doubt much finer than a word or engraving, did, shoot, both in the number and in the size of their flowers, of the descriptions I have received of their growth, under favourable circumstances in their native countries, as well as of dried specimens which I have examined.

The extreme tendency to variation in nearly all the *Lithodes* makes it impossible to give illustrations which represent satisfactorily different forms. But I can here give one best understood, as well as that of *M. Fitch*, in extreme beautiful dimension with artistic excellence. The engraving of the plates has, in some few cases, fallen short of what I could have wished, but though I have spared neither pains or expense to get the drawings as near to the original as possible, they are, nevertheless, the shining ornaments of *L. chalybeata*, which cannot be so much reproduced except in a few cases.

The materials which I have used in working out the synonymy, descriptions, and variation of the plants have been as follows:—the dried specimens in the public herbaria of Kew, Paris, Leyden, and Berlin; the type specimens of Thunberg's herbaria at Upsala; the living plants in my own garden, at the Botanic Gardens of Kew and Edinburgh, and in the collections of my friends Messrs G. F. Wilson, George Shaw, Miss Lindley, Rev. H. Blagden, and many others, to all of whom I must again express my most hearty thanks for the free use which they have afforded me to make of their specimens and drawings, and for the kindness with which they have assisted me in getting all possible information. From Messrs BARR, VERNON, BELL, KNEELAND, DE GRASSE, VAN HOUTTE, WARE, WALLACE, and other professional horticulturists I have also received valuable assistance and information, and I must say that the numerous drawings by these and others, in the introduction and description of *Lithodes* (many of which do not prove profitable from a botanical point of view) has been and I hope will always be, of the very greatest service and advantage to the interest and advancement of the science.

Among my correspondents abroad, I must thank especially Dr. BAIRD and Prof. MAXIMOWITZ of St. Petersburg, Messrs MAX LAURENCE of Berlin, Prof. DECAEN and the Abbe DAVIS of Paris, Dr. KUNZ of Calcutta, Prof. BERGMANN and WAYSON of Edinburgh University, and Messrs PELICOLA and HAYDON, Oppé, GORDON, and others in the United States, for the numerous assistance they have given me in procuring references and plants, all of which I have acknowledged in the body of the work, and without which it would have been impossible to complete it.

And, thirdly, most important is the assistance I have received from Mr. J. G. BAKER, of the Royal Herbarium at Kew, upon whose Revision of the *Lithodes* in the 'Journal of the Linnæan Society' all my work is based, whose suggestions I have used in almost all cases, and without whose experience and help in the introduction to myself and others, I feel I should have failed to keep my work free from many errors and omissions.

LITERARY HISTORY OF THE GENUS

The *Lithodes* being conspicuous and beautiful plants, have attracted the attention of authors from so early a date, that it is impossible to enumerate all the pre-Linnæan writers who have sent them their thanks. Those who are curious as to their ancient and medieval history will do well to consult Mr. GEORGE D'HAEN'S 'Monographie Historique et Littéraire des Lili' (Molans, 1870), where many questions are given in poetry and prose, and where many facts and fancies concerning Lilies are quoted from numerous authors. For our present purpose, however, it will only be necessary to mention a very few of those among whom PARRISON takes his place. This charming old writer, whose 'Paradise or Garden of Pleasant Flowers' was

published in 1868, puts the *Lilium* at the commencement of his work. Because the *Lily* is the more stately flower among mine," and after describing the Crown Imperial, which, "for its stately beautifolness, deserves the first place in this war garden of delight," proceeds to enumerate the species known to him, which are described with wonderful accuracy at the greatest of Elizabethan Eusebi. Parkinson mentions five varieties of the "Martagon Imperial" (*L. Martagon*)—"the spotted Martagon of Canada" (*L. canadense*), which had been already introduced to Europe at the early period. "the early red Martagon or Martagon Purpureum" (*L. purpureum*), "the red Martagon of Constantinople" (*L. chalcedonicum*), "the bright red Martagon of Hungary" (*L. corniculatum*), and "the yellow spotted Martagon" (*L. pyramicum*). He gives much though characteristic anecdotes of these plants, and mentions the "place" or habitat, the "time" or season of flowering and the "uses" or symptoms of each. Of the unknown *Lilium* he mentions six varieties, distinguishing clearly between *L. croceum* (the "gold and Lily") and *L. bulbiferum* ("the red-bellied Lily"). He then describes two varieties of the white *Lily*, which complete the list of those known to him.

KNEPPER in the "Amstelredamse Academie," published in 1716, mentions several species of *Lilium*, among which, though they were ignored or overlooked by LINNÆUS, *L. corniculatum*, *L. pyramicum*, and *L. purpureum* can probably be recognized.

LEWIS, in the 3rd edition of his "Systema Plantarum" (1760) describes nine species, viz. *L. candidum*, *L. bulbiferum*, *L. purpureum*, *L. chalcedonicum*, *L. superbum*, *L. Martagon*, *L. corniculatum*, *L. phaeophyllum*, and *L. hispidissimum*. He treats as varieties several plants which are now raised as species, and mentions one, *L. hispidissimum*, which we now refer to the genus *Festuca*.

THURBERG, who spent many years in Japan, published, in 1794, his "Flora Japonica," in which the following species are described—*L. candidum*, *L. bulbiferum*, *L. purpureum*, *L. pyramicum*, probably *L. corniculatum*, *L. bulbiferum*, *L. alpinum*, *L. superbum*, *L. purpureum*, *L. candidum*, *L. Martagon*, *L. phaeophyllum*, *L. alpinum*. He seems to have determined to make all the species he found in Japan agree with those described by LINNÆUS, and, in consequence, we are unable to identify with certainty several of them, but, in the second volume of the "Transactions of the Linnean Society," he gives further details of some of his species, and describes *L. purpureum*, *L. bulbiferum*, and *L. candidum*. Still later he published, in the "Mémoires" of the Imperial Academy of Sciences of St. Petersburg, 1811, as "Hortus Linnæi Japonicum," in which some species are described, and three badly figured, viz. *L. bulbiferum*, *L. purpureum*, and *L. candidum*. Most of THURBERG's descriptions are so vague, or taken from such imperfect or abnormal specimens, that they cannot be relied on with certainty, and it was only by examining the specimens in his herbarium that I was able to make out that *L. candidum* and *L. bulbiferum* are not good species, and that *L. alpinum* is what has been hitherto known as *L. Thunbergianum*.

Though WALTER, MICHAUX, GAWLIN, DEB, FISCHER, and others added one or more species each to the genus, no great increase in our knowledge was obtained till VAN STRAAT went to Japan and sent home numerous specimens of *Lilium*, both living and dried, about 1839. All those which he found were enumerated in STRAAT and ZUCKERMAN's "Flora Japonica," where *L. rubrum* is first described, and a fair account given of the other species known to him.

ROBINSON and ROBERTSON's "Systema Vegetabilium" (1828) and MARTEN's "Enumeratio" (1840), being merely descriptive catalogues of plants, need not be referred to, except to say that *L. Martagonum* was first described by ROBINSON.

The first attempt at a monograph of the genus is the "Mémoire sur les espèces du genre *Lilium*," by D. FRÉZ. published in 1847, in the seventeenth volume of the "Mémoires de l'Académie Royale de Belgique."

This monograph enumerates all the species known at that time, and gives careful descriptions, with synonymy, history, and detailed instructions for the cultivation of the various species. It was by far the most

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complete and useful account of the genus until quite recently, as it informs all Stenobolus's characters, and, being the work of a skilled horticulturist and keen botanist, was based on careful observations of living plants which as I have before said, are indispensable for the study of Lilies.

In 1870, PIERRE-LOUIS DUCHARTRE, of Paris, was attracted by the well-known collection of living Lilies formed by HERRMANN LEICHTLIN, of Karlsruhe, and wished to make them better known to the horticultural and scientific world, he published, in the second series of the Journal of the 'Société Centrale d'Horticulture' of Paris, his "Observations sur le Genre *Lilium*" an elaborate and most useful paper, of 112 pages, in which the history and classification of the genus is elaborated with most detailed and careful descriptions in French and given of all the species then known.

About the same time MR. J. G. BAKER, of Kew, published, in a series of articles in the 'Gardener's Chronicle' for 1871, a synopsis of the genus, which has had an enormous influence in making it better known and appreciated by horticulturists, and was the principal guide I had in taking up its study.

The direct result of the labours of MESSRS. LEICHTLIN, DUCHARTRE, and BAKER has been so great that I do not think there is any genus of plants, having so extensive a range of distribution, which has been studied with so much complacency, or about which so little remains to be discovered, as the *Lilium*; and, though there is much to be done before the manners of their development and variation can be said to be fully known, yet I do not think the publication of a Monograph on them is so premature as it would be in the case of most other wide-ranging genera of plants.

FROM BAKING WATSON has recently published, in the fourteenth volume of the 'Proceedings of the American Association of Arts and Sciences,' July 1879, a Revision of the North-American *Lilium*, which gives a complete description of the Lilies of that country, and which, I am glad to see, agrees very nearly with my own results as to the species and variety.

BEFORE the writers already mentioned, the late FRANK KARL KOCH has published, in the 'Wochenblatt für Gartenbau und Pflanzenkunde' for July and August 1876, a synopsis of the genus, in which he gives a key to the principal forms, together with critical notes on their synonymy and distribution.

MR. J. H. KILLACK, of Harlow, whose catalogue recently contains a larger number of Lilies than any others in the world, has published a 'Notice sur quelques espèces et variétés de *Lilium*,' in which several species are described and figured—among them *L. Philon*, *L. Humboldtii*, and *L. tyrianthiflorum*.

IN AMERICA, DR. KELLAND has described several of the western species in the 'Proceedings of the California Academy of Natural Sciences,' and many notes on hybridization and cultivation have appeared in various periodicals.

The horticultural journals of the last few years, especially the 'Gardener's Chronicle' and the 'Landscape and Gardeners' Magazine,' contain a number of valuable notices concerning Lilies.

As a strictly scientific account of the genus, MR. DRYAN's Revision of the *Taxus*, in the 'Journal of the Linnæan Society,' for 1874, is pre-eminently the most valuable, and, in my opinion, the only one of the kind which has been published in any language thus far.

PIERRE DUCHARTRE, of Paris, has published, in the 'Revue et Revue des Horticulteurs' (Paris), vol. x. 1873, and vol. xiv. 1875, two most valuable notices on the habits of Lilies, in which the various stages of their development, from the seed to the adult plant, are carefully described and figured with extreme care and minuteness. An excellent series of drawings of the bulbs of Lilies in their adult state are here made by MR. DUCHARTRE, and are published in 'The Gardeners' Magazine.'

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CLASSIFICATION

In Mr. BAKER's review of the *L. ferns*, which is the latest as well as by far the most complete and authoritative account of the tribe, the Labes are included with the Palpis, Psittacanthi, Calceolarii, Brythroni, and Lloydini in the tribe Taugeni, and form a very heterogeneous group, few of the plants included in it being different from the general type. It has been subdivided into five subgroups, of which four are natural and well marked; but there are a few plants which do not seem to fit well conveniently into either of these subdivisions.

The characters by which we can best classify the Labes are taken from the habit, and from the form and position of the flowers. The first subgroup, *Graciliflori* of Engelm., is a very distinct and well-marked one, and comprises only two nearly allied, though perfectly distinct species, *L. japonicum* and *L. confertum*. The habit of these is derived of a few thick closely compressed scales, produced into long petioles, which bear a large sessile ovate leaf. As the leaf becomes strong enough to flower, which is at about its sixth or seventh year, there is no stem or other lower than the leaf axis, but the flowering stems, when produced, arise from the axils and subnodes of the leaf, and the plant becomes completely stemless, a habit which is produced very abundantly. In some cases, however, offsets are formed at the base of the old leaf, when it has become a flowering stem. Near the manner of reproduction, namely by such offsets, appears to me the natural and well-marked character of this subgroup, for though in cultivation the reproduction by offsets is usually common, yet in its native forest *L. japonicum* appeared to me to grow so though all the plants were seedlings, and I have seen groups of offsets about the base of the old stems, as sometimes in certain plants. I should not, therefore, remark that either of these species is a true perennial, and am inclined to think that many other Labes may be considered perennials not so strictly speaking, for I have found that many of them after being brought to the highest state of perfection, and having produced seeds devoid of any vitality, as though they had been in a dormant condition, and had by the act of sowing taken up all the vitality of the life.

The next subgroup, *Evilvini* of Engelm., is characterized by long slender flowers, the segments of which are hardly reflexed, except at their tips. It includes, according to Mr. BAKER's arrangement, the following species—*L. phlegmarum*, *Holboellianum*, *acutatum*, *spissum*, *longiflorum*, *Brownii*, *japonicum*, *confertum*, *brillidum*, and *longistylatum*. None of the members of this group have been brought to me about the property of this arrangement, as they seem to me to be very possibly only subspecies, and except as the representatives of the forms found in the eastern tropics or Oriental regions—the with *L. Brownii*, being an entirely new introduction to Japan. But I think that *L. japonicum* has more affinity with *L. acutatum*, placed by Mr. BAKER in another group. *L. brillidum* is probably a synonym of it, *L. confertum* (our common white leaf) seems to me to have a distinct position in structure and habit in justify its separation from the *Evilvini* group, and *L. Washingtonianum* I should be inclined to place, with two near allies or subspecies, in another section.

In the subgenus *Evilvini* thus restricted we find a very different habit-structure, consisting of a large number of narrow jointed scales which bear narrow linear leaves only, as their axillary stems of stems and throw up stems at the end of two or three years flowering freely and ripening seed. I cannot, however, find any proof as well a number of small bulbils, which are formed either at the base of the old scales, at the base of the stem, or all along its subterranean portion, and frequently at various points on the stem above ground, except when any injury has checked or arrested the formation of flowers.

The plants included in the genus *Evilvini* seem, therefore, to be true perennials, that is to say, they pass the period of reproducing themselves for an indefinite period without seedling. They are the only Labes which are found within the tropics, and appear to require, not in their nature, a greater degree of heat than other Labes, though they are all inhabitants of high or elevated regions. I believe that the season of growth in these species is regulated, in their native countries, not by the summer and winter, but by the rainy and dry seasons.

To recapitulate briefly, I find that the subgenera which have been proposed in this genus are not except in the case of *Cochlospermum*, really natural, or if they are natural as regards certain species, they are not so for others; I should therefore prefer to drop them entirely. The genera are not so large or so diverse as to require the maintenance of artificial groups such as these seem to be, and though I will discuss the affinities of the different species, together with the principal characters by which they may be recognized I will not pretend to support an arrangement which cannot, as I think, be discarded by a careful observer without revealing superficialities and errors.

GEOGRAPHICAL DISTRIBUTION

The Lilies have a somewhat peculiar geographical distribution, being found nearly all over the temperate zone of the Old and New Worlds, but, with the exception of three or four species (all of which belong to the *Eulirion* section), nowhere within the tropics. As far as my present knowledge extends, they are absent from the narrower tract of country between the Caspian Sea and Western China, though the mountain ranges of Turkestan may be found to contain some as yet unknown species.

The climatic conditions which seem to favour their growth are a moderately cold winter of short duration, and a warm spring and summer with considerable moisture. Thus we find them absent from those parts of Europe and Asia which are subject to perennial or periodical seasons of severe drought. The two centres in which their headquarters seem to be are Japan, with about twelve indigenous species, and *Cochlospermum* with eight or nine. The Himalaya Mountains, where the climate and other conditions seem very favourable are not so prolific as might be expected, only five species occurring there, whilst in Europe we have seven, and in the Eastern States of North America ten or eleven.

Except in the case of the *Adonis* group (which are *subtropical*), none of the sections seems to favour one country or continent more than another, but the habits of Lilies belonging to different sections seem to have similar modifications in the same country. For instance, all those with *stoloniferous* habit are North American, and all those with large oblique bracts are *Cochlospermum*, whilst no European or Asiatic Lily has a bulb which could be mistaken for an American species by any one who was at all conversant with their peculiarities.

