

The Water Garden





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THE WATER GARDEN



PLATE I.

VICTORIA REGIA (TRICKER'S VARIETY) AND VICTORIA REGIA RANDII.

These are both fine specimen plants, backed by Sour Gum and Wild Cherry trees, with Eulalia, Golden-Rod, Sumach, Cyperus, and Caladium on the bank, and festooned with the Wild Cucumber, most beautiful, graceful, and harmonious. Tricker's Variety is the plant at the back; Randi in foreground.

THE
WATER GARDEN

EMBRACING

THE CONSTRUCTION OF PONDS, ADAPTING NATURAL STREAMS,
PLANTING, HYBRIDIZING, SEED SAVING, PROPAGATION, BUILDING
AN AQUATIC HOUSE, WINTERING, CORRECT DESIGNING AND
PLANTING OF BANKS AND MARGINS, TOGETHER
WITH CULTURAL DIRECTIONS FOR ALL
ORNAMENTAL AQUATICS

BY
WILLIAM TRICKER

*PROFUSELY ILLUSTRATED WITH NINE PLATES, EIGHTEEN FULL PAGE
DESCRIPTIVE VIEWS, AND NUMEROUS OTHER SKETCHES
IN THE TEXT*

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PREFACE.

OF late years interest in the cultivation of aquatic plants has grown enormously; not only are Water Lily ponds now features of our public parks and larger private gardens, but even in the back yard of the suburban resident one can frequently find a few tubs or a small tank, where the cultivation of Water Lilies and of the Lotus is indulged.

Such widespread interest in a branch of horticulture which is comparatively new seems to demand a practical handbook dealing with the Water Garden from the standpoint of the cultivator. Certain it is, from the experience of the author in having to frequently reply to inquiries as regards the proper care and attention to be given to Water Lilies and other aquatics, that there is some desire for a volume such as the present.

The production of the work in its present form would not have been possible but for the kind assistance rendered by many friends, and thanks are extended to all, but especially must acknowledgements of valuable aid be made to the following: Mr. S. C. Nash for the use of many illustrations from negatives made by himself; to Mr. J. N. Gerard, for the opportunity of adding a view of his water garden; to the proprietors of *American Gardening*, and the H. A. Dreer Co., for the use of illustrations; to Mr. Willard N. Clute who contributed the chapter on Ferns; to the Editor of the *Metal Worker* for illustrations representing Scollay's heating plant for the Tropical Water Lily Pond in Prospect Park, Brooklyn, N. Y.; to Mr. J. M. Hodgson for the miniature views of his Newport Garden; to Mr. P. Bisset for photographs furnished; to Messrs. Lord & Burnham for illustration of Aquatic house; and to Prof. Byron D. Halsted for information on diseases.

In the matter of illustration, the use of the photographic camera and the direct reproduction of its work, has been largely relied upon. The object in view has been to present, as faithfully as could be done, views taken direct

from nature and demonstrating different styles of planting suitable for different situations and locations as they may be actually seen. By this means more than by any other it is felt that a true conception of the possibilities of the water garden can be obtained, and prominence has therefore been given to photographic views in the following pages.

In conclusion I must acknowledge my indebtedness to Mr. Leonard Barron, Editor of *American Gardening*, for having prepared for press the MSS. of the entire book.

If this effort add in any way to the better appreciation of the beauties of the Water Garden and its charming occupants; if it lead but a few towards that great pleasure and satisfaction which has been mine after years of experiment and trial, the labor of production will not have been in vain.

W. T.

"It is neither wise, nor tender, nor loving, to remit to others, however expert, the supreme care of one's garden. You will tend yours with your own hands, and discover its needs with your own heart; and if, in doing so, you have to withdraw yourselves sometimes, more than accords with modern wont, into rural seclusion, your social instincts will not thereby be starved, nor your share in the graces and charities of life thereby be curtailed. You will find much resemblance between flowers and human beings, for they too grow reserved under coldness or maltreatment, and respond with almost feminine alacrity to every sympathetic endeavor to apprehend them."

Alfred Austin

TABLE OF CONTENTS.

CHAPTER	PAGE
I.—Introductory	3
II.—Where to Grow Aquatics	8
III.—Soil	20
IV.—Treatment of Margins	24
V.—Planting	33
VI.—Hybridizing, Seed Saving, Wintering	41
VII.—Seedling Plants and Propagation	46
VIII.—Nymphaeas: Classes and Distribution	49
IX.—The Victoria	53
X.—The Aquatic House	65
XI.—The Amateur's Water Garden	73
XII.—Insects, Rats, Diseases, and Enemies	77
XIII.—Heating Plant for a Victoria or Tropical Water Lily Pond	83
XIV.—Descriptive List of Water Lilies with Cultural Memoranda	
I. Hardy Nymphaeas	86
II. Tender Nymphaeas, Day Blooming	90
III. Tender Nymphaeas, Night Blooming	92
IV. Victoria and Euryale	94
V. Nelumbiums	95
XV.—Miscellaneous Aquatic Plants	
I. Tender	96
II. Hardy	98
III. Plants for Aquaria and Shallow Water	101
XVI.—Ornamental Grasses—Bamboos—Orchids—Pitcher Plants	103
XVII.—Ferns Suitable for the Aquatic Garden	107
XVIII.—Hardy Perennial Plants Suitable for Margins of Ponds and Moist Grounds	112
XIX.—Hardy Trees and Shrubs for Wet and Moist Situations, Margins of Ponds, Lakes, etc.	118

LIST OF ILLUSTRATIONS.

	PAGE
<i>Nelumbium speciosum</i>	1
A natural piece of water planted with Water Lilies.....	3
Pond of hardy Water Lilies in Union Park, Chicago.....	11
Pond of hardy Water Lilies, and rockery.....	15
Section of wall.....	18
Group of tropical Water Lilies and <i>Victoria Randii</i>	21
<i>Eulalia japonica</i>	26
An Amaten's pond, 6x12 feet, showing masonry above ground level.....	27
The Water Lily pond in the gardens of Hon. Gardiner G. Hubbard, West Washington, D. C.....	31
<i>Victoria Randii</i> and <i>Nymphaeas</i> grown in an artificial pond.....	35
A natural piece of water.....	39
Planting of a natural piece of water.....	43
<i>Victoria regia</i> (Tricker's variety) showing partly opened flower.....	51
<i>Victoria regia</i> (Tricker's variety) with fully opened flower, and bud showing.....	55
Vigorous growth of <i>Paulownia imperialis</i>	59
An Aquatic house.....	67
Leaf of <i>Ouvirandra fenestralis</i>	69
<i>Ouvirandra fenestralis</i>	70
An Aquatic garden and fishery combined.....	71
<i>Nymphaea Marliacea chromatella</i>	74
An Amateur's aquatic garden.....	75
<i>Arundo donax</i> (Giant Reed).....	79
Leaf of hardy <i>Nymphaea</i> affected with <i>Cerospora</i>	81
Heating a Lily pond in Prospect Park, N. Y.....	84
Stellate form of <i>Nymphaea</i>	91
<i>Aponogeton distachyon</i>	96
<i>Limnocharis Humboldtii</i>	97
<i>Myriophyllum proserpinacoides</i>	98
<i>Iris Kämpferi</i>	99
<i>Sagittaria</i>	100
<i>Cubomba</i>	101
<i>Stratiotes aloides</i>	102
<i>Eulalia japonica zebrina</i>	104
<i>Dionea muscipula</i> (Venus' fly-trap).....	105
<i>Sarracenia</i>	105
<i>Adiantum pedatum</i>	108
<i>Funkia</i>	113
<i>Mertensia virginica</i>	115
<i>Spiraea palmata</i>	116
<i>Trillium</i>	117
<i>Clethra alnifolia</i>	118
<i>Kalmia latifolia</i>	119
<i>Magnolia glauca</i>	120

PLATES.

I.— <i>Victoria regia</i> (Tricker's variety) and <i>Victoria regia Randii</i>	Frontispiece
II.—Flower of <i>Victoria regia Randii</i>	facing page 8
III.— <i>Nymphaea gracilis</i>	" 24
IV.— <i>Nymphaea gigantea</i>	" 40
V.— <i>Nymphaea Sturtevantii</i>	" 48
VI.—Egyptian Lotus.....	" 56
VII.—A charming nook.....	" 64
VIII.—A magnificent Clump of <i>Papyrus antiquorum</i>	" 72
IX.— <i>Musa ensete</i>	" 88



NELUMBIUM SPECIOSUM.

A view in the large pond at the Water Gardens, Clifton, N. J. In company with the Lotus are *Nymphæas*. The margin of the pond is furnished with *Zizania aquatica* (Wild Rice); the central object in the background is a trunk of a dead tree covered with the wild grape vine.

THE WATER GARDEN.

CHAPTER I.

INTRODUCTORY.



WATER LILIES, or Pond Lilies, have existed through the ages. The native species, *Nymphaea odorata*, the white fragrant Pond Lily, was introduced into England in 1786. The English species, *Nymphaea alba*, also white, was recognized long before; these two species have become widely known and the general impression has been that all Water Lilies were white, hence the expression of surprise when one sees a red, yellow, or blue Lily for the first time.

Aquatics are associated with the ancient Egyptians in their literature. Mention is made of the Lotus or Water Lily, the name being applied both to *Nelumbiums* and *Nymphaeas*, and, in fact, to several other plants in different parts of the Old World. Three distinct species are represented on many Egyptian monuments and are known to botanists and gardeners of the present day as *Nelumbium speciosum*, *Nymphaea Lotus*, and *N. cerulea*. *Nelumbiums* were not only known to the Egyptians, but were common in the East and West Indies, China and Japan, Persia, and Asiatic Russia. The United States can also lay claim to one Lotus—*Nelumbium luteum*—the well known yellow American Lotus.

Amongst the many plants now grown for the embellishment of our gardens, public parks, and cemeteries, are hardy herbaceous plants, bulbs, annuals, tender plants known as bedding plants, sub-tropical plants, and last,

but not least, aquatic plants. As Orchids are amongst greenhouse plants, so are aquatics amongst garden flowers, "The Elite." These are comparatively new and of recent introduction, though they have been known to collectors and a few cultivators for a number of years; but adaptability of them (including the most tender *Nymphæas* and *Victoria regia*) for general culture out-of-doors in summer is a realization of recent date.

No class of plants is more widely distributed than Water Lilies, being indigenous to the United States, Canada, Central and South America, East and West Indies, Japan, China, Siberia, England, Europe, Austria, Africa, and Australia, each country possessing its own or several species of marked distinction, size and color. No class of plants possesses such diversity of color, including red, white, yellow, and blue, and intermediate shades. The members are no less distinctive in point of fragrance, as nearly all are possessed of an aromatic, delicate, and pleasing odor. They are also very unlike the host of other favorite flowers: some are day-blooming and close at night, others are night-blooming and close in the day. As a rule, the flowers open and close for three days or nights in succession, generally the first day flower closes early, and on the third day after closing it sinks beneath the water and matures seed—if so be that it produce seed at all!

There is a great variation in the shape and size of *Nymphæa* flowers; some are beautifully cup-shaped (see plate of *Nymphæa Sturtevantii*, facing page 48), others star-shaped with long flat petals, tapering to a point, as *Nymphæa gracilis* (see plate facing page 24), some species have long stiff stems, 12 to 18 inches above water, while others are flexible and the flowers float on the surface of the water. *Nymphæas* have all leaves floating, but occasionally, when crowded, the leaves stand out of the water. *N. tuberosa*, one of the strongest growers, soon crowds its own foliage out of the water, and often indeed the rhizomes likewise.

The introduction of the *Victoria regia* into England gave a stimulus to aquaculture, many tropical *Nymphæas* had reached England prior to the introduction of the *Victoria*, also *Nelumbiums*; their cultivation, however, had never become general. The facts that they could not be grown out-of-doors, and that numerous other tropical plants occupied the space of the greenhouse and conservatory to better advantage, were potent factors in this.

About fifty years ago the *Victoria* was first introduced into England, and two years later was grown in a special house erected for it by Mr. Cope, of Philadelphia; with it other tropical aquatics were introduced and this



A NATURAL PIECE OF WATER PLANTED WITH WATER LILIES.

The embellishment of park ground is well represented in this picture. The art in water-gardening is exemplified by the judicious planting of clumps of Nymphaea near the margin in the open sunshine. The clear and ample water surface beyond, with shrubbery and handsome shade trees in the rear, combine to lend a charm to the place, which is thus made inviting, cool, and refreshing. Such charming scenery in our parks is a factor of health and happiness to many of our hewers, and should find a counterpart in the suburbs of all our large cities.

marks the commencement of the cultivation of aquatics in the United States. Little progress, however, was made; the indulgence in the new cult involved considerable labor and expense, and only the few could enjoy such a floral luxury. In 1853 Mr. John Fisk Allen, of Salem, Mass., exhibited a leaf and flower of *Victoria* before the Massachusetts Horticultural Society; other aquatics were also exhibited, and the cultivation of such increased somewhat, but it was not until it was found that the Egyptian Lotus, *Nelumbium speciosum*, was quite hardy that aquatic gardening commanded real attention. The introduction of that plant, as well as of several species of *Nymphaea*, into the public parks and gardens became general throughout the United States. At the present time exhibitions are not complete without a display of aquatic flowers, and they have ever proved to be a special feature and centre of attraction wherever shown. The aquatic plants at the World's Fair and in the public parks at Chicago attracted considerable interest, and their cultivation has increased by rapid strides since that time.



CHAPTER II.

WHERE TO GROW AQUATICS.

THE CULTIVATION of aquatics in our public parks, and the annual exhibitions before horticultural societies and the Society of American Florists, have been educators of the public. The cultivation has extended throughout our land, and now in many private gardens, of small or large proportions, aquatic gardening is to be seen. These ever-fascinating and attractive gems of nature have attracted the attention and admiration of multitudes, who, beholding them, desire to possess them. Yet many hesitate through fear of a possible failure, or their lack of the knowledge of cultivating such chaste and apparently delicate exotics. But this is assumption, for no plants grown in a hothouse or flower garden, are of more easy cultivation. Our common bedding plants require much coddling during the greater part of the year; cuttings are taken in August and cared for through several stages until the following May or June, when the plants are placed in their summer quarters, and the same course has to be again repeated each year; compared with aquatics the tender bedding plants are very costly.

Where a natural piece of water exists, and such is to be met with at almost every turn (ponds of stagnant water, sluggish streams, swamps, bogs, lakes), the possession of a water garden is simply a matter of planting, and when judiciously done the result is a perpetual delight, a growing interest, verily, a joy forever. See the tropical Lotus, its majestic foliage standing above the surface of the water, and its mammoth flower buds as they burst in all their oriental splendor; it is perfectly hardy, and when planted in a natural pond soon takes possession of the same to the exclusion of any other plant. All the European Nymphaeas, including the many new hybrids of delicate and exquisite shades of color, are perfectly hardy. These, and the many attractive hardy herbaceous plants, including the ornamental Grasses, Reeds,



PLATE II
VICTORIA REGIA RANDII.

In order to see a flower of a Victoria at its best in all its different stages, it is necessary to watch it very closely, and as it is a night-blooming plant the advantage of having it where an electric light is handy, is at once apparent. The flower on first opening is indeed most beautiful and its strong aroma is then most perceptible, but a continual changing of form and color is ever taking place. The above picture was photographed by flash-light and is a faithful representation of a flower as it appears during the second night.

Bamboos, Japan and other Iris, constitute one of the greatest attractions of a landscape, and can be seen in all the leading public parks, gardens, cemeteries, and private gardens; then, to them, add the most striking of all aquatics, the tropical *Nymphaeas*, and other tropical terrestrial plants that can be grown during the summer under precisely the same conditions (they make rapid growth and flower profusely), and there is produced a mass of flowers of gorgeous colors that cannot be rivaled by any other class of plants in this or any other country.

On many estates a natural pond or stream of water is to be found; if such be outside the limits of the garden proper, yet in such a location that it is in sight of a driveway or footpath, a few clumps of the red or yellow *Nymphaeas* or a mass of the Egyptian Lotus add a special charm to such a spot, and will make it inviting and attractive.

Where a stream of water exists a dam may be built and a pond made at a moderate cost. It is not necessary that the pond be more than from eighteen inches to three feet in depth; a natural soil inclining to heavy is preferable, avoiding gravelly and sandy soils. Exceptionally finely colored flowers are grown in ponds with clay bottoms.

MAKING A POND.

Presuming a pond is to be made by damming a stream, the first thing to do is to clear the ground of any brush, dead stumps, coarse weeds and such like. Then mark out the pond with stakes driven into the ground about five or six paces apart, taking levels to ascertain the exact grade. This may be done with an ordinary spirit level and straight edge, if the space be only about a hundred feet long, but if it be much larger it is advisable to have a surveyor's instrument for the purpose. Having ascertained the exact grade, an estimate can be made of the soil to be removed in leveling for the bottom, and building the dam. This latter must be of size and strength in proportion to the size of the pond, to resist the pressure and weight of the water it will have to hold in.

A dam may be built entirely of masonry if desired, and if material for that purpose be on the ground it can be used to advantage. An overflow must be provided, and provision made, either by paving with stones or planks, to prevent the bank from being washed away. An outlet is not an absolute necessity, and would seldom, if ever, be wanted in a shallow pond; but when it is considered desirable to have such, a simple outlet may be provided by using large drain or soil pipes before the dam is erected. The size of the pipe must be

according to the volume of water running into the pond: it must be of sufficient capacity to carry off the water at the same rate as it enters. Perhaps its greatest use would be during work of construction. The flanged end of the pipe should be on the pond side of the dam, and this can be plugged with a disc of wood made to fit the pipe, and finished off with a facing of puddled clay.

Should the stream supplying the pond be liable to become a dangerous freshet after heavy rains, provision should be made (by a culvert or open ditch) to divert the current of water and prevent its rushing through the pond; otherwise much damage might be done to the plants, as well as to the pond and dam. In such a case an inlet should be made with a gate that can be readily closed if need be.

In most cases it will be unnecessary to add anything to the natural bottom, but it would be best to plough, dig, or break the surface, so that the soil may be in proper condition for planting when the season arrives.

Swampy and boggy ground may be converted into a beautiful natural or wild garden, and many uncared for places are to be found that are practically worthless for any other purpose. Such a piece of ground may be outside the limits of the formal flower garden, but is an ideal spot for a water and bog garden. Here, also, many hardy perennials, native and exotic, will flourish luxuriantly; also choice flowering shrubs, trees, and ferns will thrive as in no other part of the garden. The site for the pond will naturally be the lowest part of the ground, where drains from the surrounding portions can empty. Having selected the site, mark out the dimensions, take levels, etc., as before directed, taking advantage of the natural surroundings to add to the general effect. If much water exist to interfere with operations, construct an outlet to drain off the water, taking care to place it where it may be permanently left open or closed as the case demands.

If springs exist, or the pond is subject to overflow by heavy rains, provision should be made to carry off the water without letting it rush through the pond. Spring water running into the pond will not seriously affect the culture of Water Lilies, if the pond be not shaded and the volume of water not so large as to materially lower the temperature of the pond.

The soil will have to be dug out to the required depth, which may be from eighteen inches to two or three feet, the depth must be considered in comparison with the normal thickness of ice formed in the locality, for the roots of Water Lilies must not freeze, although they are designated



POUND OF HARDY WATER LILIES IN UNION PARK, CHICAGO.

The Parks of Chicago have been leaders in the way of aquatic gardening. The picture represents a pond of hardy Water Lilies in Union Park. The massive walls and the bridge, the large open space of clear water and clumps of mound-like Water Lilies are expressive of fine art, and harmonize with one another, and are well balanced. Nothing else, no other style of planting, could equal this.

“hardy.” The soil thus dug out may be used for grading in the vicinity of the pond. Provide an overflow so as to allow any algæ or confervaceous growth to run off. If the soil at the bottom of the pond be stiff marl, it should be broken up and some good loamy soil added for planting the Lilies in.

Local conditions are very dissimilar; in many gardens there is a natural declivity and a run of water; some soils are sandy and gravelly, while others are tenaceous. Near sandy stretches of land there are often to be found deposits of pure clay—potter’s clay. A supply of water, natural or artificial, is, of course, necessary. Then, whatever natural facilities there are should be taken into account and developed, which may mean a considerable saving in the cost of construction. Having a supply of water and clay at command, the greatest obstacles to the formation of a water garden are overcome. Having selected the site, and determined on the size of the pond, its depth, etc., outline the pond with grade sticks, and see that these are perfectly level. If the site selected will allow an addition of six inches of soil, this will allow much in digging, and in the disposal of the soil dug out. The sides of the pond must be sloping outward, at an angle of 45° or more.

PUDDLING.