The present Map will show, as nearly as is possible on so small a scale, the habitat of the known species, though it is of course understood that the boundaries of their distribution cannot be indicated by the colouring when several of the species occur together in one district.

It will be noticed that there are some curious anomalies in their distribution, which coincide with that of no other genus which I can call to mind. In the *Eulirion* group we have a case which resembles that of many muskels and birds in the same region. We find *L. polybotrys* and *L. phillypense* confined to isolated mountain-ranges, and separated from any of their congeners by more than 1000 miles of sea, or by a great extent of land, which, being situated, on account of its climate, to the requirements of Lilies, is a perfect barrier against the entrance of their range.

In the same way we find many both confined to the isolated hill-regions of Southern India, whose nearest allies are in the Himalaya Mountains, but if the analogy between birds and plants holds good, I should expect to find Lilies in the high mountains of Java and Sumatra rather than in Luzon, whose climate is less akin to that of South-eastern Asia than the former of Java, Sumatra, and Borneo.

Another point worthy of notice is the great difference between the Lilies of the Atlantic and Pacific States — thus establishing the fact, which has been so clearly shown by PROF. ASA GRAY and SIR JAMES HOOKER, that the zones of distribution of plants in the United States are longitudinal rather than latitudinal, and that the flora of the Pacific States has much less in common with that of the Eastern States than would be expected.

GEOGRAPHICAL DISTRIBUTION OF LILIES.

— Note —

In these maps the distribution of the known species is shown, as nearly as is possible with the imperfect knowledge we have of most of Central Asia, where many blanks are unfilled. The yellow colour indicates the species belonging to the *Martagon* and *Archelion* group of Baker. The crimson shows the species belonging to the *Eulirion* group including the subgenus *Cerdicrinum*. The blue shows the *Isolirion* group as defined by Baker. Where two colours occur in stripes it is understood that two species are more or less evenly distributed over the region coloured. Where the colour is in spots it shows that the species are very restricted or irregular in their distribution.

INTRODUCTION

The genus *L. pennsylvanicus* is perhaps the most curious of all, and cannot be accounted for by any known cause. An inhabitant of the Pennsylvanian region, it is nowhere else found in America. It is common, but is entirely absent from the whole of the Alps of Central Europe (where it is represented by *L. pennsylvanicus* and *L. carolinensis*), and again reappears, in the same or a very closely allied form, in the mountains of Russia, at the south-east corner of the Black Sea.

The Larvae of North eastern Asia are much more numerous and have less resemblance to those of Europe than analogues would lead us to expect. *L. pennsylvanicus* is the only one which can be called a local variety of any European species; the rest is either a new species, or a variety of species not yet known. The habits, points, and interests of East Siberia are remarkably similar to those of Europe. To the Lake North Japan however, we find the insect, seemingly, several of the species, such as *L. blanda*, *L. pennsylvanicus*, and *L. confinis*, being identical at Japan, and on the one hand.

The following Table shows the distribution of all the Larvae

1. <i>L. pennsylvanicus</i>	North America, and the whole of the East.
2. <i>L. pennsylvanicus</i>	Japan, China, Korea, India, and Central Asia.
3. <i>L. pennsylvanicus</i>	Island of Japan.
4. <i>L. pennsylvanicus</i>	Russia, and perhaps Asia.
5. <i>L. pennsylvanicus</i>	Asia.
6. <i>L. pennsylvanicus</i>	Mountains of Southern India about 1000 feet elevation.
7. <i>L. pennsylvanicus</i>	Southern and Central China, probably Formosa, Lushan Island, and North Japan.
8. <i>L. pennsylvanicus</i>	Islands of Corea, and perhaps, and probably adjacent mainland.
9. <i>L. pennsylvanicus</i>	North and western coast of the Mediterranean, in several scattered localities, though here the specimens are very small.
10. <i>L. pennsylvanicus</i>	Central Asia, and the whole of the East.
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CULTURE

Though I have given directions for the cultivation of the various kinds of *Lilium* in the body of the work, yet I think some general remarks on the subject may be of use.

It is evident, from the large amount of correspondence which has appeared on the subject in the horticultural papers, that great diversity of opinion exists on the question, and though some writers profess to be able, by following out certain theories of culture, to ensure success, yet experience has shown that no amount of care or skill will enable us to grow *Lilium* unless the natural conditions of climate are favourable.

I know of no plants which seem to have such variable and incomprehensible constitutions (if that term can be fitly applied to plants) as *Lilium*, and I am more and more inclined to believe that in many cases they are not truly perennial. Whether this is the case or not, it is a fact (which no experienced *Lily-grower* will deny) that just as the perfection of development is attained, and the plant appears to be as flourishing as possible, a rapid decline in a few *hours* or a *week* without any apparent cause, and a followed by death, or by such complete exhaustion and collapse that any further good care are in most cases thrown away.

These remarks must not, however, be applied to all *Lilium*, as there are several species (such as *L. canadense*, *L. latifolium*, *L. Martiana*, and *L. californicum*) which may be grown with reasonable certainty anywhere, while others (such as *L. Catesbyi*, *L. Walcottianum*, *L. croceum*, and *L. meadowlandense*) have repeatedly baffled the skill of the most experienced horticulturists.

Before considering the causes of this want of success, it will be well to examine the general conditions under which *Lilium* grow in their native countries, and there are three points worthy of special notice:—

First, a considerable degree of summer heat is requisite, and though this may be accompanied, as in Central Europe and the United States, by severe cold in winter without injury, yet we do not find *Lilium* there well as it does in our summer.

Secondly, we find that a good deal of moisture is necessary during the growing-season, either in the form of rain or mist. Long and severe droughts are not characteristic of any country where *Lilium* are abundant, as if they occur (as in parts of California and Southern Europe), we find *Lilium* only at considerable elevations, or growing in marshy and moist places.

Lastly, it seems to be almost universally the case, that the partial shade afforded by grass and weeds, or continuous strewn, is a necessary condition for their health, and perhaps this is explained as overlooked more often than any thing else. I have repeatedly found some varieties throwing up out-of-the-way corners, where they were almost buried in rank weeds and grass and quite unobserved for, whilst the same plants in rich soil, but exposed to the sun, were weak and unhealthy.

Protection from wind, from spring frosts, and from the baking of the sun, by exposure to sun, are, I think, the most important points to be considered, and if combined with these conditions we may secure success in the result, and a considerable degree of warmth in summer and autumn, there is little doubt of success with the majority of species.

Rich soil, however, is of no use, unless it is sweet and well drained, as was lately, in *pot-cultivation*, this the roots will not occupy the good soil provided for them if it is at all sour or sticky. The constituents of the soil are, in my opinion, not so important as the situation, for though—as *Lilium*, such as *canadense* and *martiana* are very fertile for a considerable distance of poor, and refuse to grow in any containing lime, whilst others, such as

monstrous and extensive. It is difficult to find a more fertile soil, and the degree of moisture is ready for the plants to turn and turn from the nature of the soil.

The great drawbacks we have to contend with in England are—the heavy cold rains of autumn and winter, rising as they do at a time when the roots are most inactive, and thereby frequent & causing them to rot, and the late spring frosts, which injure the shoots when first appearing above ground.

Perfect drainage will no doubt help the plants to ensure the first of these evils, and artificial protection in some form, mainly covering the ground, whilst a liberal supply of light, moisture, heat, or constant fire, will keep the ground from becoming dried up in summer.

The insect pests which affect *Lausa* most severely are *Aphides*, or green flies (which are most injurious to them when young, causing grass, and most so thoroughly kept down by starvation and syringing), and a minute white insect which is generally found in abundance in the holes of tubed plants (but which is, I believe, rather the result than the cause of a rot). A fungus, *Botrytis cinerea*, is also a pest, and is especially often observed to attack the leaves of Japan *Lausa* in wet and weather, and as, I have no doubt, caused by want of warmth. The disease which destroys so many thousands of *Lausa maritima* does not, however, seem to be of a similar character, but is more probably caused by a lack of moisture at the roots, or the exposure of the roots to the air. The sudden shedding of leaves, however, and decay, which is often observed all over a house with the specimens, are very extensive, and perhaps, out of a hundred plants growing in the same conditions, only seven, thirty, or fifty may suffer, whilst the rest remain healthy and flower well.

Since the preceding was written, we have experienced in England one of the most protracted and severe winters, followed by one of the coldest and wettest summers ever known; and the results have been (as I anticipated) most disastrous to *Lausa*. My own losses have been so great that I have almost despaired of replacing them, and though in the last week of the autumn and winter I have seen that there have been fewer deaths, yet I fear the cultivation of these fine-stemmed plants has incurred a severe shock. Perhaps the most remarkable case was that of a long bed of Californian *Lausa*, mostly varieties of *L. californica*. These had grown as perfectly undisturbed as any I have ever seen, growing with unusual strength. After they had grown five or six feet high, and a most most prodigious numerous heads, they became covered with hundreds of tiny white insects, which ate the whole plant. Week after week of this, and the plants were slowly but surely destroyed, and the result was that the plants died off, and the whole bed was a mass of decayed plants.

A portion of these stems was cultivated by the Rev. M. J. Bessant, whose experience in the following disease of *Lausa* is mentioned. His report, as printed in the "Gardener's Chronicle," is as follows:

It should not be necessary to say so much of the disease, as it is well known to all who have been in the garden, and it is becoming known and established. From time to time specimens have been sent to me by one of our most anxious and able cultivators to the Secretary Committee of the Royal Horticultural Society, with various other plants, any thing at all satisfactory. No treatment or change of soil seemed to have any beneficial effect, and our own experience is in exact accordance. Whether in the conservatory or in the open air, we have never found any specimens in a weakened condition, and sometimes belonging to the very choicest species. Nothing has ever equalled, as regards condition, what we now have before us. The disease is no longer confined to one species, but affects the whole plant, extending even to the bulb, which in I now see is in a degenerate state in the plant itself. No potato stems affected with the *Peronospora* was ever in a worse state than what we have before us. The condition may perhaps have been aggravated by the fact that, though the heads of stems reached above eight inches, an extraordinary heat had been produced by their decomposition, which first attacked the bulb by the temperature of the latter which accompanied them. As the mass was so small, it was scarcely

expected that the heat must have arisen from a peculiar tendency to decomposition. The consequent change of colour in the milk penetrated deep into the tissues of the stems, and in parts the leaves are passing into a putrescent mass. At the same time there is no over-accumulation of the exsude. There is not a trace of any parasite except *Asciurus polygama*, DC., in an early stage of growth, and even supposing that the spores were connected with this (which is not probable from what we know of *Asciurus* now, which is so destructive this year), we fear that the above conclusion, as in so many other cases of disease, is not likely to suggest a possible remedy.

For somewhat reluctantly reported is, I am afraid, all I can add to the question of Lily disease. Mr. G. F. Williams believes that exposure to sun and wind is the primary cause of the disease, and that in how far it that we often see a quantity of Lilies in a greenhouse go off in just the same sort of way, and without any exposure at all. Truly the matter is at present inexplicable, for it often occurs that, in the same house or field where these sad deaths are taking place, other plants of the same species are flourishing exceedingly, and I know that even in the summer of 1892 Lilies did well in some places.

If I were about to recommence the cultivation of Lilies, I should build a house or frame on purpose for them, arranged, as nearly as possible, in the following manner—

A span-roofed pit should be made in a sheltered situation, with the ends facing north and south, and about three feet in the ground, and having an entrance at one end, with a narrow path down the centre. The lights should be made either to slide down and take off like the lights of a frame, or so arranged that the pit could be completely thrown open when desired. I think this important, because the complete exposure of the plants to sun and summer rains when not too violent is of more benefit to them than any system of syringing or watering and by lifting or drawing off the lights, and replacing them with some shading material, in hot sunny weather, we avoid the heating and drying up of the soil, which is so difficult to prevent under a fixed glass roof.

No heating-apparatus would be necessary, as the slight frost which might penetrate the house in any severe weather would not injure the plants when in a dormant condition. The brick sides of the pit would be about a foot or eighteen inches above the ground level, and might have ventilators of painted zinc to break the draught. The beds would be built up with bricks to about ground-level, and the height of the edge from the earth should be not less than seven feet, or more if it be desired to grow many plants of *Lilium auratum*. The beds would be composed of a drainage of 9 or 10 inches of broken bricks, stones, or tiles, covered by some sort of good soil laid over them, and filled in with about two feet of a compost consisting of about half light loam, one quarter coarse sand, and one quarter horse-droppings put, well broken up and mixed together. A part of the beds might have a mixture without peat, and another part should be composed of half peat and a quarter sand, but care must be taken that any half-mould used for Lilies is thoroughly rotten and free from fungoid growths. Decayed cow-mansure has been found an admirable substitute for horse-droppings, and may even be used instead of peat, though I should prefer the latter when of good quality. A good sprinkling of broken bricks, stones, or clean coarse gravel may be mixed with advantage through the whole mass of soil, and a surface of broken charcoal is also advantageous, to avoid the roots of the plants having occupied the soil there is always a risk of its becoming sour, and I believe that charcoal will, not only prevent this, but also curch the soil.

If the house could be planted with bulbs already well rooted and established in pots, I should prefer it, as among a number of purchased bulbs there will always be many failures, and there is some danger of their doing mischief to the soil. If however, the entire stock of plants was purchased, I would not plant them out till they had begun to make roots, as it frequently happens that bulbs which have been dried and severely checked by drought for several months, and when in this state they are likely to rot if kept in soil wet.

In a part of the house a bed should be kept for planting plants in pots, so that newly imported bul-

may be better to wait until they had made a good start. However large a batch may be, and whatever depth of soil it may require when introduced, it is always good policy to start it in a small pot, and either shift it to a larger one, or part of it out when well rooted. It is also better to put more than one newly imported bulb in the same pot, or to plant a number together, where a good effect is desired, until their season of flowering has been ascertained. It frequently occurs that in a batch of imported bulbs of *L. scariosa* and others, some will begin to flower in June and July, and others not before September, October, or even November. And the beauty of a pot or cutting of a somewhat married when withered stems are mixed with those in flower.

When our Liliaceae has been once established, it will be necessary to keep a most careful look-out for aphids, which if once allowed to get strong, will hide themselves in the joints of leaves, and do much damage. A frequent and regular inspection in spring and summer is essential to keep them in check, and if this is neglected the culture may be at once, as another deep feeding or red spider is to be feared in an untreated house. The lights should be thrown off whenever the weather is warm and pleasant, and whenever there is any wind rain. If some fish, a thorough good soaking of soft water should be given so as to wash to all parts which are well rooted and growing freely, and more moderate supplies to the rest. A good syringe when the house is shut up in the evening during the spring and summer months is also of great advantage.

During hot sunny weather the lights should be removed, and replaced by a standing of tiffany or some similar material, and care must be taken on no occasion to burn the plants by keeping the lights on without shade, for though some of them will stand a great deal of direct sunshine without apparent injury, yet serious root rot is in course.

As we are the Lily grower is fairly acquainted with the various species, which only experience can make us do so, it is a matter of course to select those which he prefers. Many Lilies are immediately plants of great value and a profitable supply of them is necessary to the grower.

In purchasing Lilies it is always select those which are plump and fresh, though of moderate dimensions. The largest bulbs are rarely the best. Let him endeavor to procure all home-grown varieties as soon as possible after they have been taken up in autumn, for if kept in mud or covered from all the winter, and then shown, as they are, they will lose some of the resources which they have in spring growth. With regard to imported bulbs, however, these are usually best when received in January and February, for if taken up in Japan early enough to allow them to be sold in England before Christmas, they are often imperfectly matured.

Care should always be taken, when purchasing bulbs during or after a severe frost, to see that they are not all frozen, and if after received by the grower, and for sending them to friends, at home or abroad, all the more care should be taken.