Having dug the space for the pond, the next thing is to make it hold water. Clay will effectually do this, but it needs preparation before being used, and it must be pure and free from stones, and such like matters. Provide a large shallow box similar to that used by masons and bricklayers for the mixing of mortar; take a suitable quantity of clay, and chop with a spade if lumpy and hard, using water sparingly to soften it; then with a wooden maul beat or pound it until of proper consistency—very similar to clay, or brick earth, in the making of bricks. With this clay, cover the sides of the pond to a thickness of three to four inches, beating it as firmly as possible with a wooden hammer or mallet; also cover the bottom evenly and beat or tread as the work proceeds, until the whole is entirely covered and made compact. If the plants are to be grown in tubs or boxes, cover the bottom with about two inches of bar or beach sand; this will prevent the water from getting thick and muddy, when it is necessary to get in among the plants. If the pond be of moderate size, so that a plank will reach across from bank to bank, and there is consequently no necessity for anyone to get into the pond, soil may be placed in the bottom and the plants planted in it; but in either case, use the best soil available (see Soil, page 20). When covering the bottom with sand or filling in soil, as

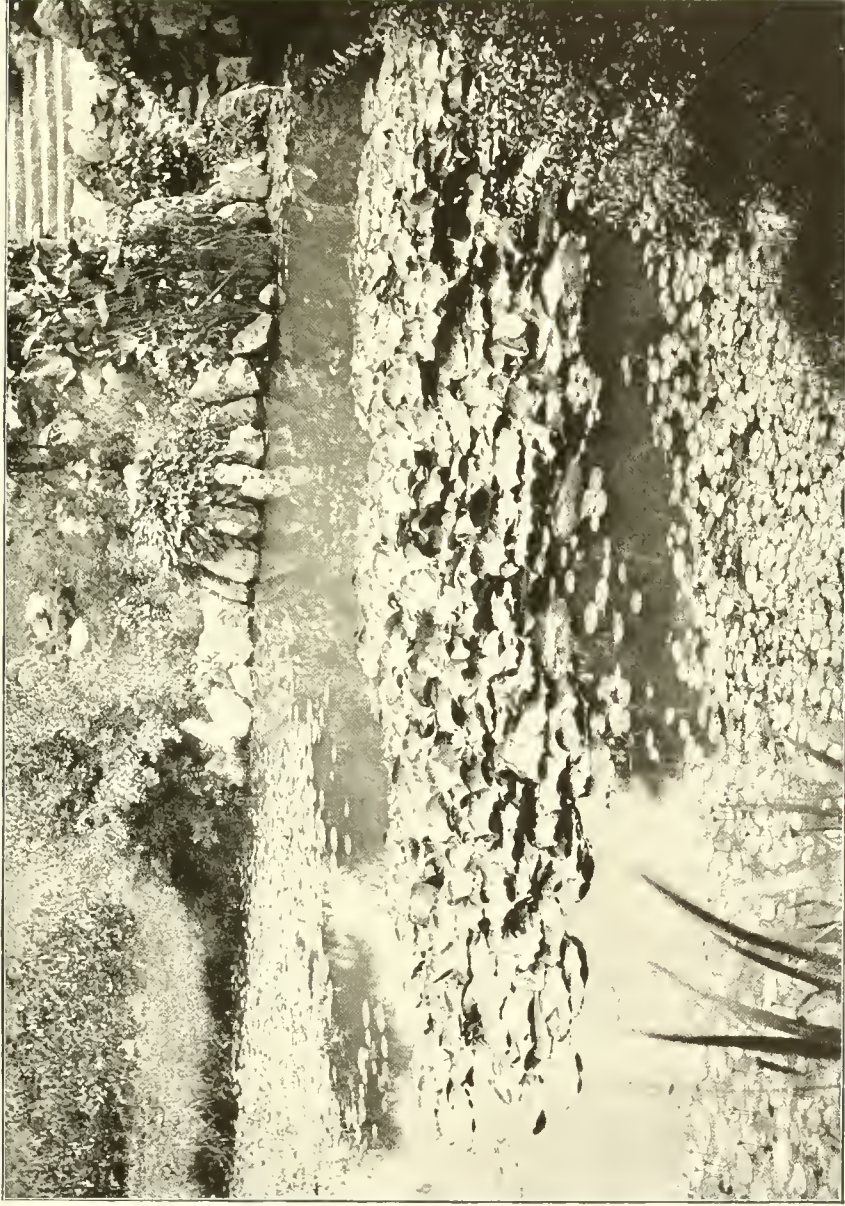
directed later, it is important to avoid making holes or indentions in the bottom or other part of the clay lining; so whatever operation is in progress, use planks or boards upon which to walk or wheel.

A sod border makes the best finish to the edge of the pond, and will allow a close inspection of the occupants, but numerous Grasses, Selaginellas, *Lysimachias*, *Glechomas*, *Rushes*, *Vineas*, etc., should find a home on the edge of the pond, or at least on a portion of it.

The foregoing method of treatment is not practical in all cases, but other means to attain similar effects may be resorted to, such as fountain basins, tanks or artificial ponds. In making such, the general idea should be to imitate nature, and, where practicable, all such work and materials should be carefully concealed (see plate facing page 64). It often happens that the most desirable spot in which to grow water plants is such that an ornamental stone wall, or the coping of such would be in harmony with the surroundings. Gravel walks leading near the pond, and kept in good condition, are a great accommodation, affording people means of making an early inspection of the gems, when otherwise, if obliged to walk over the lawn yet wet with dew, they would be debarred.

Large fountain basins of this description are to be seen in city parks, both small and large, also in cemeteries, as well as on private estates; these are available for growing most kinds of aquatic plants. Other tanks or basins specially constructed for the purpose, as well as tubs made out of hogsheds and kerosene barrels, are very serviceable and well adapted for the growing of aquatics on a smaller scale. A fountain is sometimes an ornamental and desirable structure in the garden, but it must harmonize with the surroundings and be in proportion to the dimensions of the garden, or the section thereof allotted to it. The basin of a fountain, if not very small, will prove a fitting place for aquatics, but it must not be crowded with plants, and a continual stream of water must not be permitted, as that would tend to lower the temperature of the water. Such strong growing plants as *Nelumbiums*, and tall growing plants, such as *Papyrus*, must be omitted, except in large fountain basins, and even when present, care must be taken not to allow a heavy stream or spray of water to fall on such plants, for it would beat them down and give a ragged appearance to the whole.

Tanks or artificial ponds may be constructed in almost any desired spot where a supply of water can be commanded. Such a pond may be in proximity to a dwelling house. There is no need to fear its being a nuisance, as a source



POND OF HARDY WATER LILIES AND ROCKERY.

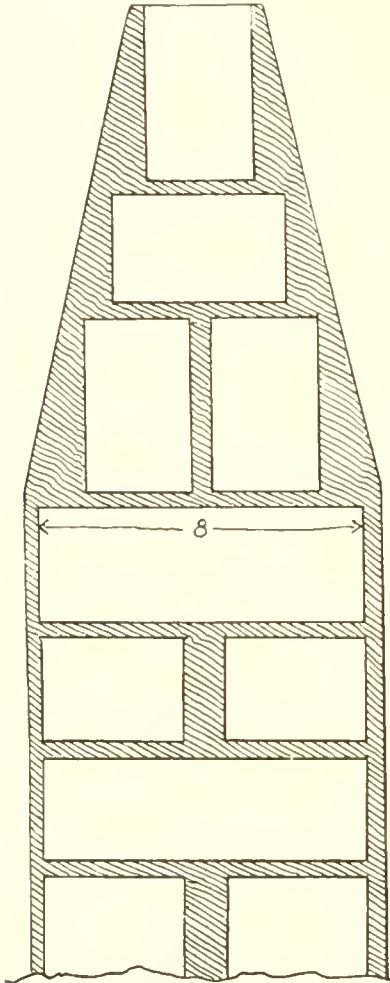
A beautiful combination is here represented. The suggestion conveyed may be greatly enlarged upon; it is the addition of the rock garden to the water garden, each with its own distinctive plants and character. This scheme offers one of the best solutions for dealing with the margins of ponds, adding much to both beauty and variety.

of malaria, or as a breeding place for mosquitoes. If near to the dwelling house, whence such a pond may constantly be viewed from the window or piazza, it, together with aquatics and other suitable plants, may form a part of the flower garden with beautiful and charming effect. A pond of irregular outline is to be preferred, and if on the lawn, the masonry should be entirely hidden or surrounded by ornamental subtropical plants. On the north and northwest sides, should be planted clumps of Bamboos, Ornamental Grasses and Reeds, with subtropical plants for summer adornment. Back of these plants, some shrubs and trees for wind-breaks should be planted, if such be not already on the ground. On the same side of, and in the pond, which should be opposite to and farthest from the dwelling, should be clumps of Lotus; these should be planted in divisions of the pond, walled in so as to keep them from rambling through the whole pond. The size of such a pond must be according to location, and should bear some proportion to the size of the entire flower garden. One from sixty to one hundred feet long and twelve to fifteen feet wide, will be large enough to accommodate a fair collection of these plants and make an attractive feature; but it may be made larger or smaller, according to individual requirements.

The best method of getting to work is to draw a plan to a scale, having previously taken the dimensions of the ground, and considered the levels, the source of water supply, overflow and outlet. Having determined what to do, (including the disposal of the soil to be excavated, which will aggregate from seventy-five to one hundred and fifty cubic yards for a pond of the size mentioned), mark out the pond, using stout set-sticks, about one foot long, nicely pointed; these may be firmly stuck in the ground, about three feet apart, closer on a curve, so that an exact outline of the pond may be apparent and corrections made if necessary. When the outline is considered satisfactory, drive the sticks firmly into the ground until but three or four inches remain above the surface; then proceed with the excavation. If the soil have to be hauled away, horses and carts will be necessary, but if it can be used in the vicinity, then the work can be accomplished with the aid of wheelbarrows.

If the ground is loamy, and of a stiff consistency, dig the sides perpendicularly, and excavate to the depth of two feet six inches; this will allow about two feet depth of water when completed, which, for general purposes, is sufficient; the walls should be eight inches thick, built of brick, and laid in cement; the joints must be all well filled in. The wall may be tapered near the top, and finished with one four-inch brick set flat or on edge.

The top course of brick should be two or three inches below the ground level, so that the green sod will cover all trace of masonry. After the walls are built, finish off with a facing of Portland cement. The bottom may be made of concrete or broken bricks well grouted in, and afterwards finished off with a layer of Portland cement. The division walls for Nelumbiums may be made of four-inch work, if the sections are not large; otherwise build them eight inches thick. These need not be built to the surface, as they are intended only to confine the roots.



SECTION OF WALL.

An overflow pipe is essential, and an outlet is very handy, but if Water Lilies and Nelumbiums are to be planted out, the water will be kept in the pond all winter; there will, however, be times when transplanting, renewal of soil, etc., will necessitate the water being drawn off, and then the usefulness of an outlet will be apparent. A drain must be provided to carry off the water, and one or more outlets made, according to the size of the pond. A two-inch pipe, or three-inch pipe, of malleable iron, built into the solid masonry at the bottom, can be made to answer for outlet and overflow. An L fitting, attached to this pipe, should be level with the bottom, and to this may be joined an upright piece of pipe that will reach the surface; this may be in two pieces, one of eighteen inches, another of six inches. If, after planting, it is desirable to have but six inches of water in the pond, remove the top section of pipe, which can be replaced when the pond is wanted full.

A most useful tank is one built of either brick work or concrete, twelve feet long, five feet six inches wide, and from eighteen to twenty inches deep. This will afford room for six or eight tubs in summer, and will prove one of the best tanks for wintering stock; using a frame and sashes, and in severe weather a shutter or covering of salt hay or

litter, and banking leaves, and litter or green manure around the frames. Two or more permanent frames may be of great service, and can be used as an auxiliary for bringing forward plants for setting in the ornamental pond, and also for wintering the hardy species; they can also be used for growing the tender *Nymphaeas* during both summer and winter, provided they are furnished with means for heating. The frame and sashes can be removed as soon as warm equable weather sets in. A shallow tank, twelve to fifteen inches in depth, would be found very serviceable for growing plants in pots.



CHAPTER III.

SOIL.

NOT A FEW who have attempted, or contemplate, growing aquatics overlook the great need—absolute necessity—of a very rich soil, and plenty of it, to have these plants grow successfully. The fact is, this is of more importance than water, for, saving a few floating species, plants cannot grow in water only, and not infrequently during the drouth of summer is the native Pond Lily, *Nymphaea odorata*, to be seen high and dry, the water having receded; and when grown in tubs, and often in natural and artificial ponds, when over-crowded, the leaves will stand out above the water. While most aquatics will flourish in a soft, muddy soil (as is to be found in most ponds from an accumulation of humus, decayed vegetable matter, and dead leaves), it is not advisable to select such soil for the artificial cultivation of the plants.

The best selection would be good turfy loam, from sods cut from a pasture and laid in a pile, adding one-third to one-half well rotted cow manure, stable, or farmyard manure, where a liberal admixture of cow manure is assured, or old hotbed manure, whichever is available. The fall is the best time to stack soil, and it should be kept dry. If no shed be convenient, cover the pile with boards, or some arrangement for throwing off water. Where ponds are to be planted in spring, and as late as May, a pile may be made a few weeks before needed. After it has lain three or four weeks, the whole should be turned, chopping it down so as to cut the fibre mass and thoroughly incorporate the manure.

In filling tubs or boxes for planting, use all the rough pieces of sods, throwing away nothing but stones, or such hard substances as will not rot. Where good barnyard manure is obtainable, it is unnecessary to use artificial manure, such as bone dust or horn shavings, but where there is a deficiency, such may be used with advantage—say one six-inch pot full to a barrow load of soil. Another good fertilizer is sheep manure. This is much stronger



GROUP OF TROPICAL WATER LILIES AND VICTORIA RANDI.

A natural bluff in the rear, with shade trees, commands a pleasant look-out, and affords inspection from a point of vantage. To the left is seen a bold clump of Lotus which forms a massive background near the margin.

than other manures—cow or farmyard—and should be used in proportion of one to nine. These manures should not be added to the soil until it is to be used for potting or planting. This soil is suitable for all aquatics grown in pots, tubs, or boxes, or planted out in artificial ponds.

The quantity of soil necessary for a plant depends very much on the species and the surface water space allowed for the plant. If the pond be of only moderate size, and it is desirable to grow as many kinds as possible, use tubs, or half barrels or boxes, containing five or six cubic feet of soil for such as *Nymphaea zanzibarensis*, *N. devoniensis*, *N. dentata*, or other strong growing species; for moderate growers, such as *N. pygmæa* and its hybrids, half the quantity allowed for the stronger one will suffice.

When *Nelumbiums* are grown in boxes or tubs, allow double the quantity of soil as for the former, since these plants are voracious feeders, and often when their culture has proved a failure and a disappointment it was really a case of starvation. Feed these plants liberally and they will respond by a generous display of their queenly flowers.

Where a large fountain basin, tank, or pond affords ample space for free development, and where flowers of the first size and quality are desired, use shallow boxes, ten to twelve inches deep, and three to four feet square, placed on the bottom. It will be necessary to place these in position before being filled with soil, and the water must necessarily be drawn off.



CHAPTER IV.

TREATMENT OF MARGINS.

THE MARGIN of the pond is every bit as important as the pond itself, and must receive the same care and consideration in the planting. As the frame is to a picture so is the margin or border to the pond—it may make or mar. The first consideration must be the occupants of the pond; to arrange all in such a manner that the surroundings add to, not detract from, the main feature, at the same time to form another distinct feature should be the object.

As no two ponds are precisely the same, the general features must be considered. As before mentioned trees and shrubbery are essential as wind-breaks, and where these are already in existence, they should be taken into consideration when laying out the water garden; they not only are necessary as wind-breaks, but are an important and indispensable part of the landscape, and a source of pleasure and comfort as shade factors, under which seats may be placed for the languid, whence a pleasant inspection of the occupants of the pond may be made without the observer being subjected to the scorching rays of a midsummer sun. Where such trees are not available a rustic summer house covered with climbing vines will afford a welcome resort.

Where a few tubs comprise the water garden they should be sunk in the ground to the level of the tops, not close together, but leaving a space of from twelve to eighteen inches between; the intervening space being planted with *Lysimachia nummularia*, which makes a delightful carpet of light, glossy green. If *Nelumbiums* be included in the collection of aquatics, these may be placed in the centre of the group or, on the northwest side, or to the rear, the group being backed with Ornamental Grasses, with sub-tropical plants such as *Musa ensete*, *Ricinus*, *Cannas*, and others.

A pond (made of masonry) in the lawn will be surrounded with the green-sward, and, as elsewhere recommended, the top of the wall should be so sunk as



PLATE III.
NYMPHÆA GRACILIS.

This, a native of Mexico, is the only known white day-flowering tender Water Lily. The flowers are borne on stout stems, 10-12 inches above the surface of the water; sepals greenish white; stamens rich golden yellow; deliciously fragrant, resembling the Lily-of-the-Valley. It will doubtless be the parent of other valuable additions to our list of Water Lilies, and we have already a grand blue form.

to be covered by the sod. If such a pond or tank be of irregular outline and from fifty to sixty feet in length, ample space will be afforded for the effective planting of large clumps of *Arundos*, Bamboos, *Erianthus*, *Musas*, etc., in the rear, and at the same time allow sufficient space for one to walk between them and the pond, so as to inspect the occupants of the latter. If clumps of *Lotus* be planted in sections of the pond at the rear, little space will be left for any other plants in the pond save a tub or two of *Papyrus antiquorum* and *Cyperus alternifolius* (Umbrella Grass). Next to the grasses, shrubs with evergreen and deciduous trees should be planted if such be not already there to give protection against high winds. In case of a tank, such as is pictured on page 27, where the brickwork is seen above ground, a frame and sashes can be used for early and late protection, but on the other hand, little can be done in the way of planting on the margins, yet a few plants, such as *Acorus calamus*, A. c., *variegatus*, *Iris Kämpferi*, *I. pseudo-acorus*, *Papyrus antiquorum*, *Cyperus alternifolius*, *Limnocharis Plumieri*, *Scirpus*, and *Sagittarias*, can be grown in pots and placed on pot stands or inverted pots, so as to bring the roots of the plants near the surface of the water. If the rear of the pond be flanked by trees as shown in the picture, the *Iris*, *Scirpus*, and *Cyperus*, together with *Iris Kämpferi* may be planted in the ground near the pond where they can enjoy a liberal supply of water at all times.

Fountain basins with ornamental copings are sometimes surrounded by a gravel walk which affords a good opportunity of inspection of the flowers in the fountain, but the stone coping and the gravel walks do not harmonize with the water and aquatic plants, and should be relieved by a border of greenward; this, however, should be omitted where, as in some public places, it is necessary to have a sign imploring people to "keep off the grass!"

A border of plants with glaring colors is most objectionable and detracts from the central or main feature of the fountain basin and its contents, but a border of Grasses, Rushes, and *Iris*, together with *Zizania aquatica*, *Typha latifolia*, and *T. minima* may be planted in boxes and distributed irregularly around the margin inside the basin, bringing the boxes near the surface of the water, allowing a depth of from three to six inches above the soil. Between the taller plants clumps of *Water Poppy* (*Limnocharis Humboldti*), *Eichornia azurea*, *Eichornia crassipes major* (*Water Hyacinth*), and *Pistia stratiotes* (*Water Lettuce*) may be introduced; the last two are floating plants and should be kept in place by hoops or wire netting supported by stakes and brought near the surface (yet out of sight), so as to keep the plants in place.

A beautiful effect is produced where the landscape affords a natural bluff or bank as shown in the illustration on page 21; from such a point of vantage a good view is had, overlooking the pond and its occupants.

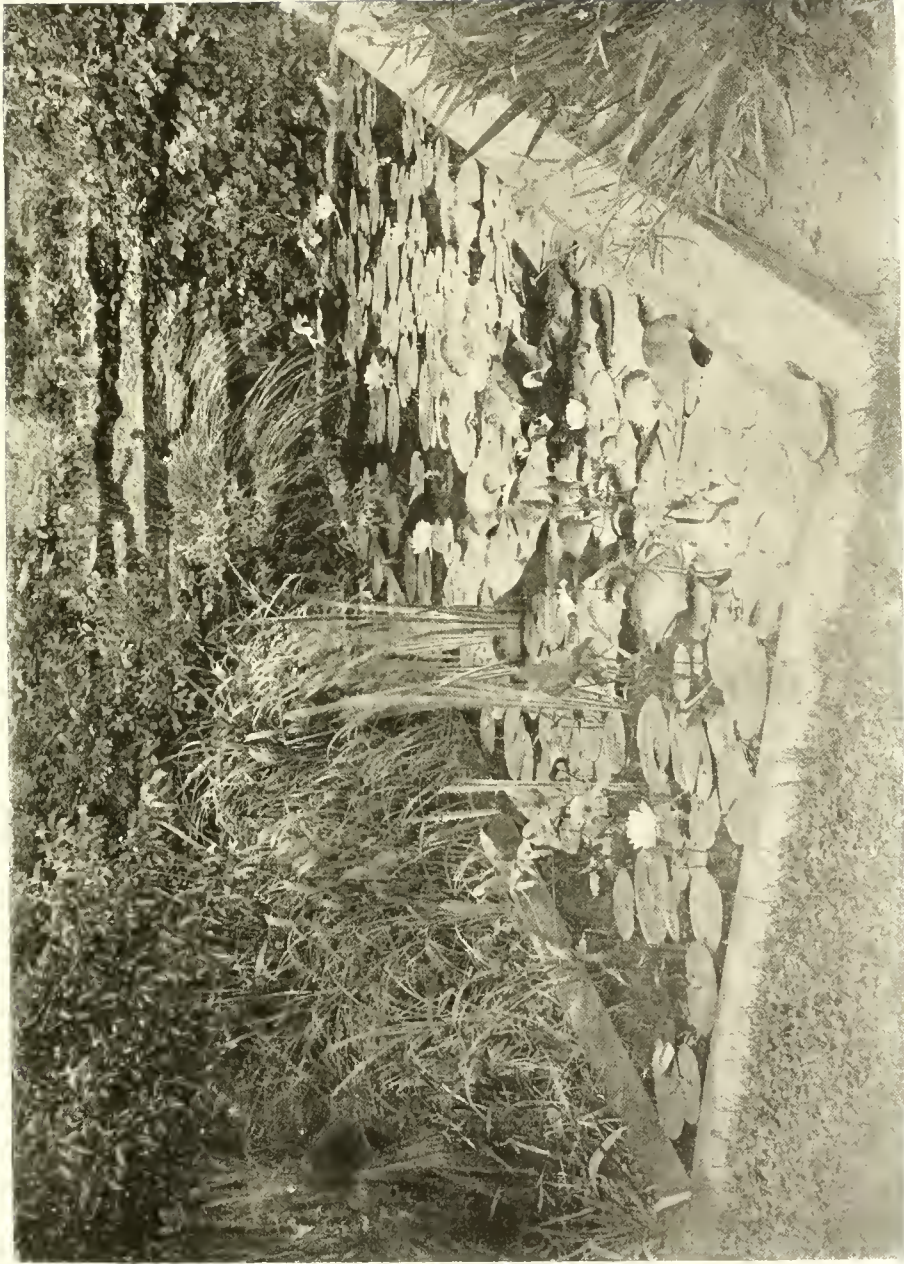
Where rocks are available an entirely different and desirable feature may



EULALIA JAPONICA.