With regard to packing Lily bulbs I can add little to what I have said in speaking of *L. polygamum*. The great point is to keep the bulbs, and as before, in a dry atmosphere and the reverse, and to pack them tightly that, without crushing, they may keep firm in the box.

During the last two years a new mode of cultivating Lilies has been suggested and put into practice by Mr. Watson, of Weybridge. The method, in essence, that most of the trees was the main mass of Lilies, many thousands, has had one of boggy woodlands in a wild garden, and planted in it thousands of Lilies in various positions. Though I have no doubt that, if the various beds are kept from being overgrown by rank weeds, and the soil is well kept, and if there will prove very successful, the soil being very suitable for most of the species yet I am inclined to think that the shade of the trees is too great at present, and that in a dry summer their roots will be exposed to the sun, and the consequence will be a very small crop.

Considering, however, the very unfortunate season of 1893, and the want of time to establish the plants the Wilmers' experiment promises a considerable measure of success, and is certainly a very interesting one. I am not, however, inclined to believe that he will succeed in establishing it, or nearly all the lilies in a good way more than in a garden, and, considering the varied nature of their habits, it is not to be expected that he should do all much success.

A theory which has been started and written on at great length by a correspondent of 'The Garden' says himself "DUNKER" as to the annual renewal of the bulbs of lilies, is, I believe, founded on an entire misapprehension of the functions of their bulbs.

This writer, as far as I can understand his very lengthy communications, maintains that the bulb of a lily is completely absorbed by the flowering stem, and entirely renewed annually by a new growth of scales in its interior. The reason therefore that the proper season to lift and transplant the bulbs of lilies is immediately after the flowers have withered. The generally received opinion that the leaves of the plant have considerable influence in maturing the growth of the bulb, and storing it to store up the necessary nutriment for the next year's flowering, is ridiculed by this writer, but, in the correspondence which took place in 'The Garden,' his theory was, I think, successfully disproved by several of our best lily-growers. I believe myself that a continuous growth of new scales from the axis of the bulb is constantly taking place at all seasons, though much more actively in the spring and summer, and that this growth only ceases when the bulb has attained its maximum development or when checked by removal, or by some other cause affecting its growth. The development of the scaling plants is continued by M. DECAENAS certainly bears out this opinion.

The propagation of lilies is affected in various ways—first, by division of the bulbs, which increase rapidly in most of the European and in many of the American and Japanese species, secondly, by planting the bulbets which are formed at the ends of the leaves of *L. igneum* and *L. bulbosum*, and at the crown of the bulb or on the base of the stem or many other species—thirdly, by seed, which, though a tedious and somewhat uncertain process, is in some cases, the only way by which increase can be obtained. For instance, *L. Martagon*, *Albuloides*, *colubacum*, *polyphyllum*, *Catalan*, *palustris*, *maritimum*, never so far as I have seen increase themselves by division or bulbets, whilst in the case of *L. pyramicum*, *cordatum*, *truncatum*, and *palustris* seedling seem to be the usual manner of reproduction. Judging from the groups in which we find lilies growing in their native habitats, many species, such as *L. onocrotis* and *L. pyramicum*, which in gardens increase more readily by offsets, are propagated by seed under natural conditions.

Germination takes place very irregularly in different species, and according to the time at which the seeds are sown. As a rule, it may be said that, if sown in 1893, or 1894, the seed will germinate in spring, but under glass it often comes up sooner, as in the case of *L. truncatum* and *L. longifolium*. If the seed is kept in spring before sowing, it usually lies a year before germinating, and never rises longer, and if more than six months elapse, it very often does not come up at all.

The only seeds of *L. onocrotis* which I ever sowed came up in September, at the same time as the autumnal leaves of the parent plant, and I have observed that the germination of the seeds of other bulbous plants usually takes place at the same time as the vegetation of the same plant. The seeds should be sown in boxes or in a frame, about a quarter of an inch deep, in light soil, and the ground should be made tolerably firm under them. If sown in pots, they must be kept pruned, or the young bulbs will soon be starved, and as soon as strong enough they should be turned out into a frame.

In sowing lilies grow very slowly for two or three years, they should not be planted in the open ground at first, and careful watch must be kept against mice, which will devour the seeds of stores in a single night. Mice are very apt to grow over the seed and choke them, drought is also very common, so that, from one cause or another, seedling lilies have not yet been able to grow in the open ground. (See also

Y.H.

Lilium Philadelphense

For the first time, the authors have presented a quantitative analysis of the effect of the size of the sample on the accuracy of the results. The authors have also presented a quantitative analysis of the effect of the size of the sample on the accuracy of the results. The authors have also presented a quantitative analysis of the effect of the size of the sample on the accuracy of the results.

and, colored with unusually fine and green-like veins, is not more than 2 to 3 inches high, while the lower branches are rather robust, appearing like those of *L. phillyria*. The leaves are small, narrow, where the end is more rather than pale, and green by transverse veins, petals, partially white, by evening, trees. The soil is of a very light nature, showing the somewhat specious to pass off stone, and is composed of a soil of loam with decomposed trunks and needles. The trees which grow in the vicinity consist of *Quercus*, *Ficus*, *Eleocharis*, *Sorbus*, *Strawberry*, *Melocactus*, *Corymbium*, was also a small tree fern. The substance character of the stones, however, is better shown by the herbaceous plants, among which are *Andropogon* of *Pala*, *Cyperus*, and *Leucaena*. The soil is not very fertile, and other reports, plants were abundant. Among them that I particularly noticed were *Cyperus* and *Cyperus* resembling *Andropogon*. With regard to the probability of other species of *L. phillyria* in the Philippines I can say, but as in the mountain ranges of these islands (which attain the elevation of 10,000 feet or more) being almost unexplored. In the islands of Mindanao and Malacca, owing to the general habits of the natives, it is almost impossible to travel there. There is no doubt many fine discoveries might be made there. The only other high mountains I visited were the *Malacca* range in Luzon, and here I was disappointed by finding nothing so remarkable as in the district of Benguet.

I was afraid that the seeds of *L. phillyria* when brought to the warm climate of Manila, would soon decay, but, thanks to the vitality of their seeds, each of which seems to have the power of producing a bag of seeds. I was enabled to bring them safely to Manila.

I would here add that the main part is in packing the seeds of *L. phillyria* for transport is to prevent them from heat and excessive moisture, which soon destroy them when decayed, and their roots (thousands of bulbs have been lost from ignorance or neglect) to the fact, but, on the other hand, care should be taken not to allow them to become over-dry from exposure to the air, which soon dries up the bulbs, some of which they are composed. No substance is better for packing small seeds than *vermiculite*, which can be obtained in most parts of the world. Packing them in *vermiculite* will not only protect them in the most best thing, and care should always be taken to pack them so tightly that they cannot be shaken in the box. In cases where the plants cannot be allowed to remain until they have naturally decayed in nature, it is better to transport them, with the roots as fresh as possible, to some shady spot in a garden until they are at rest, then to pack and send them off when in full growth. Before packing for a long journey, and especially if but chance have to be reversed, it is a good plan to expose them for a few days to the air, which will dry up the superabundant moisture of the roots, and render them less liable to rot. However, if the bulbs are packed and taken away, they are well covered by a long incense, and on not losing healthy growth for a year or more after they are replanted. Growers of *L. phillyria*, remembering this, must therefore not be disappointed if the flowers of *L. phillyria* are not so large as they are, for the plants have increased their natural vigour, will be rewarded by a display which cannot fail to give pleasure to those who can appreciate their delicate beauty.

With regard to the culture of *L. phillyria*, I am not well informed. As the bulbs are somewhat delicate, and grow best in a warm house in small pots plunged in a bed of slats or sand. When growing in the open air, the other *L. phillyria*, abundance of moisture, and when at rest should be kept plunged in a cool house where the pots, without watering, may never become quite dry. In February the bulbs will start into growth in a temperature of 55°-60°, and the delicate stems then begin to show the character of their narrow leaves. The leaves produced by small bulbs or seeds are much like the primary leaves of *L. densifolia*. It is to be hoped that the stock of this plant, under the tender care of Mr. Dancer (who is undoubtedly one of the most careful gardeners of the city in all delicate operations of plant culture), will soon be sufficiently increased to enable Messrs. Verno to send it out. In the mean time let us hope that the climate where it came may not long remain, as at present, almost a mere ungenial to cultivate.

Lilium Hansonii

Mr. LAURENCE, however, on seeing these figures at once recognized the plant, and wrote to govt. and had through the flowers and stem might be very similar to those of *arvensis*, the bulb was remarkably different.

This I have verified by personal examination, having seen excellent specimens of the larvae with which several *herbaria* are, though it is not now in cultivation. There can be no doubt that *Mrs. Lencornier* is right.

The habitat of the plant, however, at *L. muscivora* *adulterata* (as though it is certainly found in Japan, as travellers had met with it in a wild state and it might be like several others only introduced to the gardens of Japan).

A few months ago I was able to show a plant of this species in flower to *Frederick Maximowicz*, who at once recognized it as what he had discovered at *Victoria* Gulf and previously supposed to be *L. arvensis*. It is quite possible that the plant may have been known before, as it was certainly sent to America several years ago, and has been again received by *Mrs. Lencornier* direct from Japan, but the mystery which hangs over its origin has now been, I hope, satisfactorily cleared up.

I may add that the name of *musculina* (Tenth.), which was thought to have been given to this bit, cannot stand, the type specimen in this very own herbarium (taken, through the kindness of *Frederick Maximowicz*, from a Japanese, has been sent to the Kew herbarium for examination) being nothing more than a garden variety of *L. rhynchos*.

I have seen, in a book of drawings of Japanese plants very well and truthfully done from nature, by a native artist, admirable representations of both *L. Muscivora* and *L. arvensis*—showing that they are recognized as distinct by the natives of that country, and may both be found in the southern parts of the archipelago.

The nature of this plant is so easy that I have no doubt it will soon become better known in America. A small bulb stands the winter fire of an owner, and is given to him, and though it does not open and at the country, it may be propagated by means of seedling plants. It is the easiest of growth of any kind I know, and succeeds well in a peaty soil which does not become hot and dry in summer. The only seed which has been obtained by *Mrs. Lencornier* is from a seed, which is not the case with the *Martinez* (also from which this plant is also distinguished by many characters, of both habit, and shape of flowers).

P.S. From information I have quite recently received from *Mrs. Lencornier*, an American gentleman, now resident in Japan, I have no doubt that the plant is found in the southern part of the Japanese archipelago, and I am persuaded by him a few specimens of all the seeds of that country in their wild state, about which as yet we have very little knowledge.

Lilium *sp.* *sp.*

With regard to the little-understood subject of hybridisation among Larks, I would have been delighted to a communication by Mr. TILLYARD, of Walsby, to the 'Gleanings' Chronicle, 1875, II, p. 39. For the numerous as well years I have been trying to effect a cross between a dark, verdant *Sylvia spinus* and a singing *S. cinerea* with a downed head, causing the numerous the female parent. I have obtained some of the same result from the

Linum Pyrenaicum

 

Lilium testaceum

The National Institutes of Health, through the National Institute of Mental Health, is sponsoring a study of the effects of the environment on the development of the brain. The study is being conducted by a team of scientists from the University of California, Los Angeles, and the University of Michigan, Ann Arbor. The study is being conducted in two phases. The first phase is a longitudinal study of the development of the brain in children from birth to age 18. The second phase is a cross-sectional study of the development of the brain in children from age 18 to age 65. The study is being conducted in two locations, Los Angeles and Ann Arbor. The study is being conducted in two phases. The first phase is a longitudinal study of the development of the brain in children from birth to age 18. The second phase is a cross-sectional study of the development of the brain in children from age 18 to age 65. The study is being conducted in two locations, Los Angeles and Ann Arbor.

Marquis spent 11 years from 1922 to 1932, and most of the time from 1932 to 1935. It is well known the significance of his studies in the West Indies and their direct influence on the Caribbean region (Marquis). The results are still today, but as there is nothing remarkable about the results, I will not repeat it here and elsewhere.

I have seen the same thing in Grand Marais, Trinidad, C. W. in the Caribbean, and one time experienced something in Costa Rica. But he has produced his results from the Caribbean region, by fertilizing *L. chalcidoides* with the pest *L. chalcidoides* as I have seen the same thing in the same year from seed produced by *L. chalcidoides*, here I give a possibility of what I have become convinced, though he has little doubt of the correctness of his strategy.

Lilium Da...

[illegible]

Lilium longiflorum

The photograph accompanying this Part is by HENRY BURNES and SHERBURN, of Colorado, and represents the W. 22° E. of the N. 100° W. Homocline at the base of the lowermost zone. *Trans. Geological Survey*, 1890, p. 100.

Bonne 261

LILY (Lilium)

[illegible]

Lilium Philadelphicum

Fig. 3

Fig. 4

Fig. 5

Lilium Day and Night

LILIUM DAVURICUM.

THE SIBERIAN LILY.

L. Davuricum, (Lil. Sib. var.) 2nd Year, cultivated at T. & J. Gifford, Dairy Farm, near Luton, p. 14.
This is the only Lil. var. N. V. known.

L. pinnatifidum, (Lil. Sib. var.) 2nd Year, cultivated at T. & J. Gifford.

L. pinnatifidum, (Lil. Sib. var.) 2nd Year, cultivated at T. & J. Gifford, Dairy Farm, near Luton, p. 14.
This is the only Lil. var. N. V. known.

The following are the principal varieties of *L. Davuricum*, which are the only ones known to have been introduced from the East. They are all of the same species, and are distinguished by the shape of the leaves, the shape of the flowers, the shape of the fruit, and the shape of the seed. The following are the principal varieties of *L. Davuricum*, which are the only ones known to have been introduced from the East. They are all of the same species, and are distinguished by the shape of the leaves, the shape of the flowers, the shape of the fruit, and the shape of the seed.

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As before, these plants were not so full of honey as when they came from the spring of the Bog. But see into the "Garden," Feb. 1, 1873, p. 80, Prof. Maximowicz's notes on the peculiar formation of the bulb of this species. He then describes his experiments in fertilizing *L. alpinum* by the same process that was used in fertilizing *L. helveticum*. He states that *L. alpinum* produces a capsule closely resembling that of *L. helveticum*, whilst *L. helveticum* fertilized with the pollen of *L. alpinum* produced the capsule of the latter parent.

Now this fact, if it could be really verified, would be a most remarkable one. But it is so contrary to the experience of many persons who have attempted to hybridize them (see under *L. Puchanum*), that I cannot help supposing that there must be some error in the statement.

From what I have seen myself, I believe that very much dependence cannot be placed on the nature or size of any capsule produced in cultivation. It often happens that capsules of *L. alpinum* produced from plants more often than that the rigour of the plant is not sufficient to enable it to mature or even swell the whole of its capsule, in which case its shape is very different from what it should be. Whether the difference between the capsules of these plants is a wild state is really constant I am unable to decide, from the scarcity of mature specimens. As I have never seen or been able to produce a perfect capsule of *helveticum*, and the only supposed one, existing in the Herbarium, being from *L. alpinum*, I am inclined to believe it to belong to *L. alpinum*. The capsules of *L. alpinum*, which I have seen, differ conspicuously in having the apex flat.

I was at one time inclined to believe that the plant shown in fig. 2, which is undoubtedly *Gussonea*'s *L. alpinum*, was different from the one described by Dr. Rostk, as the introduction of the bulb-scales (see fig. 3) which both he and Prof. Maximowicz regard as one of the distinctive characters in these Siberian plants, is, so far as my experience goes, not visible in the old cultivated stock, which has, moreover, a creeping habit (see fig. 2). Some cultivation may have had the effect of removing this difference, though it does not seem to have improved the size or solidity of the capsule, which is always fragile and delicate, but there is no doubt-similarity in the shape and shape of the bulb-scales.

Gussonea writes of it in 1829, "It has now been cultivated in our gardens for at least thirty years, during which time it has maintained its appearance and habits. It is very dry of flowering, never produces more than two flowers, and rarely more than one, hardly ever a perfect pod, but a profusion of stamens, which is very rare in the wild state. The same is also the case in the appearance of the capsule, which is not so full."