This most graceful grass is seen here to perfection. Planted close on the margin of the land its graceful habit has full scope. An isolated position is the best for it.

be added to the water garden. They should be arranged in such a manner as to produce a natural and pleasing effect (see illus. page 15); too often the rockery represents nothing more than a pile of stones laid up in a conventional manner as if the main object had been to get rid of an incumbrance and to



AN AMATEUR'S POND, 6X12 FEET, SHOWING MASONRY ABOVE GROUND LEVEL.

*This is useful where a frame and sashes are used for protection, and the walls also serve, in some degree, as a protection against juvenile feet approaching too close to the water line. The hardy *Nymphoides* are luxuriant, although not subjected to annual replanting. The pond is flanked by fruit trees, with grasses, *Scirpus*, and Iris next to the pond.*

occupy as little space as possible. Bold rocks should be used wherever possible and especially where the pond is of large dimensions. Ferns, Bamboos, shrubs and trees planted on the face of such and in the background are very effective; and if it be possible, a stream of water, natural or artificial, should take its course over the rocks into the pond below. Nothing, indeed, could be more picturesque than such a scheme properly carried out.

A pond of irregular outline, either on the lawn or surrounded by a gravel walk or drive, may afford ample space for numerous plants in clumps or groups, close to the margin and yet at the same time leave opening of sufficient space to allow different views of the pond and its occupants.

The Victoria pond shown on page 35 is an artificial one, where native plants figure largely on the margin, very charmingly and effectually obliterating any signs of masonry or traces of the fact that the whole is artificial. Iris Kæmpferi, Eulalia in variety, and Musas were planted, and native plants growing wild in that section were allowed to grow and luxuriate in their own natural bent and inclination. As nothing could be planted directly in the pond, the Nelumbiums, Thalia, and Cyperus shown are grown in tubs, the rich green foliage—relieved occasionally by the Lotus flowers—standing two to four feet above the surface of the water, breaking the line and giving depth. Shallow pockets are made on the inside margin of the pond to hold soil for such plants as *Limnanthemum indicum*, *Limnocharis Humboldti*, *Myosotis*, *Eichornia azurea*, *Callas*, *Lobelias*, *Scirpus*, *Sagittarias*—all of which delight in shallow water. Where these are not damaged by overhanging luxuriant growth of the plants on the outer margin of the pond, they form a most pleasing and artistic method of planting the edge of artificial areas.

The dealing with the margin of a natural piece of water is not so difficult as the manipulation of the edge of an artificial, cemented, or walled pond. As a rule, the water near the edge, or at least a part of it, will be shallow, and many plants delighting in just such conditions as are thus afforded may be planted with telling effect. Whatever may be the piece of water that is to be planted, the margin should receive first consideration: the water line should present an irregular outline, no straight, parallel, or regular lines should be permitted; shallow pools and bays should be constructed where necessary, if such do not exist naturally, for such plants as flourish in shallow water. Clumps of shrubbery, subtropical perennial plants, with large shade trees, forming a secluded and quiet retreat as is so well represented in the illustration on page 31, must be borne in mind. Under such trees, and through shrubbery,

circuitous walks should lead to the margin of the pond at different points whence views of some choice variety or groups of plants are prominently brought into line. Along such walks and under the shade of the trees should be seen groups of native and other hardy flowers, Ferns, Orchids, etc., and if a spring and stream exist meandering toward the pond, the margin of the same should be clothed with such plants as Ferns (See Fern Chapter), Forget-me-not, Cardinal flowers, Impatiens (Touch-me-not), *Caltha palustris*, *Sarracenia*s and other Pitcher plants.

Clumps of Cat-tails should be planted near the edge and inward. *Pontederia cordata* delights in shallow water as do all *Scirpus*, *Acorus Calamus*, Japan Iris, *Sagittaria*, *Jussiaea*, etc.; these should be planted in large patches in shallow water, which may vary from two to five feet from the edge of the pond; also *Papyrus antiquorum* (see plate facing page 72), the latter is not hardy, and requires protection in a warm greenhouse during winter; here too, is a fitting place for *Zizania aquatica*, one of the most picturesque of hardy native aquatic plants, but it is an annual and will spread along the whole margin if not pulled out early in spring where it is not wanted, for otherwise it will smother other plants. Another very desirable plant, and one of the grandest of our native flower plants, is *Hibiscus moscheutos*; this is a strong and vigorous grower and requires room—eight to ten feet for a single specimen. *Orontium aquaticum* and *Peltandra virginica* should find a place on the margin in shallow water. On the water edge, on slightly rising ground, bold clumps of Ornamental Grasses and Bamboos should be planted not too close, and for bold foliage effect, *Musa ensete*, *Paulownia*, *Caladium esculentum*, *Fatsia*, *Aralia*, *Maranta*, and other plants (their name is legion), not included in this list, will suggest themselves. They will, with these, prove most appropriate and will appear as in their native haunts if planted in the water garden.

Since no two ponds are precisely the same, no absolute guide can be given; individual taste and judgment must be exercised in the selection of the plants for each individual case. Overcrowding must be avoided; it is almost impossible to have each and every appropriate plant represented on the margin of a single pond.



THE WATER LILY POND IN THE GARDENS OF HON. GARDNER G. HUBBARD, WEST WASHINGTON, D. C.

This picture represents an ideal Water Garden, that of Hon. Gardner G. Hubbard. One of the most striking features is the extensive collection of aquatics, from a pygmy Lily to a giant Victoria. The informal arrangement and planting of subtropical plants, with shade trees in the rear, is admirable, giving as it does touches of natural scenery and grandeur, with picturesque and subtropical effects.

CHAPTER V.

PLANTING.

THE SEASON for planting will vary according to locality and section, but it may be considered perfectly safe to plant all hardy *Nymphaeas* and other aquatics (except *Nelumbiums*) as soon as vegetation is assured. Where the native species grow wild, just as soon as the ponds are clear of ice the young leaves of the plants are to be seen, thus demonstrating that they start early into growth; when such is perceptible it is time to plant or transplant. The natural order for planting appears to be: First, hardy *Nymphaeas*; secondly, *Nelumbiums*; thirdly, tropical or tender *Nymphaeas*, and lastly, *Victoria Regia*, if not in an artificially heated pond.

The practice of planting out is not commendable unless in a moderately-sized pond, where a plank will reach over from side to side, avoiding the necessity of tramping through the plants to clean off any dead leaves, or to cut a flower, and thereby making the pond and plants muddy and dirty, besides doing much injury to the plants by breaking unseen roots and rhizomes. In larger pieces of water and in artificial ponds (whether puddled with clay or built of masonry) it is better to have boxes or tubs for the plants to grow in. These, if large, should be placed in position before being filled with soil; small boxes or tubs may be filled and planted before being put into the pond. After the filled but unplanted tubs are in position and covered with sand, the pond should be partly filled with water to say, 4 or 6 inches above the tops of the boxes or tubs. At no time allow the plants to be exposed to the drying action of the sun or air, as they will then very soon wilt and be seriously damaged, indeed, in many cases such drying, while waiting for the pond to fill up would be fatal. The work of planting in the submerged tubs can easily be accomplished by a man with rubber boots on.

When it is deemed best to plant out the Lilies in the pond itself, put from twelve to fifteen inches of soil over the bottom, or on that section of the pond which is to be planted. Make the soil moderately firm in either instance, and in all cases cover the surface with an inch or two of sand, this to prevent the manure from rising or mixing with the water, thus giving it the appearance of liquid manure, which would be most objectionable.

The Native Water Lily, *Nymphaea odorata*, and its varieties, have a rhizomateous creeping root stock sending out numerous side shoots; a good, healthy root with a plump leading shoot is sufficient to make a good, strong plant, and produce a good crop of flowers the first season. When planting, all that is necessary is to press the roots into the soft soil, leaving them somewhat obliquely with the crown just under the soil. The European species and its hybrids grow more compactly, making large clumps and specimen plants; others, particularly *Nymphaea pygmaea*, produce no sideshoots or offsets, having but the single crown, and are but moderate growers.

New plants may be set out after growth is apparent at any time during the season, and as late as August; or plants from pots, and which have several leaves may be used, but to produce flowers the same season, plant early. Pot plants with a ball of soil and roots are in the best condition for planting. In planting, remove a small proportion of the prepared soil (sufficient to make a hole to hold the plant), afterward, make all secure, and level off similarly to planting in a flower-bed. It is immaterial whether or not the water be deeper than that in which the plants have been growing previously; the plant will adjust itself to the new quarters, and in an incredibly short space of time the leaves will be floating on the surface of the water, even if submerged two feet at the time of planting.

Nelumbiums are impatient of removal, and should not be disturbed in their winter quarters, or transplanted until there is warm, settled weather, new growth perceptible, and the conditions of the pond such as to insure active growth at once. Such conditions exist about the middle or end of April, and during May, according to the section of country. *Nelumbiums* should not be planted in a small pond where *Nymphaeas* are growing, unless a division wall confine them to a given space, or they will soon ramble over the whole pond, and the dense foliage will then smother the *Nymphaeas* out of existence. The tubers of *Nelumbiums* vary in size from a few inches to three feet in length, but the latter is exceptional; they are very brittle, and care should be taken in handling and planting that the roots are not bruised or damaged. A good



Mush ensete,
Cyperus alternifolius.

Thalia dealbata.

Scheuchzeria palustris.

VICTORIA RANDI AND SYMPLES GROWN IN AN ARTIFICIAL POND.

The masonry completely hidden by the luxuriant growth of such native plants as Golden Rod, Poke Weed, New York Iron Weed, Sour Gum and Wild Cherry Trees, in front of this are Lotus, Thalia, and Cyperus in small tubs. This is an excellent method of obliterating all traces of the workman and giving a beautifully natural and picturesque appearance.

tuber should possess an unbroken leading shoot, and a small lateral one at the base; an extra size root more often consists of two sections, thus having a leading shoot and two smaller ones.

In planting, place the tuber horizontally in the soil, about three inches under the surface, and cover the whole root; if necessary, place a brick or some other heavy article upon it, to keep it from rising and floating on the surface. Small tubers may be started in pots, or in wooden pails, and thus treated, are preferable for planting in Northern sections where the season is late. Nelumbiums grown in tubs should have more soil than is allowed for Nymphaeas, and a larger tub, say a half-hogshead, so as to give all possible soil (plant food) during the growing season. The tubs may be filled to within two inches of the top, giving a rich top-dressing, also giving the plants frequent waterings with liquid manure. This, of course, applies only to tubs that are not submerged in a pond.