The Siberian *L. alpinum* from the mountains of the Altai, near the V. range, Mandchuria and the range of the Amur to the north of Saghalien and Tsou, where it has been found by Prof. Maximowicz, will do so.

I am submitted to Mr. Buxa for the plant shown in fig. 1, which was received by him from St. Petersburg.

Lilium croceum Steud.

LILIUM CROCEUM.

THE ORANGE LILY.

Lilium croceum Liliaceae. From the Middle Ages to the present day it has been one of the most popular of garden flowers.

It is a native of Asia.

It was first introduced into Europe by the Spaniards in 1522, and was first cultivated in the garden of the Duke of Burgundy.

It is now common in all gardens.

The flowers are of a bright orange-red color, and are very fragrant. The leaves are of a dark green color, and are very glossy. The plant is very hardy, and will grow in any soil. It is very easy to propagate, and is one of the most popular of garden flowers.

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[illegible]

The common house fly of gardens is so well known that I need not describe it. There are many wandering varieties or subspecies of which one is particularly troublesome, others common, and others the signs of decay of their hosts. I cannot, however, say that the commonest subspecies of *musca domestica* is the most common, and should wish to draw attention to the fact of its being so.

J. ramosa *longifolia*.—*J. Mx.* River's garden is a very large tree, with much slender, drooping, very short & flat leaf, without the common serrate characters of *J. ramosa*—very green. The shape of the species is easily distinguished from that of *J. ramosa* by its uniformly very narrow crown, by the different form of *J. longifolia*, & I have seen no form resembling the shape and size of *J. ramosa* on plants of the same species that I do not think are great distances off, or so situated as to suggest any form.

Lilium tigrinum

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Lilium candidum

LILIUM CANDIDUM.

THE WHITE LILY.

L. Candidum.—Linn. Sp. 435, Bot. May 1, 1758, Edinb. L. 1: 130. Ray Heral. 4: 58. Boiss. L. 1: 44.

Bulbus arvensis procerus albus vel flavescens. Folia pinnatifida lanceolata acutis glaucis, nervis 3-7 nervi longis. (L.) *Stem*—erect, simple, glaucous, smooth, without any hairs, except a few at the base. *Leaves*—pinnatifid, lanceolate, acute, glaucous, with 3-7 long nerves. *Flowers*—large, bell-shaped, white, with a few yellow spots on the petals. *Stamens*—long, slender, white. *Pistil*—long, slender, white. *Seed*—small, round, white.

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The White Lily is one of the most beautiful and most common of our flowers. It is a native of the mountains of the Alps, and is now cultivated in all the gardens of Europe. It is a very hardy plant, and will grow in any soil, but it is best suited to a rich, moist soil. It is a very beautiful flower, and is well adapted for the border or the garden.

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Lilium tigrinum

Figure 10.10

and though it is not generally known or pointed to, it is, however, a very common one. The larvae of *L. brevitarsis* will germinate very slowly and quickly as the ground is properly treated, and the following table shows the results.

In the far famed nursery of Mrs. Louis Van Haver, at Ghent, I have seen a very interesting case since the 1st of Aug. all raised from seeds, which surpassed in health and vigor any of the other species I have ever seen elsewhere.

It appears to grow best in a light and sandy loam, and most and very apt to die after flowering strongly. I am, indeed, inclined to think that the bulbs of this *Lily* are not truly perennial, and perish from the mere act of reproduction by seed, like those of *L. pyramidalis*. This is very probable by their habit in nature, as well as the results of culture. The *Lily* was introduced by Van Haver, which was introduced by him from Japan, to a Mr. Lacroix, a species, more a cultivated form of *longifolius*. It does not appear to be common in Japan, if, indeed, it is indigenous, as I have seen no specimens in any herbarium.

The bulbs of this *Lily*, which are imported from Russia have a somewhat different appearance from the one shown in the Plate, the scales being longer, thicker, and less numerous. They are somewhat more numerous, but these details will be best shown by woodcuts at the end of my work.

Lilium Chalcedonicum

LILIUM CHALCEDONICUM

THE SCARLET WATTS-SON LILY

2. *Chloroanthus* Less. Sp. Pland. 474, ex parte. Cuvil. Bot. Mus. t. 30. Bot. Ed. t. 176, Boich. le Germ. t. 235, non Jacq.

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J. Rappaport, econ. and econ. sys. objectives, 1975 19

[illegible]

an. $\text{SiO}_2 = 52.0$ g. $\text{H}_2\text{O} = 4.0$ g. $\text{H}_2\text{O} = 1.0$ g. $\text{H}_2\text{O} = 1.0$ g.

[illegible]

The Chacoan or Santa Mariana flycatcher is a species of bird in the family Trogonidae, occurring in the open woodlands of the Maricao National Forest in the mountains of Puerto Rico. It was first described by the ornithologist John Gould in 1860. It is named in honor of Mariana, a saint of the Roman Catholic Church. It is a small bird, about 10 cm (4 in) long, with a yellowish-brown head and back, and a white underparts. It has a long, thin beak, and its tail is deeply forked. It is a common bird in the Maricao National Forest, and is often seen feeding on insects in the open woodlands. It is a monogamous species, and the male builds a cup-shaped nest of sticks and mud in a tree hollow. The female lays two to four eggs, which are incubated for about 12 days. The young are born naked and are fed by the parents for about 10 days. It is a common bird in the Maricao National Forest, and is often seen feeding on insects in the open woodlands. It is a monogamous species, and the male builds a cup-shaped nest of sticks and mud in a tree hollow. The female lays two to four eggs, which are incubated for about 12 days. The young are born naked and are fed by the parents for about 10 days.

Now, however, owing to the complete fix upon the attainment of our first object, we are not drawn in many old directions and of course, the Secret Machine, though one of the most brilliant and successful of appliances, is not to be used. The only way to get the best results is to use the "Secret Machine" as a "Secret Machine" and not as a "Secret Machine".

It seems to prefer heavy ground than light soil, and will flourish in much shaded corners where it is left unmolested. Deep water, however, is not very congenial to it, and it is more numerous and varied in its growth, throughout the extensive low-lying marshes, and the numerous swamps of temperate and tropical Africa, than in the high, sterile, and sandy regions of the interior.

There are so far no known specimens of this species in the
British Museum or elsewhere. Very few specimens have been seen
by me. The cultivated ones of the cultivated ones, more the white garden form. I saw many specimens
of the white and flower-flowered, very similar to those which have been perhaps for years
in the garden. I have never seen a double-flowered form, which is a form of great value.

Dr. J. H. ... Mr. H. ... in the 'Lancet' as L. ... of ...

Lilium Brown

LILIUM BROWNII.

BROWN'S LILY.

L. Brownii, Mamm. Acad. Sci. Am., Proc. 1875, vol. 1, Spec. Mem. 1, p. 276. (Illustration, p. 277.)

L. Brownii, Mamm. Acad. Sci. Am., Proc. 1875, vol. 1, Spec. Mem. 1, p. 276. (Illustration, p. 277.)

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THIS first was introduced to Europe from China in 1861, by C. Brown, who was a Chinese official. It was first introduced to England in 1862, by C. Brown, who was a Chinese official. It was first introduced to England in 1862, by C. Brown, who was a Chinese official.

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From what I have read of its culture it is not so well known as a species grown by some of the Dutch and German nurseries, and in Berlin where it is common in the houses. I imagine that a very bold and a necessary work is required. It is the M. Van Houttei's variety, which when well fed of it is great perfection, many of the seeds being too small. It was in a house where the seeds were better than seed sown with me. In Mexico (Hawaii) I have seen that it was to be there, but, though perfectly hardy, one rarely sees it doing well in the garden.

I have never been able to produce a perfect specimen of it, and I have seen that the seed germinates quickly, as in all the *Salvia* group and water-growing flower in the first or fifth year of growth.

The purple colour on the outside of the flowers of *L. rosea* is a deep purple, and the amount of light the plant has received, and is not so dark when growing in a cold place. The light was taken from a plant grown by Gen. FARRER CHAMBERLAIN, of White Plains, which flowers early in Aug. 1872.

Lilium monadelphum

LILIUM MONADELPHUM.

THE CASSIAN LILY.

5

Leafy petioles 2-3 lines long, 2-3 times as broad as the leaf, 1-2 lines long, 2-3 times as broad as the leaf.

Stem 1-2 lines long, 2-3 times as broad as the leaf.

Flowers 1-2 lines long, 2-3 times as broad as the leaf, 1-2 lines long, 2-3 times as broad as the leaf.

The flowers are generally single, but sometimes they are double. The petals are generally single, but sometimes they are double. The stamens are generally single, but sometimes they are double. The pistil is generally single, but sometimes it is double. The fruit is generally single, but sometimes it is double. The seed is generally single, but sometimes it is double. The plant is generally single, but sometimes it is double.

The leaves are generally single, but sometimes they are double.

The stem is generally single, but sometimes it is double.

The flowers are generally single, but sometimes they are double.

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The Cassian Lily is one of the most beautiful of the lily family. It is a very delicate and elegant plant, with long, slender stems and large, bell-shaped flowers. The leaves are generally single, but sometimes they are double. The stem is generally single, but sometimes it is double. The flowers are generally single, but sometimes they are double. The stamens are generally single, but sometimes they are double. The pistil is generally single, but sometimes it is double. The fruit is generally single, but sometimes it is double. The seed is generally single, but sometimes it is double. The plant is generally single, but sometimes it is double.

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Though introduced by Maxim. Lenzner early in this century, it has not become common until the last few years, when it has been reported from the Caucasus mountains. Being a very variable species, it has been described and figured under several different names by various writers, and though the varieties are fairly distinct, yet they run into each other so closely, that I think best to follow the lead of Mr. BAKER in considering them as varieties only.

The first was first described by the Russian Botanist MARSHALL VON BOMBARDIER, having been found in the Caucasus when those mountains were first explored by Russian naturalists. By Lenzner it was considered identical with *L. pyramidalis*, and though that species may seem ridiculous when a fine old well-grown plant is examined, yet one of the varieties, which Mr. BAKER has distinguished as the *Lobatum*, is but little different from the *Pyramidalis*.

The next largest variety of *L. pyramidalis* was the species from which it is named, or rather character. It was distinguished by its pyramidal shape, and was found at least one third of the height and as wide as that of the last at first seen, though it is more common at the variety called *Montanum*.

The plant described as *L. portense* by PAUL GUNT KNOX, of which I have seen the type specimen in the Berlin Herbarium, does not appear to me to be in any way separable from this species. The strong pinnate compound leaves, the long slender stems, the small flowers, and the habit of the plant, are all in accordance with the description of *Pyramidalis* given here. There is, however, in Lobatum (the mountainous region at the S.E. slope of the Black Sea) a much smaller and possibly distinct plant, collected by BAKER, and described in herbaria of M. BOMBARDIER as *L. portense*.

As far as I can learn, the variety *montanum* (which I have figured from a plant which flowered in my garden in June 1875, and produced in 1876 twenty-nine flowers on one stem) is confined to the northern and eastern parts of the Caucasian region, whilst the variety *caucasicum* (of which a plant will be given shortly) is only found on the southern slopes of the mountains in the provinces of Iveria, Mingrelia, and Georgia.

I would here point out that, though I am not at all confident that these two forms can in all cases be well separated, yet as a rule, they may be distinguished by several characters, among which the colour of the palm, which is red-brown in *caucasicum* and castaneous in *montanum*, is the most striking one. *Montanum* is also free from the weight to their stems either in flower, and when first it was first grown, small, and its leaves are disposed, whereas in *caucasicum* they are concealed by the leaves until the plant is just ready to flower.

LILIUM JAPONICUM.

KRANE'S LILY

L. japonicum, Thunb. Fl. Jap. 473

L. Kranei (Hook. fil. Bot. Mag. t. 6038) Bot. Lea. Jap. vol. 2 p. 225

L. japonicum, Sieber, Jour. Jour. bot. p. 197

L. Elaeagnifolia, Hook. fil.

Roots perennating, prostrate, pyramidal. Culm 1 1/2-2 feet high, terete, glabrous. Folia disticha, ovata, acuminate, 1/2-1 foot long, 1/4-1/2 inch wide, 5-6 lines long, 5-6 lines wide. Perianthium corollae, lobes ovate, 1/2-1 foot long, 1/4-1/2 inch wide, 5-6 lines long, 5-6 lines wide. Ovary 1/2-1 foot long, 1/4-1/2 inch wide, 5-6 lines long, 5-6 lines wide. Style 1/2-1 foot long, 1/4-1/2 inch wide, 5-6 lines long, 5-6 lines wide. Capsule 1/2-1 foot long, 1/4-1/2 inch wide, 5-6 lines long, 5-6 lines wide.

Bot. Jap. (CHAMISE, MATSUMOTO)

Roots and stems 1 1/2-2 feet high, terete, glabrous. Leaves distichous, ovate, 1/2-1 foot long, 1/4-1/2 inch wide, 5-6 lines long, 5-6 lines wide. Perianthium corollae, lobes ovate, 1/2-1 foot long, 1/4-1/2 inch wide, 5-6 lines long, 5-6 lines wide. Ovary 1/2-1 foot long, 1/4-1/2 inch wide, 5-6 lines long, 5-6 lines wide. Style 1/2-1 foot long, 1/4-1/2 inch wide, 5-6 lines long, 5-6 lines wide. Capsule 1/2-1 foot long, 1/4-1/2 inch wide, 5-6 lines long, 5-6 lines wide.

THE charming Lily here described has a curious history, and affords an additional proof of the necessity of studying such plants from living rather than from dried specimens. When introduced to Europe a few years ago it was considered a new species, and figured as such in the 'Botanical Magazine'. Professor Maximowicz, on seeing the plant in flower at Mr. Walpers's in 1876, told me that it was known to him in Japan, and had been regarded as *L. japonicum* of Thunberg. To meet this claim Mr. Baker was good enough to procure, through the kindness of Peter Acmann, of Upsala, the specimens of Lilies collected by Maximowicz in Japan, after examining which we both agreed that the original plant named *japonicum* by him was identical with what had hitherto been known as *Krane's*, and not, as was supposed, with *L. japonicum*.

I have little doubt that the Lily described as *L. elaeagnifolia*, from a drawing made by Mr. Hance of New York, and kindly sent me by him, must also be referred to this species, for though I have not seen the plant from which the drawing was made, I have seen forms of *L. japonicum* very closely resembling it. Both *L. Krane's* and *L. elaeagnifolia* have been supposed to be hybrids, but from what I can learn about the plant in its native country, I think there is little doubt that it is a distinct species, occurring abundantly in some parts of Southern Japan.

Professor Maximowicz did not see it himself in a wild state, but had it brought him from a considerable elevation in the mountains of Shikoku, in the island of Japan, and Mr. T. Hance, an American gentleman who has seen some large quantities of bulbs of this plant, says that it grows wild near Lake Biwa on the hills of Koto, in South-west Japan.

From 1874 I was, owing to the difficulty of importing its seeds and rather delicate bulbs alive, one of the first Lilies in our gardens, but large quantities having been received in first-rate condition during the last two seasons, it has been sold at a more moderate price than formerly, and has become better known. If healthy bulbs can be procured, there seems to be no particular difficulty about growing them, though I must confess that on one last, to my knowledge, successful Mr. Hance in his successful treatment of this Lily.

In 1874 it was about a height of 3 feet, or even more, and produced one or two or five flowers of a green and white, but more commonly, in my own garden, it assumes much smaller proportions, and

the variety distinguished by Mr. HALL as *Edmond*. If cultivated under glass, it should be treated exactly like *E. arvensis*; but it may be grown and fruited out of doors with success. Its propagation at present is little understood, as offsets are not produced freely, and the seeds, if obtained, seem to be a year in the ground before germinating.

At the Vienna Exhibition in 1874 a large collection of *Loasas* was sent by the Japanese Government from the Royal Gardens at Meisei, accompanied by detailed drawings from nature. As my time was several forms of *E. japonicum*, varying considerably in size, form, and colour. One of the most beautiful of these (which I saw flowering at HERR LANGE'S garden in 1875 under the name of *E. Edmondii*) was a large pink-flowered form resembling the one which I have figured, and it is possible that some are hybrids between *E. japonicum* and *E. arvensis*, which is nearly allied to it.

The plants here figured are the rose-coloured and the white variety, and were both shown at Mr. WILSON'S residence in June 1874. The outline of a petal of a simple lanceolate form (see reverse) which this malformation is probably not permanent. In the 'Gardener's Chronicle' for August 15, 1887, Mr. J. L. KENNEDY, of Hurlers, mentions a fine purple-flowered variety in his garden, which I have not as yet seen elsewhere.

Lilium martagon var. *dalmaticum*

The very distinct variety of this plant usually called *deflexa*-*rac*, though it had been previously described under the name of *depressa*, was hardly known to our writers until 1868 when it was recognized as a distinct species of *Hebe* by Mr. LINDLEY, and was named *Hebe deflexa* in his *Vegetation of the Himalayas*.

The following is a list of the names of the persons who have been named in the preceding pages. It is not intended to be a complete list, but only a list of the names of the persons who have been named in the preceding pages. It is not intended to be a complete list, but only a list of the names of the persons who have been named in the preceding pages.

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Lilium auratum

LILIUM SUPERBUM.

THE SWAMP LILY.

L. superbum, L. Sp. 455. Bot. Mag. t. 935. Bot. Jah. t. 185. Flor. des Serres, t. 1814 10. Ann. Gray. Bot. p. 622. Bot. & Linn. Journ. vol. v. p. 52.

Palata brevis obtusiuscula, acuta, apicula alba interiori. Oculi 2-3-petali, rubri, glabri, purpureo lutei. Petala 5, nervis 5-6-8-10-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-59-60-61-62-63-64-65-66-67-68-69-70-71-72-73-74-75-76-77-78-79-80-81-82-83-84-85-86-87-88-89-90-91-92-93-94-95-96-97-98-99-100-101-102-103-104-105-106-107-108-109-110-111-112-113-114-115-116-117-118-119-120-121-122-123-124-125-126-127-128-129-130-131-132-133-134-135-136-137-138-139-140-141-142-143-144-145-146-147-148-149-150-151-152-153-154-155-156-157-158-159-160-161-162-163-164-165-166-167-168-169-170-171-172-173-174-175-176-177-178-179-180-181-182-183-184-185-186-187-188-189-190-191-192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-239-240-241-242-243-244-245-246-247-248-249-250-251-252-253-254-255-256-257-258-259-260-261-262-263-264-265-266-267-268-269-270-271-272-273-274-275-276-277-278-279-280-281-282-283-284-285-286-287-288-289-290-291-292-293-294-295-296-297-298-299-300-301-302-303-304-305-306-307-308-309-310-311-312-313-314-315-316-317-318-319-320-321-322-323-324-325-326-327-328-329-330-331-332-333-334-335-336-337-338-339-340-341-342-343-344-345-346-347-348-349-350-351-352-353-354-355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000-1001-1002-1003-1004-1005-1006-1007-1008-1009-1010-1011-1012-1013-1014-1015-1016-1017-1018-1019-1020-1021-1022-1023-1024-1025-1026-1027-1028-1029-1030-1031-1032-1033-1034-1035-1036-1037-1038-1039-1040-1041-1042-1043-1044-1045-1046-1047-1048-1049-1050-1051-1052-1053-1054-1055-1056-1057-1058-1059-1060-1061-1062-1063-1064-1065-1066-1067-1068-1069-1070-1071-1072-1073-1074-1075-1076-1077-1078-1079-1080-1081-1082-1083-1084-1085-1086-1087-1088-1089-1090-1091-1092-1093-1094-1095-1096-1097-1098-1099-1100-1101-1102-1103-1104-1105-1106-1107-1108-1109-1110-1111-1112-1113-1114-1115-1116-1117-1118-1119-1120-1121-1122-1123-1124-1125-1126-1127-1128-1129-1130-1131-1132-1133-1134-1135-1136-1137-1138-1139-1140-1141-1142-1143-1144-1145-1146-1147-1148-1149-1150-1151-1152-1153-1154-1155-1156-1157-1158-1159-1160-1161-1162-1163-1164-1165-1166-1167-1168-1169-1170-1171-1172-1173-1174-1175-1176-1177-1178-1179-1180-1181-1182-1183-1184-1185-1186-1187-1188-1189-1190-1191-1192-1193-1194-1195-1196-1197-1198-1199-1200-1201-1202-1203-1204-1205-1206-1207-1208-1209-1210-1211-1212-1213-1214-1215-1216-1217-1218-1219-1220-1221-1222-1223-1224-1225-1226-1227-1228-1229-1230-1231-1232-1233-1234-1235-1236-1237-1238-1239-1240-1241-1242-1243-1244-1245-1246-1247-1248-1249-1250-1251-1252-1253-1254-1255-1256-1257-1258-1259-1260-1261-1262-1263-1264-1265-1266-1267-1268-1269-1270-1271-1272-1273-1274-1275-1276-1277-1278-1279-1280-1281-1282-1283-1284-1285-1286-1287-1288-1289-1290-1291-1292-1293-1294-1295-1296-1297-1298-1299-1300-1301-1302-1303-1304-1305-1306-1307-1308-1309-1310-1311-1312-1313-1314-1315-1316-1317-1318-1319-1320-1321-1322-1323-1324-1325-1326-1327-1328-1329-1330-1331-1332-1333-1334-1335-1336-1337-1338-1339-1340-1341-1342-1343-1344-1345-1346-1347-1348-1349-1350-1351-1352-1353-1354-1355-1356-1357-1358-1359-1360-1361-1362-1363-1364-1365-1366-1367-1368-1369-1370-1371-1372-1373-1374-1375-1376-1377-1378-1379-1380-1381-1382-1383-1384-1385-1386-1387-1388-1389-1390-1391-1392-1393-1394-1395-1396-1397-1398-1399-1400-1401-1402-1403-1404-1405-1406-1407-1408-1409-1410-1411-1412-1413-1414-1415-1416-1417-1418-1419-1420-1421-1422-1423-1424-1425-1426-1427-1428-1429-1430-1431-1432-1433-1434-1435-1436-1437-1438-1439-1440-1441-1442-1443-1444-1445-1446-1447-1448-1449-1450-1451-1452-1453-1454-1455-1456-1457-1458-1459-1460-1461-1462-1463-1464-1465-1466-1467-1468-1469-1470-1471-1472-1473-1474-1475-1476-1477-1478-1479-1480-1481-1482-1483-1484-1485-1486-1487-1488-1489-1490-1491-1492-1493-1494-1495-1496-1497-1498-1499-1500-1501-1502-1503-1504-1505-1506-1507-1508-1509-1510-1511-1512-1513-1514-1515-1516-1517-1518-1519-1520-1521-1522-1523-1524-1525-1526-1527-1528-1529-1530-1531-1532-1533-1534-1535-1536-1537-1538-1539-1540-1541-1542-1543-1544-1545-1546-1547-1548-1549-1550-1551-1552-1553-1554-1555-1556-1557-1558-1559-1560-1561-1562-1563-1564-1565-1566-1567-1568-1569-1570-1571-1572-1573-1574-1575-1576-1577-1578-1579-1580-1581-1582-1583-1584-1585-1586-1587-1588-1589-1590-1591-1592-1593-1594-1595-1596-1597-1598-1599-1600-1601-1602-1603-1604-1605-1606-1607-1608-1609-1610-1611-1612-1613-1614-1615-1616-1617-1618-1619-1620-1621-1622-1623-1624-1625-1626-1627-1628-1629-1630-1631-1632-1633-1634-1635-1636-1637-1638-1639-1640-1641-1642-1643-1644-1645-1646-1647-1648-1649-1650-1651-1652-1653-1654-1655-1656-1657-1658-1659-1660-1661-1662-1663-1664-1665-1666-1667-1668-1669-1670-1671-1672-1673-1674-1675-1676-1677-1678-1679-1680-1681-1682-1683-1684-1685-1686-1687-1688-1689-1690-1691-1692-1693-1694-1695-1696-1697-1698-1699-1700-1701-1702-1703-1704-1705-1706-1707-1708-1709-1710-1711-1712-1713-1714-1715-1716-1717-1718-1719-1720-1721-1722-1723-1724-1725-1726-1727-1728-1729-1730-1731-1732-1733-1734-1735-1736-1737-1738-1739-1740-1741-1742-1743-1744-1745-1746-1747-1748-1749-1750-1751-1752-1753-1754-1755-1756-1757-1758-1759-1760-1761-1762-1763-1764-1765-1766-1767-1768-1769-1770-1771-1772-1773-1774-1775-1776-1777-1778-1779-1780-1781-1782-1783-1784-1785-1786-1787-1788-1789-1790-1791-1792-1793-1794-1795-1796-1797-1798-1799-1800-1801-1802-1803-1804-1805-1806-1807-1808-1809-1810-1811-1812-1813-1814-1815-1816-1817-1818-1819-1820-1821-1822-1823-1824-1825-1826-1827-1828-1829-1830-1831-1832-1833-1834-1835-1836-1837-1838-1839-1840-1841-1842-1843-1844-1845-1846-1847-1848-1849-1850-1851-1852-1853-1854-1855-1856-1857-1858-1859-1860-1861-1862-1863-1864-1865-1866-1867-1868-1869-1870-1871-1872-1873-1874-1875-1876-1877-1878-1879-1880-1881-1882-1883-1884-1885-1886-1887-1888-1889-1890-1891-1892-1893-1894-1895-1896-1897-1898-1899-1900-1901-1902-1903-1904-1905-1906-1907-1908-1909-1910-1911-1912-1913-1914-1915-1916-1917-1918-1919-1920-1921-1922-1923-1924-1925-1926-1927-1928-1929-1930-1931-1932-1933-1934-1935-1936-1937-1938-1939-1940-1941-1942-1943-1944-1945-1946-1947-1948-1949-1950-1951-1952-1953-1954-1955-1956-1957-1958-1959-1960-1961-1962-1963-1964-1965-1966-1967-1968-1969-1970-1971-1972-1973-1974-1975-1976-1977-1978-1979-1980-1981-1982-1983-1984-1985-1986-1987-1988-1989-1990-1991-1992-1993-1994-1995-1996-1997-1998-1999-2000-2001-2002-2003-2004-2005-2006-2007-2008-2009-2010-2011-2012-2013-2014-2015-2016-2017-2018-2019-2020-2021-2022-2023-2024-2025-2026-2027-2028-2029-2030-2031-2032-2033-2034-2035-2036-2037-2038-2039-2040-2041-2042-2043-2044-2045-2046-2047-2048-2049-2050-2051-2052-2053-2054-2055-2056-2057-2058-2059-2060-2061-2062-2063-2064-2065-2066-2067-2068-2069-2070-2071-2072-2073-2074-2075-2076-2077-2078-2079-2080-2081-2082-2083-2084-2085-2086-2087-2088-2089-2090-2091-2092-2093-2094-2095-2096-2097-2098-2099-2100-2101-2102-2103-2104-2105-2106-2107-2108-2109-2110-2111-2112-2113-2114-2115-2116-2117-2118-2119-2120-2121-2122-2123-2124-2125-2126-2127-2128-2129-2130-2131-2132-2133-2134-2135-2136-2137-2138-2139-2140-2141-2142-2143-2144-2145-2146-2147-2148-2149-2150-2151-2152-2153-2154-2155-2156-2157-2158-2159-2160-2161-2162-2163-2164-2165-2166-2167-2168-2169-2170-2171-2172-2173-2174-2175-2176-2177-2178-2179-2180-2181-2182-2183-2184-2185-2186-2187-2188-2189-2190-2191-2192-2193-2194-2195-2196-2197-2198-2199-2200-2201-2202-2203-2204-2205-2206-2207-2208-2209-2210-2211-2212-2213-2214-2215-2216-2217-2218-2219-2220-2221-2222-2223-2224-2225-2226-2227-2228-2229-2230-2231-2232-2233-2234-2235-2236-2237-2238-2239-2240-2241-2242-2243-2244-2245-2246-2247-2248-2249-2250-2251-2252-2253-2254-2255-2256-2257-2258-2259-2260-2261-2262-2263-2264-2265-2266-2267-2268-2269-2270-2271-2272-2273-2274-2275-2276-2277-2278-2279-2280-2281-2282-2283-2284-2285-2286-2287-2288-2289-2290-2291-2292-2293-2294-2295-2296-2297-2298-2299-2300-2301-2302-2303-2304-2305-2306-2307-2308-2309-2310-2311-2312-2313-2314-2315-2316-2317-2318-2319-2320-2321-2322-2323-2324-2325-2326-2327-2328-2329-2330-2331-2332-2333-2334-2335-2336-2337-2338-2339-2340-2341-2342-2343-2344-2345-2346-2347-2348-2349-2350-2351-2352-2353-2354-2355-2356-2357-2358-2359-2360-2361-2362-2363-2364-2365-2366-2367-2368-2369-2370-2371-2372-2373-2374-2375-2376-2377-2378-2379-2380-2381-2382-2383-2384-2385-2386-2387-2388-2389-2390-2391-2392-2393-2394-2395-2396-2397-2398-2399-2400-2401-2402-2403-2404-2405-2406-2407-2408-2409-2410-2411-2412-2413-2414-2415-2416-2417-2418-2419-2420-2421-2422-2423-2424-2425-2426-2427-2428-2429-2430-2431-2432-2433-2434-2435-2436-2437-2438-2439-2440-2441-2442-2443-2444-2445-2446-2447-2448-2449-2450-2451-2452-2453-2454-2455-2456-2457-2458-2459-2460-2461-2462-2463-2464-2465-2466-2467-2468-2469-2470-2471-2472-2473-2474-2475-2476-2477-2478-2479-2480-2481-2482-2483-2484-2485-2486-2487-2488-2489-2490-2491-2492-2493-2494-2495-2496-2497-2498-2499-2500-2501-2502-2503-2504-2505-2506-2507-2508-2509-2510-2511-2512-2513-2514-2515-2516-2517-2518-2519-2520-2521-2522-2523-2524-2525-2526-2527-2528-2529-2530-2531-2532-2533-2534-2535-2536-2537-2538-2539-2540-2541-2542-2543-2544-2545-2546-2547-2548-2549-2550-2551-2552-2553-2554-2555-2556-2557-2558-2559-2560-2561-2562-2563-2564-2565-2566-2567-2568-2569-2570-2571-2572-2573-2574-2575-2576-2577-2578-2579-2580-2581-2582-2583-2584-2585-2586-2587-2588-2589-2590-2591-2592-2593-2594-2595-2596-2597-2598-2599-2600-2601-2602-2603-2604-2605-2606-2607-2608-2609-2610-2611-2612-2613-2614-2615-2616-2617-2618-2619-2620-2621-2622-2623-2624-2625-2626-2627-2628-2629-2630-2631-2632-2633-2634-2635-2636-2637-2638-2639-2640-2641-2

Lilium Leichtlinii

Chrysomelidae (Coleoptera) (continued)

As FLORENSIA MANNING is perhaps the only botanist who has had the advantage of comparing these species in a wild state, great weight must be attached to his opinion, but I cannot without the remark that, however different they may appear at first sight, I am not inclined, so far as my acquaintance of them as cultivated goes, to allow much importance to those characters. In fact, if it were not that such good botanists as Dr. HOOKER and Mr. BAKER had treated this plant as a distinct species, I should be inclined to join it with *L. pseudoboreum* and *L. thymoides*. The colour of the flower, however, will always distinguish it from either of these, and does not seem to vary at all.