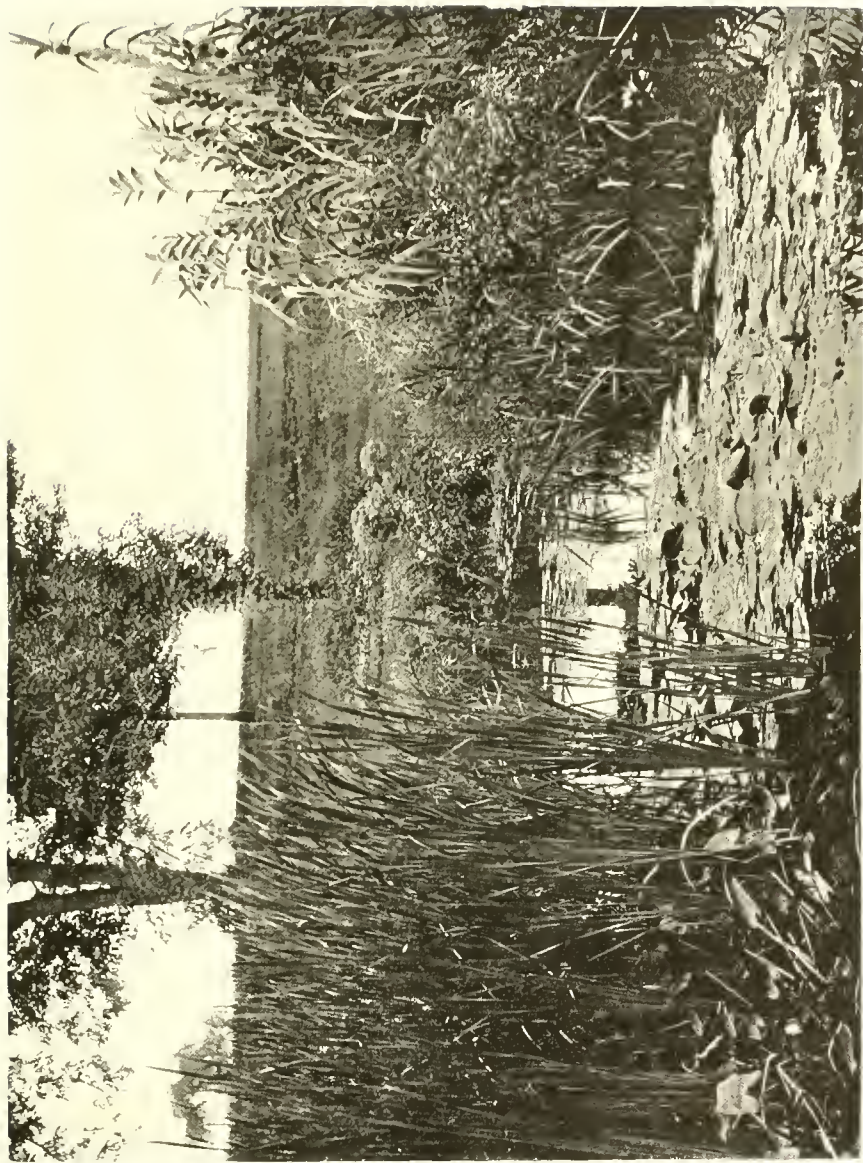
Tropical or Tender Nymphaeas should not be planted out until settled warm weather is assured; this will be sometime from the middle of May to the first week of June. A good rule may be to plant them out when it is considered safe to plant out tender bedding plants such as Colens and Alternanthera. As our summers are none too early or too long for these plants to fully develop, it is advisable to have these plants well advanced before being planted out, and if plants have to be procured from a distance, and only a few are required, it is better to secure them three or four weeks before the time of planting out in permanent quarters, repotting them into a size larger pot, or according to size and condition of the plants, using soil as before recommended. Place these in tubs of water, and give them every chance to grow. If a few hotbed sash are at command, the tubs may be placed or plunged in a frame, and covered with the sash. If this protection cannot be afforded, some warm sheltered spot may be found, and the plants protected from cold winds and nights, this will accelerate active growth, and ensure earlier blooming, thus prolonging the season by several weeks.

It is sometimes desirable to retard the blooming of hardy Nymphaeas, so as to bring them into flower somewhat later than, or at the same as, the tender ones. This may be done where these are grown in tubs or boxes, or planted out: draw off the water, thus exposing the crowns of the plants, which must be kept out of the water, but must not be dried up by the action of the sun and air; cover with sphagnum and keep moist (branches or bracken may also be laid over them to shade from sun and keep from drying). The roots may also

be "heeled in" in a cold frame, or a shady border, before growth commences, and well watered to settle the soil around the roots: these, kept shaded, may be held some time, at least until it is time to plant the tender aquatics.

After the plants are in their summer quarters little remains to be done; the overflow having been fixed so that the water level will be about six inches below full water mark. After the plants have made a good start and are growing vigorously, the water should be raised to the full height, and any scum that may collect on the surface should be cleared off by the use of the garden hose, spraying towards the flow; attention must be given that the pond be kept full to running over, as there will be more or less evaporation taking place, conditional on the weather and quantity of surface clear; after the surface is covered with foliage, evaporation will be less. As the season advances, unsightly and dead leaves should be removed; confervæ may accumulate, but the amount of care and attention necessary will be comparatively small.





Typha latifolia.

A NATURAL EDGE OF WATER

Arundo donax

Showing a group of *Typha latifolia* (Cat Tails), and *Arundo donax* (Giant Reed); the former in water from 6 to 18 in. deep; the Arundo above the water line, with native plants on the margin, and growing in the water, thus obscuring the ground line. The effect produced is most pleasing and natural, and gives a suggestion for the best treatment of margins of large ponds.



PLATE IV.

NYMPHÆA GIGANTEA

The illustration represents an individual flower reduced one-third. It is entirely distinct from any other species of *Nymphaea*. The color is purple in bud, changing on opening to a soft satiny blue, shading to white, the yellow stamens are slender and incurving. The plant requires a temperature of from 80° to 90° to start either seed or tubers and ample root room prior to planting in permanent quarters, avoiding at all times a sudden fluctuation in temperature or disturbing of the roots. Native of Australia.

CHAPTER VI.

HYBRIDIZING, SEED SAVING, WINTERING.

HYBRIDIZING or cross-fertilization of Water Lily flowers and the raising of such progeny is always a source of great pleasure, and all who grow Water Lilies may partake of this diversion. The large list of *Nymphaeas* now under cultivation embraces numerous varieties, surpassing original species, due to the exercise of this art. Few good things are traceable to "luck" or "chance" in either the animal or vegetable kingdom; to achieve anything worthy of special merit, requires a practical knowledge of the different species or varieties.

With a special object in view, pick out the varieties for the separate parent plants; having selected these among *Nymphaeas*, what is to be the seed bearing plant must be closely watched, and the flower stripped of its stamens the first day of opening, and a piece of fine gauze tied over the flower to exclude any insect that might alight on it and thus deposit any foreign pollen. On the second day, gather the pollen from the selected pollen-bearing plant, using for the purpose a soft camel's hair pencil, and deposit the same on the stigmas of the selected flower. This operation must be performed without wetting either flower, and must necessarily be done on a fine day. The flower must be re-covered with the gauze immediately after the operation, and remain covered until the flower dies off. Should there be a scarcity of pollen on the selected plant or flower, repeat the operation on the next day. When the fertilized flower dies off and shows unmistakable signs of having been impregnated, secure seed pod in a muslin bag, wait until it ripens, and in due course of time gather the seed and wash it, then either dry and store it away until it is time to sow, or sow at once, as the necessities of the case may determine.

SEED SAVING.

Nymphaea species and some crosses produce seed very freely. Some species are only propagated by seed, but several varieties do not produce seed

at all. Young plants that show a tendency to produce seed, should have the dead flowers taken off, to allow the plant to attain vigor and maturity before ripening seed. The native *Nymphaea odorata*, *N. tuberosa*, and most of their forms produce seed freely. A very large percentage of what is produced is devoured by fish, turtles, etc., and it is difficult to save or harvest seed, except in small ponds, where it is not difficult to get at the seed pods or capsules; they should be tied in muslin bags and be collected at intervals. As soon as the seed is ripe, the pods burst and the seed rises to the surface, but if tied up in a bag, is prevented from rising and spreading over the surface, and is easily collected.

Where this is not practicable, a careful lookout for the seed must be made about a month after the flower fades, quantities of seed can be skimmed off the surface of the water as soon as the capsule bursts, but after a day or two, the seed all disappear; it either sinks to the bottom or floats to the edges of the pond, or is washed away.

The tender *Nymphaeas*, such as *N. zanzibarensis* and its forms, and *N. dentata*, also produce seed freely. Select strong plants, and allow only two or three pods to mature on each plant; the seed of these species is much finer or smaller than those of the hardy ones, and if not secured in bags, it is impossible to collect it off the surface of the water.

As the bags are collected, allow them to remain in water two or three days before washing, and do not expose to full sun, as the extreme heat of August will cause the seed to sprout and render it worthless for keeping. Provide a fine and a coarse sieve; the mesh of the coarse one should be about the size of that of ordinary mosquito netting, this will allow the seed of the tender species (with the exception of *N. gigantea*) to pass through, thus separating the seed from the dead parts of the flower and capsule. A fine wire sieve or a gravy strainer, the size of a large cup, is an excellent article to use for collecting the seed. It is necessary to use plenty of water in washing and cleaning the seed, the seed of the hardy *Nymphaeas* being larger and heavier, readily sinks in water, and is easy to clean.

As each lot is washed, it should be laid on thick paper with the name written on it, and then be securely stored away in an airy place to dry, airy, yet secure from wind and mice; after it is dry, the seed may be stored away in paper packets, (wax or parchment paper preferable), or put into tin boxes and kept in a dry cool place until wanted for sowing.

Some seed is best sown at once, and if seedlings can be carried over winter, they will make strong plants early in the season. It is perhaps best to sow all



Erianthus Eulalia. Musa ensete. Papyrus antiquorum. Eulalia.
Ravenne.

PLANTING OF A NATURAL PIECE OF WATER.

A natural pond in part, showing Egyptian Lotus and Water Lilies in the foreground, with clumps of ornamental Grasses, such as Erianthus, Eulalia, Papyrus, and Musas on the margin, with Sour Gum, Maple, and Chestnut trees in the background. The treatment of the margin here shown is suitable for large ponds with ample space for forest trees and park-like landscape. The picture has the false appearance of the plants being crowded; this is owing to reduction, and to the fact that only a small part of the pond is visible. The plants are: Erianthus Ravenne; Eulalia japonica variegata; Musa ensete, large specimen; Papyrus antiquorum; Eulalia japonica zebrina.

hardy kinds as soon as ripe, but this is not absolutely necessary, but the best results have been obtained in this way in some cases, particularly with *Nymphaea pygmaea* and *N. gigantea*; some of the same seed carried over to spring failed to germinate.

CARRYING OVER: WINTERING.