The form distinguished as *L. Ledebourii* n. sp. is, I believe, in a great measure the result of the exposure cultivation for which Mr. WILLSON is so distinguished, so I have not seen it except in his garden. I am indebted to him for the plant here figured, which flowered at Heatherbank in July 1816.

Lilium callosum

LILIUM CALLOSUM.

SIBOLD'S LILY

6. *C. glaucum*, Rich. & Tuck. Fl. Jan. in 18, t. 47. Moncl. Ann. Mus. Luy. Nat. 41, 184. Fl. in Green. 1.

L. pomonorum, Thunb. Fl. Jap. 184, non Laro.

Phytophthora complex, *Annals* 9: 407

[illegible]R.B. Bennett et al. / *Journal of Leadership Development* 2 (2005) 103–114

1. *Journal of Management Studies*, 1997, 34, 1, 1-14.

A. tenuifolium var. *stomatolobum*, Thiers. J. L. B. Bot. vix p. 224

L. 10/10/2000, 10/10/2000, 10/10/2000, 10/10/2000

E. musifera, Beagl. *Chetivolum*, 1908, t. 418, fig. 1, et *Mon. Leontina*, non P.O.

4 walls, 100 ft. E. of entrance, brackets found on 100 ft. wall.

Abd. Mawdood (Mawdood). *Deputy editor-in-chief* (1984-90)

Small glabrous to sub glabrous, plumy corollas without style. Stamens 2½-3½ feet long, anthers glabrous, slender, 2-4-petate in length. Leaves 30-50, scattered, long, linear, 5-4 inches long, 1-2 lines broad, narrowed gradually to the bluntly pointed, the edges shallowly revolute, 2-4-nerved. Flowers 2-5, pedicels axillary, ascending, 1-5 inches long, subterminal in the *Agave* plants, though not so distinctly in the *Strophocarpus* (especially by a pair of leaves at the tip). Pedicels marked-out, with obscure black dots on lower half 1-1½ inch long, the segments oblong-obovate to elliptic 3-4 lines broad, obscurely papillose, revolute. Bract about half length. Ovary globose 1 inch long, style 4-5 inch long. Filaments about as long as bract; anthers reniform, 5-4 lines long, pollen reniform. Capsule 1½-1½ inch long, narrow in upper part, 2-4 lines across.

THE plant here described is one which, until quite recently, was little known in Europe, and as it has been confused by authors with another species (*L. naniflorum*), I have taken an early opportunity of clearing it up.

Originally described and figured in BONPLAND's fine folio work on the Flora of Japan, it was afterwards discovered by FERDINAND MARCHAND in America and Mexico, and introduced by MAHER to the Botanic Garden of St. Petersburg in 1853. The continental variety which he sent, being in some points unlike the Japanese plant figured by BONPLAND, was supposed by DR. REICH to be the *Adiantum* province of RAINBOLD, and was named in his honor that name as the "Gartenflora" for 1863.

This variety was afterwards described by Mr. BAKER in the 'Journal of the Linnean Society,' from a drawing of Mr. LACROIX's, as a variety of *L. longifolius*. On a subsequent examination of the plant in a living state, and comparison with dried specimens from Japan, however, Mr. BAKER agreed with me that it is really not distinct from *Scilla'sia* species, though the calyx bracts, which in his figure are probably accidental, are hardly visible in many specimens.

Professor MANMONTZ of St. Petersburg, to whom I applied for information, confirms this opinion and tells me that this variety, which he calls *positiva*, is smaller and lower than the Japanese variety, has few flowers, broader leaves, and few, compressed bracts. He found it rare in Manchuria, in the low hills along the

Sargent often, but more common on dry meadows further up the same river, where it flowers in the month of July. The Japanese plant is found abundantly round Nagasaki, at 500-1000 feet elevation, in mountain-park-lands, where it flowers from July to the end of September—also in grassy valleys at the foot of volcanic mountains in Simabara, but did not find it, however, in the island of Nippon.

Stenroos tells us that he found it growing, in company with such plants as *Androsace*, *Lupulus*, *Erigeron*, and various grasses, on the slopes of volcanic mountains. He also states that the buds are collected and eaten like those of *L. japonica*, either boiled or roasted. They are very nourishing and agreeable in taste, and are used in a preserved state as a relish for *chawan soupin*.

As an ornamental plant this species has little to recommend it. Its flowers are small and dull in colour compared with most *Lilies*, and though it is quite hardy and easy of culture, it is not likely to find favour in the majority of gardens. The specimen figured flowered in my garden in July 1875, from a bulb sent me by Dr. Rostk, in the previous autumn. It profused seed in good season, but, being now tolerably abundant in cultivation, I have not attempted to raise it. I believe that most of the plants now in England are of Russian origin, and belong to the Siberian variety, as I have seen some which showed the collared bracts so distinctly as they are shown in dried specimens from Japan.

Lilium parvum

It appears to succeed best in moist shady soil, and if undisturbed soon acquires rigour, though I have nowhere seen a finer example than the one here figured, for which I am indebted to Messrs. BAKER and GUYTON.

Lilium longiflorum

* $\mathcal{H}_1$ and $\mathcal{H}_2$ are the subspaces of $\mathcal{H}$ of functions which are odd and even, respectively. Suppose $\mathcal{H}_1 \neq \{0\}$ and let $\mathcal{H}_1$ be a core of $\mathcal{H}$ for $\mathcal{H}_1$. Then $\mathcal{H}_1$ is a core of $\mathcal{H}$ for $\mathcal{H}$ and $\mathcal{H}_2$ is a core of $\mathcal{H}$ for $\mathcal{H}$.

[illegible]

and all α_{ij} that are not in S are set to 0. $M = \{A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z\}$, and where α_{ij} denotes the weight of the edge between i and j . The graph is shown in Figure 1, which proves to have a much better constitution and to be more easy to evaluate than many of its neighbors. A detailed description is not

Asplenium = one (possibly more than one) set of leaves at the south end of England, as well as elsewhere. I think, unfortunately, we have lost it as a hardy plant – not so y on account of its dislike to cold but, I think, because of the very poor soil at which it sometimes grows.

Figure 2. *A* shows a corner of an other Lohr's *W. alb. linea* in strong dorsal view, the most prominent which must be well pronounced by those who wish to succeed in its culture. *B*, *C*, *D*, *E*, *F*, *G*, *H*, *I*, *J*, *K*, *L*, *M*, *N*, *O*, *P*, *Q*, *R*, *S*, *T*, *U*, *V*, *W*, *X*, *Y*, *Z*, *AA*, *BB*, *CC*, *DD*, *EE*, *FF*, *GG*, *HH*, *II*, *JJ*, *KK*, *LL*, *MM*, *NN*, *OO*, *PP*, *QQ*, *RR*, *SS*, *TT*, *UU*, *VV*, *WW*, *XX*, *YY*, *ZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*, *CCC*, *DDD*, *EEE*, *FFF*, *GGG*, *HHH*, *III*, *JJJ*, *KKK*, *LLL*, *MMM*, *NNN*, *OOO*, *PPP*, *QQQ*, *RRR*, *SSS*, *TTT*, *UUU*, *VVV*, *WWW*, *XXX*, *YYY*, *ZZZ*, *AAA*, *BBB*,

If care be taken not to overwater it, and to keep down spheros, I believe this Lily will succeed to perfection, planted out in a Greenhouse house, where it will have plenty of space to travel about in well.

Though I have not yet seen more than three flowers on a single stem, I believe it is capable of producing many, and at least may at times have several flowering on separate stems from July to November, or it must be considered again, if not superior to *L. serotum* as an indoor Lily, and surpassing all other, except *L. spicata* which I still look upon as the best of the genus.

Though the furrows vary in size from 4 inches up to a foot long, and in colour from creamy white to brownish and occasionally pink, the varieties are not, in a botanical point of view, very remarkable, and until I knew more about their consistency and local distribution, I should be desirous to separate one of them from the rest. In such a case, colour on characters which in this genus are of little value, described them as *Trifolium sp.*

The seeds, which seem to take much longer in opening than in the case with *L. fulvescens*, and produce *arabids* at once, after the manner of *L. reniformis*, I imagine that in four or five years the seedlings will attain a flowering size, but no effects are made freely, both on the hulls and on the subterranean stem. It is easy to conceive the plant without so great an effect, as that of 1890, on the

The plant here figured flowered in the garden of J. H. S. 1898, 844, at Colchester Park, Gloucestershire on 2 x 1878, and is the same from which a drawing was made by J. H. S. for the 'Gardens of the University'.

LILIUM PARDALINUM.

THE CALIFORNIAN LILY

L. pardalinum, Mill., *Proc. Ch. f. Acad. & 12*, Bucking., Obo 77. *Baker* *Linn. Soc.* no. p. 1.

L. pardalinum, var. *parvifolium*, Baker, loc. cit.

L. pardalinum, var. *dissectum*, Baker, loc. cit.

L. pardalinum, var. *reflexum*, Robt. Lindley, *Flora*, 1873, p. 318, t. 22.

Fl. *Booth*, *Engl. Garden*, t. 523, 1875.

L. pardalinum, var. *Boothii*, Baker, *Gard. Chron.* 1871, p. 821.

L. pardalinum, var. *Boothii*, *Wood*, *Proc. Acad. Phil.* 1879, p. 164.

L. pardalinum, var. *puberulum*, Torr. Bot. Whipple, 97.

Stems simple, lower glaucous, upper lanceolate planes, serrate ciliate. Oculi 5-6-peta, term, strict, glab. Petals variegated 6-12-lobes deeply red, green, 4-6 inch long, 4-6 inch wide, glab, term, ciliate. Stamens 6-12 in anther 4-6 inch long, 4-6 inch wide, glab, term, ciliate. Pistil 6-12 inch long, 4-6 inch wide, glab, term, ciliate. Anthers 6-12 inch long, 4-6 inch wide, glab, term, ciliate. Ovary 6-12 inch long, 4-6 inch wide, glab, term, ciliate. Capsule 6-12 inch long, 4-6 inch wide, glab, term, ciliate.

Cal. California. Oreg. Cal. (Hawaii, Borneo, Kansas, etc.)

Both large, white, producing 4-6 inches or less in the axillary compound of both, white, often attached under. Stem 4-6 inch high, erect, green. Leaves 4-6 inch long, 1-2 inch wide, glab, term, ciliate. Petals 6-12 inch long, 4-6 inch wide, glab, term, ciliate. Anthers 6-12 inch long, 4-6 inch wide, glab, term, ciliate. Ovary 6-12 inch long, 4-6 inch wide, glab, term, ciliate. Capsule 6-12 inch long, 4-6 inch wide, glab, term, ciliate.

THE first Lily, of which one variety is here figured, has been known for some years, having been collected by HARTWELL in 1860, and received the name of *reflexum* from Dr. LINDLEY. As, however, no description was published until 1873, and a plant which had been previously named by THOMAS CARPENT as being referred to this species, it will be best to keep it under Dr. KNEASS's name, by which it is most generally known both in America and England.

The varieties of this species are both numerous and puzzling, but after watching the growth of many plants from different sources, in my own garden, and those of others, for four seasons, I am inclined to believe that not more than two or three are worthy of description, and that even these might so change their form as to become a different one, and conclude that it would be hard to recognize or distinguish them. Reasons when naming species from dried specimens, or after the comparison of a few plants, are often misled by characters which seem at the time good and distinct, but which prove too unstable to rely on, so that the confusion which prevails among the various western species of American Lilies would hardly have been avoided if it had not been for the assistance that has been derived from horticulturists.

I cannot certainly say whether the plants named *Boothii*, *Boothii*, and *Hawaii* come properly under this species or not, but as living plants out of the thousands I have examined can be referred to either *L. pardalinum* or *L. puberulum*, and though these species, or varieties of them, may extend west of the Rocky Mountains, yet I am inclined to think that all the Lilies with stone-colored buds from the Pacific States are forms of *L. pardalinum*.

As I shall have to give another Plate of this species, I will leave the description of the different varieties for a future article, merely stating that the one figured here, which, I believe, shows itself as var. *reflexum*, may always be distinguished from the rest by the greater size and beauty, though smaller number of its flowers, which rarely exceed three in number. It was introduced by HENRY KNEASS, but it is found on the coast range, at a lower elevation than the other varieties, and that in the interior it is represented by a taller and more-flowered plant which he named *L. puberulum*.

Lilium pinnatifidum

Lilium Calceolae

LILIUM CAROLINIANUM

THE SOUTHERN SWAMP LILY

L. carolinianum Greene, Bot. Treas. May 1890, for long 1891, N. Carolina. (See also Greene's report, 1891.)

L. carolinianum Greene, Bot. Treas. May 1890, for long 1891, N. Carolina.

L. carolinianum Greene, Bot. Treas. May 1890, for long 1891, N. Carolina.

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L. carolinianum Greene, Bot. Treas. May 1890, for long 1891, N. Carolina. (See also Greene's report, 1891.)

LILIUM CATESBEEI

PLATE I.

FIGURE 1. Flower. The flower is 2 1/2 inches long, 1 1/2 inches wide, and 1 1/2 inches deep. The petals are white, with a yellow center. The stamens are yellow, and the pistil is white.

FIGURE 2. Flower. The flower is 2 1/2 inches long, 1 1/2 inches wide, and 1 1/2 inches deep. The petals are white, with a yellow center. The stamens are yellow, and the pistil is white.

FIGURE 3. Flower. The flower is 2 1/2 inches long, 1 1/2 inches wide, and 1 1/2 inches deep. The petals are white, with a yellow center. The stamens are yellow, and the pistil is white.

FIGURE 4. Flower. The flower is 2 1/2 inches long, 1 1/2 inches wide, and 1 1/2 inches deep. The petals are white, with a yellow center. The stamens are yellow, and the pistil is white.

FIGURE 5. Flower. The flower is 2 1/2 inches long, 1 1/2 inches wide, and 1 1/2 inches deep. The petals are white, with a yellow center. The stamens are yellow, and the pistil is white.

FIGURE 6. Flower. The flower is 2 1/2 inches long, 1 1/2 inches wide, and 1 1/2 inches deep. The petals are white, with a yellow center. The stamens are yellow, and the pistil is white.

LILIUM CATESBEEI, the most common of the lilies, is a native of the mountains of the Sierra Nevada, and is found in the same parts of the State as the other species of the genus.

This is a very beautiful plant, and is one of the most common of the mountains of the Sierra Nevada. It is a native of the mountains of the Sierra Nevada, and is found in the same parts of the State as the other species of the genus.

The structure of the flower is very beautiful, and is one of the most common of the mountains of the Sierra Nevada. It is a native of the mountains of the Sierra Nevada, and is found in the same parts of the State as the other species of the genus.

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The fully known as *L. undulatum*, which is the most floriferous of all the sections (bearing as many as 1000 flowers), has no bulbils, but flowers at the same time as *L. bulbifera*, fifteen to twenty days before *L.*

There is a curious little stunted plant, which I take to be *E. leucodes* of MEXICO, sometimes it may be so with the *leucodes* *E. leucodes* in its principal characters, though much smaller and, as far as my experience goes, much more delicate. It is a very delicate plant.

E. polyantha, of BAHAMA, is another plant sometimes seen on the Continent, and appearing a variety of *E. leucodes*, from which it differs by being more polyantha. What is known as *E. leucodes* *leucodes* is, in fact, an *leucodes* of the East of Garden, and a most desirable plant. It is, perhaps, a *leucodes* *leucodes* *leucodes* *leucodes* and will be crossed with one of the varieties of the latter species.

The cultivation of *E. leucodes* is extremely simple, as it succeeds well in the ordinary soil of the garden, and is rapidly increased by the bulblets, which, if placed in good soil, will be flowering in one or two or three years.

The plant figured forwarded in my garden in June 1875, and was selected as showing the typical character of the species better than one with a large number of flowers.