Nymphaeas of the stellata type, such as *N. caerulea*, *N. zanzibarensis*, etc., differ from other tropical kinds in that they do not send out side shoots, but are mostly confined to one central crown, such plants are difficult to keep over winter, as they will not make tubers, but will invariably rot if any attempt be made to dry them off. Should it be desirable to save or retain a special plant of this type for another season or otherwise, the plant should be lifted and reduced in size (both leaves and roots), and planted in a tub or large pot, placed in a tub or tank of water and kept thus growing on. The water need not be above a temperature of 65°, and during cold weather the plant will not suffer in a temperature of 60°, but in the former temperature the plant will keep growing and produce some flowers all through winter.

The tubers of all tender Nymphaeas may be kept in moist sand, or sandy soil at a temperature between 50° and 60°; do not keep too dry, and at all times look out for mice, as they will assuredly find out the tubers. All hardy Nymphaeas and Nelumbiums grown in tubs must necessarily be protected from frost; this method of culture is not natural, hence the necessity of protection. Our native Water Lilies in natural ponds have above them sufficient depth of water to protect the roots so that they *do not* freeze. The tubs can be wintered in a cellar, or plunged in the ground and covered with leaves, bracken, or any material that will prevent them from freezing. Where such tubs of Nymphaeas are submerged in a tank, it is best to leave them in position provided the tank is frost proof, but it is best to protect the masonry, and the whole tank where subjected to severe winter freezing. This may be effected by covering with old lumber, leaves, branches, salt hay, etc., and where snow is generally in plenty, any material that will collect and hold the snow should be used, as there is no better protective material than snow.

CHAPTER VII.

SEEDLING PLANTS AND PROPAGATION.

FROM the first of February onward, seeds of *Nymphaeas* and other aquatics may be sown; location, requirements, and convenience for handling must be considered independently. In good seasons March is more favorable for quick and healthy growth, and the resulting seedlings are not so apt to get a check or become stunted in their growth. The seed may be sown just as other flower seeds, in pots or pans, using soil neither light nor heavy. Soil from a pile of sods and manure composted the previous fall will be in prime condition; if the soil be inclined to heavy add sufficient sand to make it porous. If this soil be not available use the best that can be procured, such as that in which it is known that other flowers will grow, but do not use fresh manure in the soil, as it will ferment in the water. Sow the seed on a smooth surface and cover lightly with fine sandy soil, after sowing stand the pots in water for a few hours until thoroughly soaked, afterwards submerge in water covering the pots two to three inches; keep the water at a temperature of 75° to 80°. The seedlings of the *stellata* type will germinate in about ten or fifteen days, looking somewhat like spears of grass, the first leaf will be visible a few days later. The seed of *Nymphaea dentata* and of other night blooming Water Lilies requires several days longer before germinating, and the hardy species longer still. No definite time can be stated, we have had seed germinate six months after being sown.

After the seedlings have made two or three leaves they should be transplanted into other pots or seed pans, similar to other seedlings, using soil as in the first instance. This operation may at first be somewhat tedious, but the simplest method of handling these seedlings is to keep them in the water; use a flat pointed stick, or better still, a piece of bamboo cane, and having filled the pots with soil covered lightly with sand, place them in the water along-

side the seed pot; select a plant, take hold of it with one hand, between finger and thumb, and with the stick in the other hand, loosen and raise the plant. Now it will appear to be the most erratic of all plants, on being raised the roots are inclined to cling to something, and most particularly to the leaves, and to get tangled together and seemingly impossible to separate and straighten out. When such is the case allow the plant to float, straightening out the roots by means of the stick and then with a gentle pressure near the tips of the roots move the plant to the desired spot and press it gently into the new soil. That is all that is necessary, and in this manner the work can be performed expeditiously and in good style. After the seedlings have made some good growth they should be potted singly into small pots (2½ or 3 inch), and when well established in these, repotted into 4-inch pots and from these into summer quarters, or as the case demands. Do not allow the seedlings to remain long in the seed pots, but keep the young plants growing steadily, and if they appear to be in a stand-still condition, wash off all loose soil and repot in fresh material.

Hardy species that do not produce seed may be propagated by division of the roots or rhizomes, which work is best accomplished in spring, and when new growth is assured. Tropical species of the *dentata* and *rubra* types produce side shoots, which form tubers toward the close of the season. After the leaves are cut off by frost, the main root, with side shoots attached, should be dug up, the roots trimmed, and any dead stalks cut off. These stools may be planted under the benches in a greenhouse in sandy soil, giving them a good watering to settle the soil about the roots; after a few days it may be necessary to repeat the same operation. After this the plants may be allowed to become dry, but not so dry so as to shrivel. In this condition they will remain sound and good for a long period.

The most simple and easy method of holding stock plants is to keep one or two of a kind in 4 or 5-inch pots during the summer; they will probably exhaust the plant food in these small pots before the season is over, and may give but little bloom, but show a tendency to go to rest early, the leaves take on autumn hues and tubers are formed. At the proper time these plants should be taken out of the water, and the pots, with their contents, placed under the bench in the greenhouse or other suitable or convenient place. If left too long in the water and the weather is hot, the tubers will start into growth, and if taken out too soon the tubers may not be sufficiently ripe to keep until they are wanted to start in the following spring. In spring the

tubers may be potted in fresh soil and placed in water at a temperature of 75° to 80° , when they will start into active growth and send out numerous shoots making separate and independent growths. Select the strongest when they have three or four leaves, and pot into 4-inch pots; these will make better plants individually, and produce larger and better flowers than a number of smaller plants. As soon as established in these pots they should be planted in permanent summer quarters, or repotted into 6-inch pots if it be too early to plant out. Others may be allowed to finish their growth in 4-inch pots and mature tubers for another year; all *Nymphæas* that produce tubers may be treated as above recommended.

Victoria and *Euryale* plants are annuals, producing no tubers, and propagation is effected only by seed; sow in February and March, according to the date when it is considered safe for planting out, allowing between three and four months from date of sowing seed to time for planting.—(See further directions in Chapter IX).





PLATE V

NYMPHÆA STURTEVANTII.

Reproduced from a photograph and greatly reduced. This massive incurved flower with large broad shell-like petals is entirely distinct from all other tropical night-blooming *Nymphæas* in size, form, color, and general characteristics. The color is a bright rosy red, brilliant in the early morning sun and dazzling by artificial light. Like all tropical *Nymphæas*, the plant delights in a high temperature, full sunshine, and pure air; where it can enjoy the same cultural conditions as *Victoria regia* it produces its magnificent flowers not in the least sparingly.

CHAPTER VIII.

NYMPHÆAS: CLASSES AND DISTRIBUTION.

WHO IS NOT familiar with our native Pond Lily, *Nymphæa odorata*, and its pink form, *N. o. rosea*? These are admired by all lovers of flowers; yes, and by those who are not! The lovely pure white flowers floating on the placid water in the early morn, attract the attention of the laborer and artisan as they pass by to their daily tasks and catch a breath of air laden with the sweet spicy fragrance of these charming flowers. Who can help but admire and love such flowers? In the western states *Nymphæa reniformis* (*syn. tuberosa*), is indigenous; yet another in the southern states, also the yellow species, *flava*. Thus we have three distinct species in three colors; white, yellow, and pink, natives of the United States and the progenitors of numerous hybrids and varieties that in many instances are superior to the original types. Other countries, too, have their own species of *Nymphæa*. England has its white Water Lily, *N. alba*; Sweden its pink variety of that, *N. alba var. rosea*; Bohemia has also its white, *N. candida*; China and Japan their *N. pygmæa*. These are all hardy and will grow under the same conditions as our native species.

Another hardy aquatic must not be overlooked here, it is the American Lotus—*Nelumbium luteum*. This grand Lotus is indigenous to several sections of the United States, also the West Indies; it is nevertheless little known generally. It thrives under the same conditions as the hardy *Nymphæas*; its flowers are of a rich sulphur yellow color, and is almost identical with the Egyptian Lotus, sacred bean of India, *Nelumbium speciosum*, excepting in the color of the flower; the latter is indigenous to the East and West Indies, Persia and Asiatic Russia, China, and Japan, where it is also held sacred. Notwithstanding that *Nelumbiums* are indigenous to the above named tropical countries, they can all be grown and treated as hardy aquatics in the United States, although

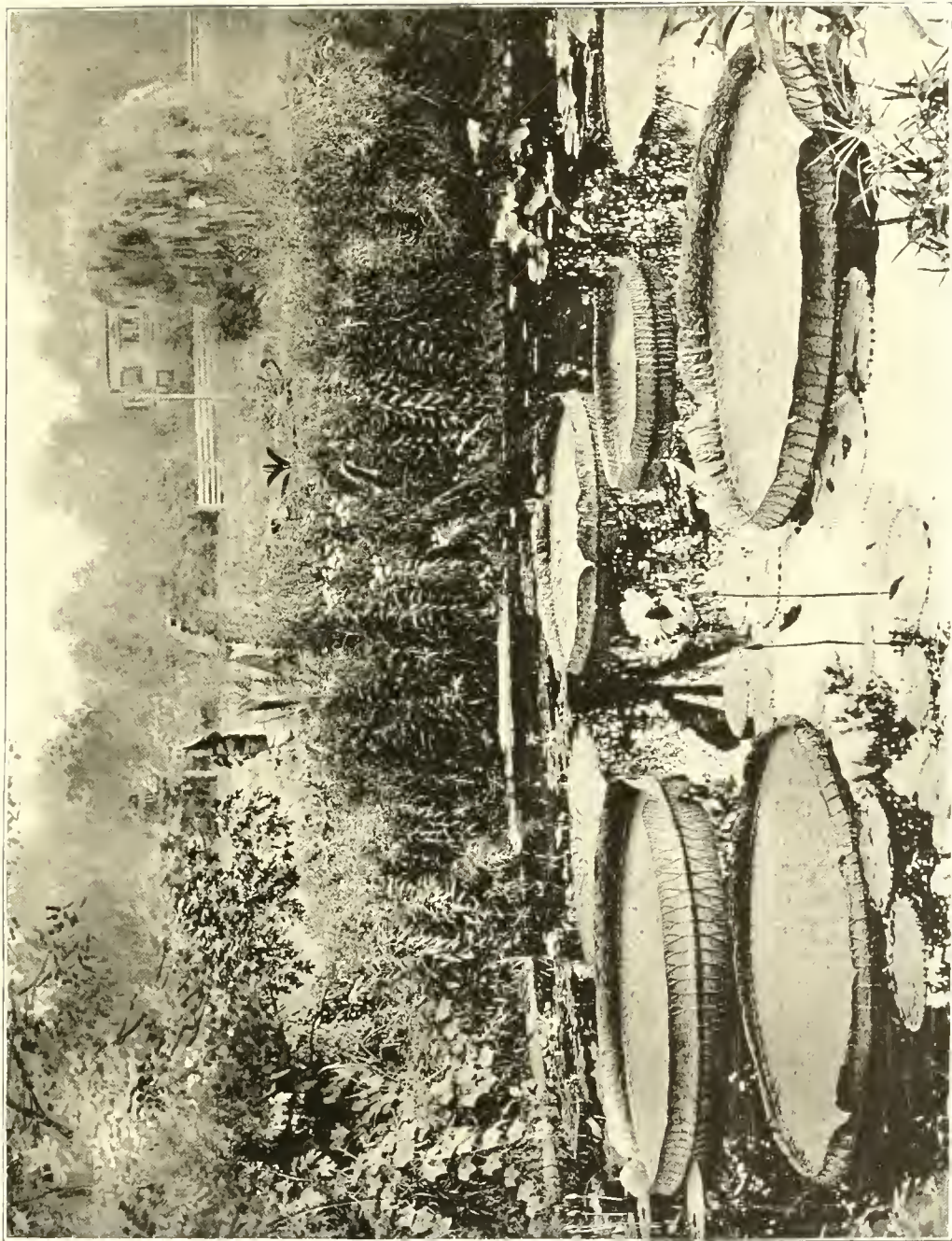
they cannot be thus grown in England, where such severe winters are not experienced, but on the other hand that country lacks the heat of our summers, so the plant is not able to perfect or mature its growth. Nelumbiums, like hardy Nymphæas, embrace the white, pink, deep rose, and yellow colors, and are among the choicest of hardy aquatics.