The *Bolanderia*, or "the Garden" for Jan. 2, 1919, has grown as good as second of its native habitat that I will quote his description—"This large species has apparently a far less wide range than *A. frutescens*. It occurs mainly on the more elevated portions of the foot hills of the Sierra, from 3200 to nearly 3500 feet altitude, obviously requiring a greater amount of heat to develop its full beauty than the others. The stem in which its bulb is found is of a rather compact character, consisting of clay like, an adventure of broken rocks and a small portion of vegetable mould. Growing in open pasture, or some- where cleared off and therefore exposed to a dry and exhausting air, we find the bulb also at a considerable depth. The stem bulb is very large and strongly bulb, its outer scales are largest, coloured lavender, grey, yellowish and very fleshy, well calculated to hold a large supply of moisture. A short time ago these scales were all broken." Mr. HAZEN on the Island of Santa Rosa, opposite Santa Barbara. As far as I know it is not yet been found on any part of the coast ranges. The plant from Santa-Rosa Island differs but very slightly from that on the foot hills of the Sierra. Its leaves are of a brighter green, narrower, and its whorls are denser and more regular, while the leaves of plants from the Sierra are rather applanate, and the whorls are more or less irregular. The former is exposed to sun, breeze and fog, the latter to a dry air. The bulb

from Santa Rosa, the latter such as at San Francisco than those from the Santa Rosa Island. The type is Van Houttei's "Pina de Hierro," vol. III, p. 1873, representing the usual form as abundant on a mountain in the island.

The bulb of *Lilium Humboldtii* is very remarkable, not only on account of the great size, but because of another shape and structure, which has been well described by PAUL DUCHARTRE, in his "Observations sur l'espèce lat." p. 161. Like that of *L. Washingtonii*, its scales do not spring from a central base, but from a lateral ascending axis, which, growing outwards and downwards every year, throws up its stems except on one side, and, decaying slowly on the opposite side, forms by degrees an elongated mass, quite different from the bulb of any Old World Lily. Whether this peculiar structure is in any way influenced by its native soil and climate I cannot say, and it is curious that the only two species which in any way resemble it in bulb characters, viz. *L. Washingtonii* and *L. schubertianum*, are from the Pacific slope of North America.

The colour of the young stems and leaves, like that of the bulb, is purplish, and the growth is very rapid. This species seems to succeed well in England, both out of doors and in pots, and, perhaps owing to its large and solid bulb, suffers much less from exposure than the majority of Lilies. It appears to like a poor, cold soil, though the young specimens much injured by cold winds or drought, the bulbs rarely decay.

With regard to the varieties of *Lilium Humboldtii*, I can say, as I shall have to say of many other Lilies, that if I had only seen a few of the most distinct, I should readily allow that they were worthy of names and descriptions; but having seen and cultivated a large number, I can say no least by word to define them, yet this opinion I do not think that the variety named by KILLIP as *evansianum*, from Santa-Rosa Island, can be treated as a distinct plant, though Mr. REYNOLDS thinks that it is more distinct than the others, growing as secure as 70 or 40 flowers, while the one now sent has no more than 20-25 and more usually only 5-15, but see the remarks in Dr. KILLIP's paper.

The size, colour, spots, and arrangement of the flowers vary extremely. In some plants the flowers stand out almost at right angles to the stem; in others, as shown on the Plate, they droop at an angle of 45°; in others the pedicels are inclined upwards, and the size and form of individual flowers also vary considerably.

I have received it from various parts of California, from the Napa valley, and from as far south as Santa Barbara. But Mr. HARRIS tells me that the Lily imported as a species from Mexico, and which proved to be a variety of *Humboldtii*, is sent from San Blas.

For the beautiful specimen here figured, which represents the cultivated variety, I have to thank my friend Mr. WILSON, in whose garden at Hestonhouse it flowered in July 1874. The single flowers of other varieties are from Mr. HARRIS.

Lilium Columbianum

The two solutions of $\text{cub}(\lambda)$ are $\lambda_{\pm} = \frac{1}{2} \left(-\frac{1}{2} \pm \sqrt{\frac{1}{4} - 4\alpha} \right)$. For $\alpha \in \mathbb{R}$, the two solutions are

Lilium spectabile

The common narrow-jawed variety (Fig. 2) is from Lower Isle of New York where the HLA is $\alpha\beta\beta\beta$; it is abundant, and is locally, where I have shown it in Fig. 3, not very different from the same, and is more typical of the habits of the typical form. I have no doubt many other well-studied cases have been met with if I see a β . I do not think they need ever be confused with *A. parvus* or *A. columbianus*. Of the plant described by Faxon, Moore in the 'Proceedings of the American Academies' 1903, p. 136, as *F. latifolia* and conceived by Mr. Huxley as a variety of *A. moniliforme*, I know neither, and should regard this as to be a form of *A. parvus*, worth comparison, under *A. moniliforme* be the same surface, as, I think I have shown, as a record of nature's work, is very

For the purpose of the present inquiry, the nature of the "wages" is asked to be specified, but not to be given as a few examples. The more I know of the nature of the wages, the more I am enabled to give a few examples. The more I know of the nature of the wages, the more I am enabled to give a few examples.

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Lilium longiflorum

in 1881, however, it is introduced by no less than four different persons. The Van Smeekens sent 2 eggs, 10 *Heligorus* under the name of *L. piceus* respectively. Mr. T. G. HENSON sent it to America, where it is still called by a local name, *the M. - white*. - J. VAN DER NEEVE in July 1882, and named *Chalcid* *Antaris* by M. HENNE. Mr. R. TONKENS and the late Mr. JOSEPH GOULD VANDERBILT, both of whom were known to me, brought a single, very not long in getting hold of this one, and a good number were dispatched to London, where it has arrived in fair condition. However VAN DER NEEVE and some of Chalcids, knowing of their trust, brought next a male and a female of *Chalcid* *Antaris* - from there it is given out in 1883. - VAN DER NEEVE.

and the natural delicacy of the plant has been something terrible, there is hardly a garden, large or small, where it is not grown and valued. In our own country it is abundant, growing almost by acres in some of its woods, and in a light moist soil on the borders of streams. It is called *Shim-Jay*, or *Hiz-Lu-p*, by the Japanese, and *Shim-Jay* is the name of *Lilac*, the root, according to Mr. Kawan, one of the principal importers in Japan.

The bulbs are collected from the roots of *Lilac* trees in other parts about the end of October or great quantities, and packed in boxes of 25 or 30 each. It is not, as is often said, the bulbs not properly ripened, or the ones exposed to much heat on the voyage, as it is too often the case, the majority arrive rotten, and I suppose to say that hundreds of ones are lost almost every year from rot or other causes.

A large quantity of bulbs are stored, by which the Japanese at Kanton, send as fresh as when they were taken up. Many thousands have been sold at Kanton, growers' rooms during recent winters in splendid order, and at a price so low that there can hardly be much profit to the exporters. If only they were packed in a loose yellowish earth, which filled up the space between the bulb and kept them firm in the box, but now each bulb is packed separately in a ball of mud or clay which hardens so and it, and, by keeping it so, preserves it in a perfectly firm and fresh state.

Still there is something in the constitution of this plant which seems to make it very liable to decay and decay, and the number of bulbs that perish annually in England would hardly be believed. In a dry season, as 1874 they sometimes go off quite suddenly, the leaves first falling, and the stem and flower-buds withering without any apparent cause. Out of a batch of 50 or 60 plants perhaps only 5 or 6 will remain alive two years after they are set in England, but those, if well managed, will be a surprising and successful result. The cause of this disease does not seem to be yet fully understood, but it is in all gardens have suffered from it, and though in some favoured spots the Golden-eyed Lily will probably live and flourish permanently, it does not seem to find the soil and climate of England generally congenial to it. About its hardiness, however, there is not a doubt, and as there is no difficulty in raising it in large quantities from seeds or roots, I do not think we are likely to run short of it even if the usual supplies from Japan should fail.

With proper treatment and attention I believe the Golden-eyed Lily can be grown to greater perfection in pots than in the open ground, and though this is of course the most troublesome method, yet the point is so well stated in the discussion of cactaceae and bulbs that it is the one chosen by most people.

The treatment that I have found by experience the most successful, is as follows.—On receipt of the bulbs, which should be purchased early in the winter (Chinese growers once being in most cases to be preferred to importers), they should be potted singly in pots from 5 to 8 inches in diameter, according to their size. The pots must be well drained and filled about half full of a mixture of moss fibres, peat and well rotted manure, not mixed with coarse river sand. The bulb should then be put in and covered with the same compost to within 1 or 2 inches of the rim. The pots should then be plunged in water, moss-water, or some similar substance, in a cold frame, orched-house, or shed where the frost cannot enter, and covered up with leaves or straw. In three to four months they will begin to shoot, and should then be uncovered, and placed in a light and airy place, not too much exposed to the direct rays of the sun. Water must be given sparingly, but in the summer months, as advanced, copious supplies are necessary, and the soil from first to last must never be allowed to get hot or dry. Bulbs, which are very fond of and require to the young growth of *Lilac*, must be carefully sought for and destroyed, or they will injure the flowers. As the stem begins to show out roots a good surface-dressing, of rough peat must be put on, and very weak liquid manure may be given at intervals, if the plants are well rooted and growing freely, otherwise it does harm, and it must never be used too freely.

During the growing-season the plants should be kept in a cool greenhouse, and well syringed at intervals, or may be plunged out of doors in a sheltered and half shade position, where they will bloom later. If this preliminary syringing, they may be syringed into larger pots without injury about May or June, and when once they are well rooted in these latter or larger pots than in those first, so the soil is kept in a more regular state of moisture. If, however, a number of imported bulbs are potted together in one pot, they will probably flower at different times, and so spoil the effect.

The greatest success is usually obtained with bulbs that have been grown two or three years in England.

It is not, as is often said, the bulbs not properly ripened, or the ones exposed to much heat on the voyage, as it is too often the case, the majority arrive rotten, and I suppose to say that hundreds of ones are lost almost every year from rot or other causes.

and these frequently attain a height of 5 to 7 feet, and produce as many as 20 to 30 or even more flowers on a single stem. They vary much in size and colour, as will be noticed—some plants bearing flowers only at the top of the stem, and others more by way down it.

After leaving the pots moist by no means be neglected or allowed to become dry, as they so often are. These varieties are the cream of the greenhouse stock, and require the pots being watered for as long a period as possible, and this is to be ensured by careful watering. If they are watered sparingly, which is the practice of many growers, it should be done as soon as the stems have completely withered, and with as little disturbance to the roots as possible. The stems, however, should always be cut off close to the bulb, removing with it the mass of roots, which having fulfilled their function of nourishment during the growing-season, are now useless. A fresh top-dressing being put on, the pots should be returned to their winter quarters, and kept in a state of gentle moisture, neither dry nor wet, until the new growth again appears.

As regards the soil—on which this plant succeeds best out of doors I cannot do better than refer my readers to an account of the garden of JAMES MITCHELL Esq., at Ockendon Park, Weybridge, which was published in the 'Gardener's Chronicle' for December 18, 1872.

The extraordinary success which has been obtained here is in my experience unequalled, and so, I think, due principally to the soil and situation of Mr. MITCHELL'S garden, which slopes gently to the north, and is well sheltered by trees from wind. The soil is very light, but always moist below, and the Lilies are all planted on the edges of shallow beds, where they are protected from spring frosts and the soil is sheltered from the sun. Here they attain a height of 5 to 11 feet, bearing commonly 20 to 40 flowers on a single stem, and blooming at various times from July till the end of October, the middle of August being the time when they are usually seen in the greatest perfection.

Lilies require exposure and being under favourable conditions, and may be propagated in this manner with moderate care if once the secret is lost for more than a year before germinating. I have not yet been able to ascertain the reason why seeds ripened and sown at the same time vary so remarkably in the period of germination. A few usually come up in the first season, and the majority in the second, but some lie dormant for as much as thirty months.

The plant which I introduced is by no means so fine as is often seen, either in the market or out of it however. But a Duke of Devon, this fine variety not contain a truly large specimen.

The variegation is so numerous that hardy two plants in fifty will, be exactly alike, but no striking departure from the typical form exists.

The plant known as *L. edmondstoni* is an extremely scarce and beautiful variety, which I hope to figure in a future Plate. It has the yellow band replaced on the upper part of the petal by more or less deep red, in rare cases almost crimson, and appearing, much more frequently, however, the red tint is pale, and fades after the flower has been out a few days.

A somewhat scarce and even more beautiful variety was figured in the 'Floral Magazine' for November 1872, under the name of *L. edmondstoni*, offering from the bud in the crimson band, which is the centre of a extremely dark being extended to the very base of the petal.

Lilium reginae
var. *reginae* (L.) Miller

along an extremely variable path, both in form and colour, and one that has been long cultivated in Japan, a host of variations have been reported from time to time, and have been given such names as *obanake* or *obanaka* species. As, however, no good characters can be found to distinguish them, and many of the garden names have been applied without description to the same or different varieties, I shall not

I have studied the *dissectum* group of this group *dissectum* in the gardens of England and the Continent, with much care, and have to thank especially Mr. WILSON, Mr. J. H. KRAMER, of HARTING, and Mr. P. HARRIS, of KING'S CROSS, COVENT GARDEN, for the facilities they have given me in visiting and examining their *dissectum* gardens, but through the paper by MARIAN BAKER and DYER in the "Gardener's Chronicle," 1912, I have been enabled to do so. The fact is, that the Japanese Orange *Limon* have been crossed, commonly with the European ones, and it is therefore impossible to refer many of the garden forms to either species. One thing, however, I think probable is, that the forms grown under the name of *L. dissectum* but with one exception, nothing to do with the true *L. dissectum* of Siberia (which has a very different habit), are more nearly related to *L. japonicum* than *L. dissectum*.

The varieties of *L. japonicum* which I think most distinct and worthy of notice are as follows:

1. *L. japonicum*, var. *dissectum* in the "Botanical Magazine," vol. xiv, p. 38. 1-2 feet in height, with broad leaves, many of them, and unspotted flowers of a deep reddish orange. This may be considered the type of the group.
2. *L. japonicum*, var. *humboldtii*, Maxim. Floral Magazine, t. 104. Under a foot high, broad leaves, inter-veined. Flowers spotted towards the base, orange in the middle of the petals, with few spots.
3. *L. japonicum*, var. *oblongum*, Baker and Dyer (*L. Thalictrum japonicum nigro-maculatum*, Flare des Serres, t. 1907, and grown under this name in the Dutch and Belgian gardens). The dwarfest form of all under a foot high, with two or three large, apricot-colored flowers freely spotted with black. A most graceful and beautiful form.
4. *L. japonicum*, var. *oblongum* (Baker and Dyer). Resembles the last in color, but brighter, with silver spots, and considerably taller. A very pretty variety, which I have only seen in Mr. Wilson's garden.
5. *L. japonicum*, var. *oblongum*, Lindl. Bot. Mag. 22, t. 56 (*oblongum* hort.). A fine, dwarfed variety, with open segments of a deep red color, moderating towards the tips, but not so dark as the others.
6. *L. japonicum*, var. *oblongum*, Baker and Dyer (*L. Thalictrum japonicum nigro-maculatum*, Flare des Serres, t. 1907, and grown under this name in the Dutch and Belgian gardens). A taller form, with very dark crimson flowers, narrow petals and dark spots.
7. *L. japonicum*, var. *oblongum*, Knuth, Enum. p. 345, Flare des Serres, t. 1907 (*oblongum*, Flare des Serres, t. 1907, and grown under this name in the Dutch and Belgian gardens). A taller form, with very dark crimson flowers, narrow petals and dark spots.
8. *L. japonicum*, var. *oblongum*, Knuth, Enum. p. 345, Flare des Serres, t. 1907 (*oblongum*, Flare des Serres, t. 1907, and grown under this name in the Dutch and Belgian gardens). A taller form, with very dark crimson flowers, narrow petals and dark spots.

There is also a variegated form, *L. japonicum*, var. *oblongum*, Lindl. Bot. Mag. 22, t. 56, which has white and green variegated petals, but it has no seeds and is recommended.

I am indebted to Prof. MARIAN BAKER, of St. Petersburg, for the following notes on *L. japonicum* as observed by him in Japan. "It is very rare *L. dissectum* whose capsule it has, but seems to differ by the narrower veins of its petals, broader leaves, in the quadrilateral, and often also in the quadrilateral plant in its flower, which is red throughout, and not yellow at the base as in *L. dissectum*, and in the first stage of the capsule, but the principal difference is in the habit. I have this species only, only from the west of Japan from two sources, where it seems to grow in clayey soil, but it is cultivated in many gardens around Japan. The most plant is a open light, the flower red, with dark spots. The cultivated one is a small and a common one."

The Japanese distinguish two a spring and a summer form. The former, with narrower leaves and

a more open flower, they call "Muri-ushuku-puri," and the latter, with broader leaves and "warmer flowers," "Koto-ushuku-puri." I have not seen the second form.

L. belliforme, L., with which *L. elaeagnifolia* was often confounded, is here remarkable in its elongated capsule which is deeply umbilicate at the apex, and sometimes (not always) by its solitary bulb.

L. dolabriforme, Gertl., is also found abundantly on the island of Yezo, about Hakodadi, where it grows in wet places, crevices of rocks, and on borders of fir-woods. It is possible that some of the varieties of *L. elaeagnifolia* have been found in Japan between two species and *L. dolabriforme*, in the same way that they have appeared in Europe between *L. dolabriforme* and *L. belliforme*. There is reason to suppose that a *L. elaeagnifolia* type is found in a wild state in the north of China, but having seen no dried or living indigenous specimens from that country, I cannot be sure to which species it belongs.

The cultivation of *L. elaeagnifolia* and its varieties is easy: it requires nothing more than a good rich sandy soil, well drained, but not too shallow; and though it sometimes grows best in a peaty soil, it is not necessary for this as for some Lilies. In pots it also grows well if properly attended to, and produces seed which germinates quickly, and grows more rapidly than in the case of the Martagon, though great care must be taken of the young plants in their earlier stages.

My first Plate represents three varieties:—on the left hand is *L. cretense*, in the centre, *L. elaeagnifolia*, and on the right, *L. sinuatum*,—all of which were drawn from plants which flowered in my garden in 1875.

The second Plate represents the variety *Alba* Wilson on the right,—on the left the variety *L. sempervirens* which I believe to be a hybrid between *L. elaeagnifolia* and *L. belliforme*:—on that account I have not mentioned it among the varieties of this species, though for garden purposes it is one of the best forms which are constantly grown.

to make an analogy I was using the situation of metals and metalloids. I was at a time and place where we were very much in charge of the situation.

It seems that this Toy was first introduced from China some time about 1840 by Mr. J. B. Smith, a Scotch-
born, of the House of Burgh, to whom they belonged. The game, however, has since been brought out, al-
though it has been raised from seed by Miss Mary Leitch, who was quite a young lady when she first
saw some, and I do not think it will ever become as popular a game as our present one. It is, in fact,
being apparently of a more delicate constitution and much inferior in beauty.

There was some correspondence on the subject of the Lily in the 'Gardener's Chronicle' for 1897, which tends to show that the variety first introduced by Mr. Forster, and which, as I have said, probably came from China, was taller, more floriferous, and whiter than those now in cultivation. There is now not a decided difference in the arrangement of the leaves, which are not always arranged in a regular whorl, but are sometimes scattered.

As this plant produces its stems very early in the spring, and they are much injured by frost, it is desirable to protect them with a hand-sift, and care must be taken that the beautiful browned foliage is not injured by sun and wind.

Though it has been successfully grown by HERR, LESTER, M. KRAUSE, and others, I have never myself been fortunate enough to flower the plant, and am indebted to SAM JOSEPH HANSEN for permission to figure a variety observed at the Royal Gardens at Kew in July 1937.

The spore, which is the only one I have seen, was grown by Mr. HARRINGTON, of Oaklands Park, Weybridge, and though probably not fully developed, contained a few good seeds, and shows the peculiar shape very clearly.

Lilium longiternum Maxim.

Dr. KILLICK says the "Garden," January 7, 1874—"It occurs in the Capatzen Mountain in San Diego county (in most southern basins that at present), northward along the western slope of the Sierra Nevada between 5000 and 6000 feet elevation, as Orizaba, in the Comalsá river, and as the most-easterly north of the mountains, in the western parts of Mono and Tehuacan valleys. In all the above named it occurs on the steeply shaded slopes of rocks having a porous loose soil resting on a gravelly substratum. At no time have I met with a point of the species in a soil of which the drainage was not perfect, or where which being on a slope, did not flow to some point between east and south. The rock, mostly sandstone, was of all degrees of softness, from 10 to 20 inches. The height of the stems, the number of whorls and of flowers on a single stem, vary very much according to soil, position, and age of the plants. Much has been said about the difficulty of extracting the beautiful species. I strongly confess that I have also met with many specimens until I paid proper attention to the soil and situation. If the bell is placed at a depth of from 5 to 12 inches in a zone, somewhat gravelly,

Lilium Martagon

Writing from Mazatzal he says:—*L. Nuttallianum* flowers in August or September, usually the latter. It is a hardy plant, and here develops both heat and cold. I find it growing at an elevation of 5000 feet on the open grassy hills, on a slope of 45°, not in the shelter of the forest, at a soil full of limestone pebbles, the matrix composed of sand, clay, and vegetable mould. On account of the steep slope of the hillside it is thoroughly free from surplus water, the temperature of the summer sun being from 110° to 120°. From June to the end of September (which is our rainy season) it grows in a perfect dry spot, and in the autumn it must get dry for 30 days. From September to December it gradually dies down in a few warm temperatures by day, with here and there a frost in November. Little rain falls during these months. Sometimes there is but little snow in winter, with hard frosts at other times the snow lies 2 feet deep, but this is unusual. The bulbs are at first 6 to 2 inches deep, and annual, and the plant seldom or never produces seed, but is propagated by suckers or by tubers from some part of the stem, so that the flowering plants are surrounded by numerous young ones of 1/2 to 3/4 size.

The plant was given by Mr. Fitch from the excellent dried specimens in the Kew herbarium, which were collected by Mr. OLSHAK in 1962 in the Herodes Islands, part of the Curaca archipelago. It is most likely that the extremely attractive bees and fauna of these islands and the Curaca may not remain much longer a most colorful show.

[illegible]

It is important that the disposition of the funds be made in accordance with the instructions of the donor, and that the funds be used for the purposes for which they were given.

As a result, the model is able to capture the underlying structure of the data, and the model is able to capture the underlying structure of the data.

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and the individual part of a system, the most serious limitation to design space. The system is a complex system and most designers have to find a solution by a trial-and-error and a combination of their own knowledge and the knowledge of the others. Figure 1 shows the design of a multi-link mechanism. Figure 2 shows the design of a mechanism for a robot arm. Figure 3 shows the design of a mechanism for a robot arm. Figure 4 shows the design of a mechanism for a robot arm.

25. The following are the first four terms of a geometric sequence. Find the next three terms.

Lilium zeylanicum

I am anxious to think that Mr. Barker has drawn up a list on the species in the "Gardens' Club state" with some other point in view, but as I believe the specimens in U. S. ARCADE'S herbarium are the same - which can be depended on, they have been copied by Mr. Fitch for this week.

LILIUM MARITIMUM.

THE COAST-LILY.

Lilium maritimum, L. f. *Bot. Voy.* 1. p. 104. t. 1. f. 1. *Bot. Voy.* 1. p. 104. t. 1. f. 1.

Lilium maritimum, L. f. *Bot. Voy.* 1. p. 104. t. 1. f. 1. *Bot. Voy.* 1. p. 104. t. 1. f. 1.

Lilium maritimum, L. f. *Bot. Voy.* 1. p. 104. t. 1. f. 1.

Lilium maritimum, L. f. *Bot. Voy.* 1. p. 104. t. 1. f. 1. *Bot. Voy.* 1. p. 104. t. 1. f. 1.

THIS flag has been recently described by Dr. Kneass, of San Francisco, and though it has not yet been imported into living state to Europe, I am anxious, through the kindness of Mr. Haussmann, of Liverpool University, to give a figure of it from a dried specimen, which was selected as being fairly typical of the plant, and which is now in the Royal Herbarium, Kew.

Mr. BAKER, to whom I am indebted for the description given above, thinks (and I am entirely of the same opinion) that there is, as far as we know at present, no good character by which the plant can be distinguished from *L. Andromeda*; but as we have not yet been able to compare the plants in a living state, and Dr. Kneass must have been a participator of doing so, I should not be right in refusing to recognize it as a distinct species.

I have received from Mr. HORTON, a well known botanist and collector, an account of a *Lily* which he found on the same coast, between the Falk and American rivers, about 200 miles north of San Francisco, and says it is most like the same. Mr. HORTON sent home both of it under the name of *L. Van Houttei*, but I am not aware that any botanist who has been in Europe (though I received a drawing of it under that name from Mr. H. B. S. and the Count de St. Albans). He differs and it is found a dwarf *Lily*, very distinct in habit from any other, and having a small, orange red-spotted, compound flower. The bracts resembled those of *L. rubicundum*, of which the plant is very peculiarly a good variety.

The following note on this *Lily* by Dr. Kneass was published in 'The Garden,' July 17, 1852.—"This is a very small maritime *Lily*, recently described, though for 20 or 30 years considered *distinctly* distinct by Mr. Haussmann and myself. I have seen it in the last. A year ago I visited the native habitat, directed particular attention to its special characteristics, and collected many bulbs for distribution to Mr. Haussmann and other friends for study, culture, and use. It is now in bloom at Mr. Haussmann's, and I think it well worthy of a distinctive name. It has not the creeping, caespitose, or zigzag, form of *L. perfoliatum* or *L. pardalinum*, and may be worth a distinct name hereafter."

LILIUM PARDALINUM.

THE CALIFORNIAN LILY.

In my previous account of the Lily which accompanied the Plate of the species in last number, we saw that the varieties were numerous. In this account I could judge from the examination of a few specimens of which I had obtained during former seasons in my garden, I believed them all to be of the same species. The appearance of the plant, however, is very much varied, and though I have endeavored to show the most common forms, I am not certain whether some of the specimens quoted under this species may not be distinct *L. Pardalini*.

Mr. SUMNER WATSON, of Harvard University, who has recently revised the flora of the Pacific States, writes to me in a letter dated April 22, 1878: "I suspect that there is some confusion with regard to *L. pardalinum* and its varieties. My specimens are more exactly than I could wish, but I have specimens from HALLGREN himself, both of *L. pardalinum* and also var. *angustifolium*. His *pardalinum* is from Alameda County, and the stout large-flowered form with many branched pedicels. The variety has narrower standard leaves, and is more like HARTWEG's No. 3003 (*L. californicum*, var. *Hartwegi*, Baker), which I suspect must also be *L. Huntii*, Regel's name is considered to come from Utah, and is my opinion a good variety as compared with what I have to be the typical form. I do not know what your *californicum* is, as I have not access to LEBLANC's plants. HARTWEG's per se, which WATSON refers to it (1874 *discolor*), he mentions again in connection with *L. californicum*, var. *californicum*, Watson, under *L. Humboldtii*. Is it not possible that this *L. californicum* means forms of *L. Humboldtii* which ranges as far north as Yuba Co. at least, as well as perhaps the typical *pardalinum*?"

In a later letter dated May 15th, and written after seeing the Plate in the fourth part of this work, Mr. WATSON says:—"It seems that my suggestions respecting *L. pardalinum* were, at least in part, correct. Your figure represents exactly what I received from Mr. HALLGREN of the typical form, so that there need be, I think, no more said of a var. *californicum*."

After taking into consideration all the facts I have been able to gather respecting this species, I think it is most convenient for its future use to be as follows:

1. *L. pardalinum*, Kell., var. *californicum*, Ledeb., = *L. Nelsonii* hort., figured in part 4 of this work as the Plate heretofore incorrectly as *Lilium californicum*.

One, which I take to be the typical form, is easily distinguished from the rest by the size and color of its flowers, which approach those of *L. Humboldtii* in dimensions and brilliancy. This form never, in my experience, bears more than five flowers, usually only two or three. The pedicels usually spring from one point on the stem, as shown in the figure, and do not form a raceme, as usual in the other varieties. This form came true from seed in my garden, but I cannot say whether it always does so. I believe it was first introduced from California to the country by Mr. BARRISMAN of the "Garden," who has done more to make ladies and other hardly popular than any other writer.

18th Alameda Co., California.

2. *L. pardalinum*, var. *angustifolium*, Kell., as figured on the present Plate.

This form, which is perhaps the most common in gardens, is distinguished by numerous flowers of moderate size, lanceolate leaves about 6 inches long by one broad, usually in whorls of eight to twelve, but the whorls on other branches and the leaves scattered.

3. *L. pardalinum*, var. *umbellatum*, hort. Watson.

A form near the last, but with narrower, more pointed leaves, twelve to fifteen in a whorl, the pedicels double under, longer, and more open than in the last. It was raised from seed in Mr. WATSON's nursery at Fort Union, but a plant from SUMNER Co., Oregon, which I received from Mr. HALLGREN, was exactly similar.

4. *L. pardalinum*, var. *discolor*, Watson.

A form resembles the last two more than the first, but is distinguished by the whorls of narrow leaves being more closely double. Each whorl contains about 12-24 leaves in two series. The plant is, in England, free-

been to receive data later or fewer than the others. It has been in cultivation many years in the gardens of the Rev. H. Ellacombe at Broom, under the name of *L. Molandii*—but has nothing to do with the *L. Molandii* of which *L. Molandii* is a synonym. It was, I believe, introduced many years ago by H. B. Rees, a Welsh horticulturist, who wrote:

L. pinnatifida, var. *pinnatifida*, Baker

This form, which is, in general, usually called *pinnatifida*, but is not the *pinnatifida* of Tuckerm., is distinguished by its short, blunt, squarish leaves, which are constantly of a paler colour than those of the other varieties. It is very dwarfish, producing from twenty or thirty or more flowers on a stem from 2 to 3 feet high, but the flowers are not quite so numerous and pure as in the other varieties. I first received it in 1872 from Messrs. Rees & Co., of York, and I believe it was first introduced, together with other varieties of the same plant, by Mr. B. Rees. The form, indeed, and life of these forms certainly appear to be distinct and constant, but the *L. pinnatifida* and *L. pinnatifida* have been in my garden for four seasons, but I should not be surprised to find that the distinctive characters disappeared under changed conditions, and, perhaps, even now they could not be exactly identified with plants in a state of nature.

The habitat of this plant is the coast-range of California and Oregon, from about 1000 to 4000 feet elevation, where it grows in rocky valleys and wet places near springs. It is found growing in great abundance in certain localities, and frequently attains an elevation of 7 or 8 feet. I am not aware that any of the forms of this *Lily* have been found in the Rocky Mountains, or in Southern California. The habitat given for *L. pinnatifida* in Utah, as I think, very doubtful, and Mr. Rees himself was unable to remember having found any point of this nature in Utah.

The cultivation of all these forms is so easy, their constitution so good, and their increase so rapid, that I can confidently recommend them to all. Unlike so many *Lilies*, which year by year get weaker and fewer and soon die, notwithstanding all the pains which have been taken to provide them with orange soil quartets, this species is a really good garden plant, requiring only tolerably deep moist soil and protection from wind to develop its full beauty.

The buds, when established, produce annually from three to five flowering growths from each and one, each setting a crowd of five stems to spring up, and a great abundance of flowers to appear. The seed plant, which is produced in fiveable stems, grows much more quickly and easily than in the case with many *Lilies*, and produces flowering plants in about four years. I have found that it is better to divide the masses of bulbs formed by the varieties of this *Lily* about once in three years, as they crowd each other so much by their rapid increase that the stems become weak from want of roots.

The plant from which my figure was drawn flowered in my garden in July 1881.