The tropical or tender Nymphæas embrace all the deeper shades of rose and crimson, pale blue and purple, also white and yellow. These are again divided into two classes; day and night blooming. These species and varieties are widely distributed and are indigenous to the tropics, as are the hardy varieties to the temperate zones. *Nymphaea zanzibarensis* and its forms *azurea* and *rosea* are, as the name implies, indigenous to Zanzibar, in Africa; *N. caerulea* comes from Egypt; *N. gigantea* is a native of Australia; *N. versicolor*, India; *N. gracilis*, Mexico; these are day flowering forms.

In the night flowering class are; *N. ampla*, (Jamaica); *N. lotus*, (Hungary); *N. dentata*, (Sierra Leone); *N. rubra*, (East Indies). This last is apparently the only red species, but be this as it may, we have many garden hybrids of many shades of pink, carmine, and crimson, which make up a large and complete list of night flowering forms. Detailed descriptions of these are given in chapter XIV. These not only afford different and distinct colors, but the individual flowers are as varied in shape and size as they are in color; some flowers are cup shaped, others open horizontally; some have wide petals, others narrow and sharp pointed; some flowers float on the surface of the water, others are erect and stand out above the surface of the water several inches on stout stalks.

As to fragrance; some resemble Violets, others Tea Roses, Lily of the Valley, etc., in their odor, but the fragrance of *N. odorata*, our native species, may be truly styled the fragrance of the Water Lily, it is peculiarly its own.





VICTORIA REGIA (TRICKER'S VARIETY) SHOWING PARTLY OPENED FLOWER.
The margin of the pond is planted with native plants, such as Golden Rod, Achillea, Wild Cucumber, with Eulalia, Musa, etc.

CHAPTER IX.

THE VICTORIA.

THE VICTORIA regia is now well known throughout the civilized world, although its introduction into England and the United States dates back to a period less than fifty years ago. It is grown most successfully in the open air, and is a very great attraction whenever seen, it is the grandest and most wonderful of all aquatic plants. It is a native of South America, where it inhabits the tranquil bays of the great streams. The earliest traveller who discovered it was Hœnke, in 1801. Dr. Lindley tells us that “Bompland subsequently met with it, but M. D’Orbigny was the first to send home specimens to Paris in 1828; they were, however, neglected or overlooked. In a work published some few years after this time, M. D’Orbigny mentions having discovered the plant in the river Parana in Guiana. It was known, he says, to the natives by the name of Irupe, in allusion to the shape of the leaves, which resemble that of the broad dishes used in the country. The Spaniards call the plant water-maize, as they collect the seeds and eat them roasted.”

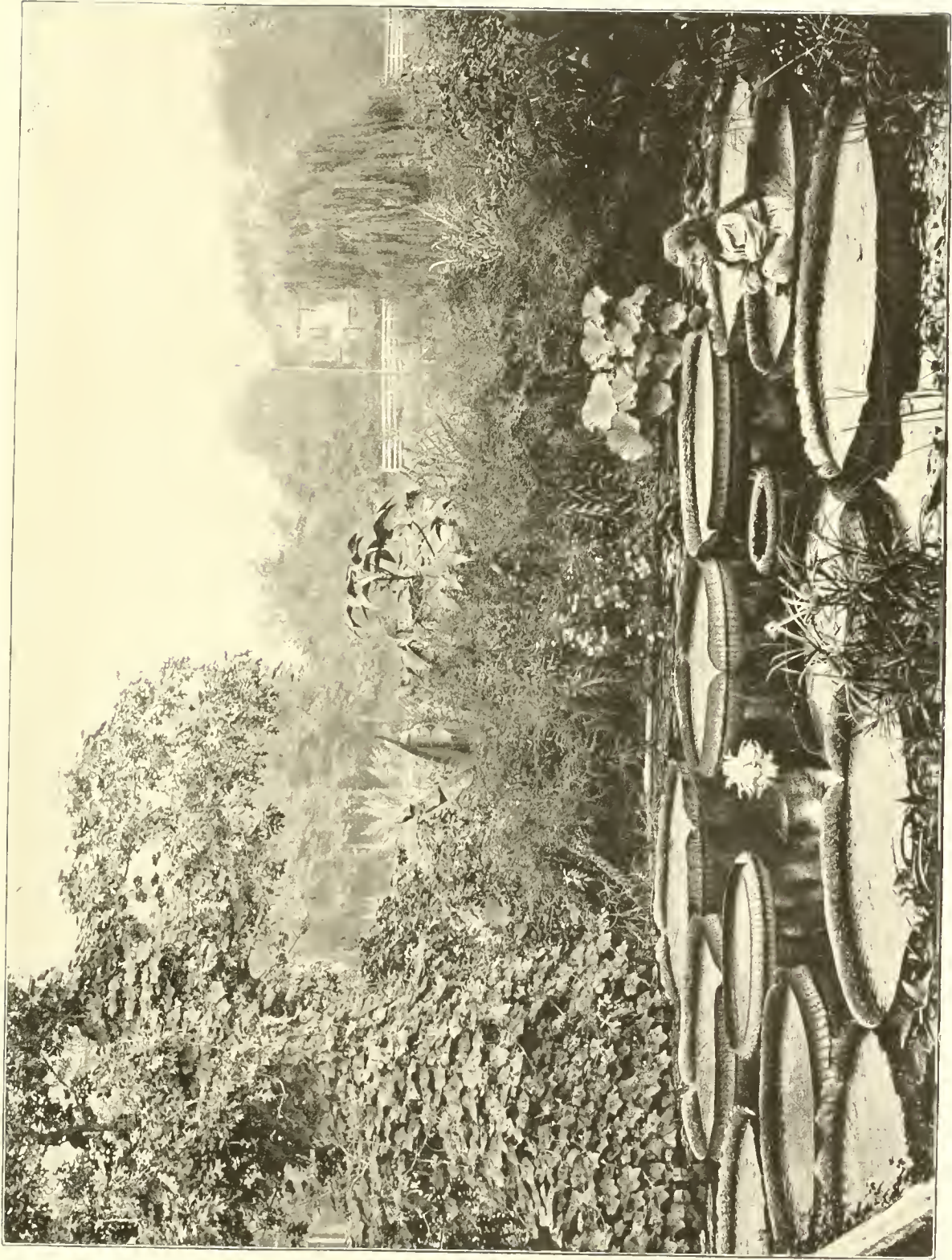
It was a great day, horticulturally speaking, when on the first day of January, 1837, Sir R. Schomburgh came upon this noble plant in British Guiana. A German traveller had found it in some tributaries of the Amazon in 1832, but it was when Sir R. Schomburgh, in a letter to the Royal Geographical Society of England, described the largest specimen he had met with, that public attention was drawn to this magnificent plant. Sir R. Schomburgh rightly described it as a vegetable wonder. It was while proceeding up the river Berbice that he came upon it. “It had gigantic leaves five to six feet across, with a flat broad rim, lighter green above and vivid crimson underneath, floating upon the water, and in character with such wonderful foliage I saw luxuriant flowers, each consisting of numerous petals passing in alternate tints, from pure white to rose and pink. The

smooth water was covered with the blossoms, and which possess the additional charm of extensively diffusing a sweet fragrance." Its introduction to gardens is probably owing to Mr. Bridges, who, in his journey through Bolivia, found the *Victoria regia* in considerable abundance, and he brought home in 1846 seeds in wet clay, well-dried foliage, and flowers in spirits.

The first flower was produced in England in November of 1849, and was presented to Her Majesty, Queen Victoria, in whose honor the plant was named. Its gigantic leaves are five to six feet in diameter, turned up at the edges five to seven inches additional. The upper surface is of a deep brilliant green, the under side a vivid crimson, and furnished with strong veins which are cellular, filled with air, and form a regular and elegant network. The underside of the leaf, as well as the foot stalks of the leaves and flowers, are covered with very prominent and elastic spines. The peculiar formation of the under surface of the leaf imparts to it great buoyancy, rendering the mature leaf capable of bearing a considerable weight, not infrequently 150 to 200 pounds, and a plant grown at Tower Grove Park, St. Louis, in 1896, had a leaf that bore the unprecedented weight of 250 pounds. The illustration on page 51 represents a *Victoria* as grown at Clifton, N. J., which had at one time twenty perfect leaves in different stages of development, and which produced a large number of its magnificent flowers from July to October. These flowers are not less marvelous than the leaves; when expanded a bloom measures from fifteen to eighteen inches in diameter, the petals are very numerous, the color, when the bud first opens, is white, passing by successive shades, the second day, into a rosy hue, a lively red to crimson. The flowers exhale a pleasant odor, not unlike that of a rich pineapple, during the first evening on opening; this is distinctly perceptible as soon as the sepals show signs of bursting, and hours before the flower is open. The bloom lasts but two days, or more correctly speaking, two nights, during the hot weather, but occasionally at the end of the season the flowers endure three days.

For many years there was but one type of *Victoria* in cultivation, but in 1886 a plant was grown at Bordentown, N. J., by Mr. Sturtevant, which produced a deep crimson flower, and also possessed darker foliage than the original; the turned-up rim of the leaf was also deeper. It was altogether a distinct variety, and is now known as *V. r.*, var. *Randii*. This variety has proved a most useful and very desirable one for open air cultivation in the United States, and is generally grown in preference to the type.

Later it became a difficult matter to obtain seed of the true *V. regia*, and



VICTORIA REGIA (TUCKER'S VARIETY) WITH FULLY OPENED FLOWER AND BUD SHOWING.

This represents a single plant having at one time fourteen leaves. It attains this fine development from a seed in the short space of twenty-two weeks, which is sufficient demonstration of its marvellous growth and capability when the proper conditions are available. To the left of the picture a Wild Cucumber plant adds gracefully to the natural scenery by climbing over an oak tree; this is not always to be commended as it will not add to the life or well being of the tree. On the right is seen a Weeping Willow tree, such trees always add to the Water Garden a charm peculiarly their own. The margin of the pond is clothed by the luxuriant growth of native plants with *Mosses*, *Ricinus*, *Euphlias*, and *Lottus*.

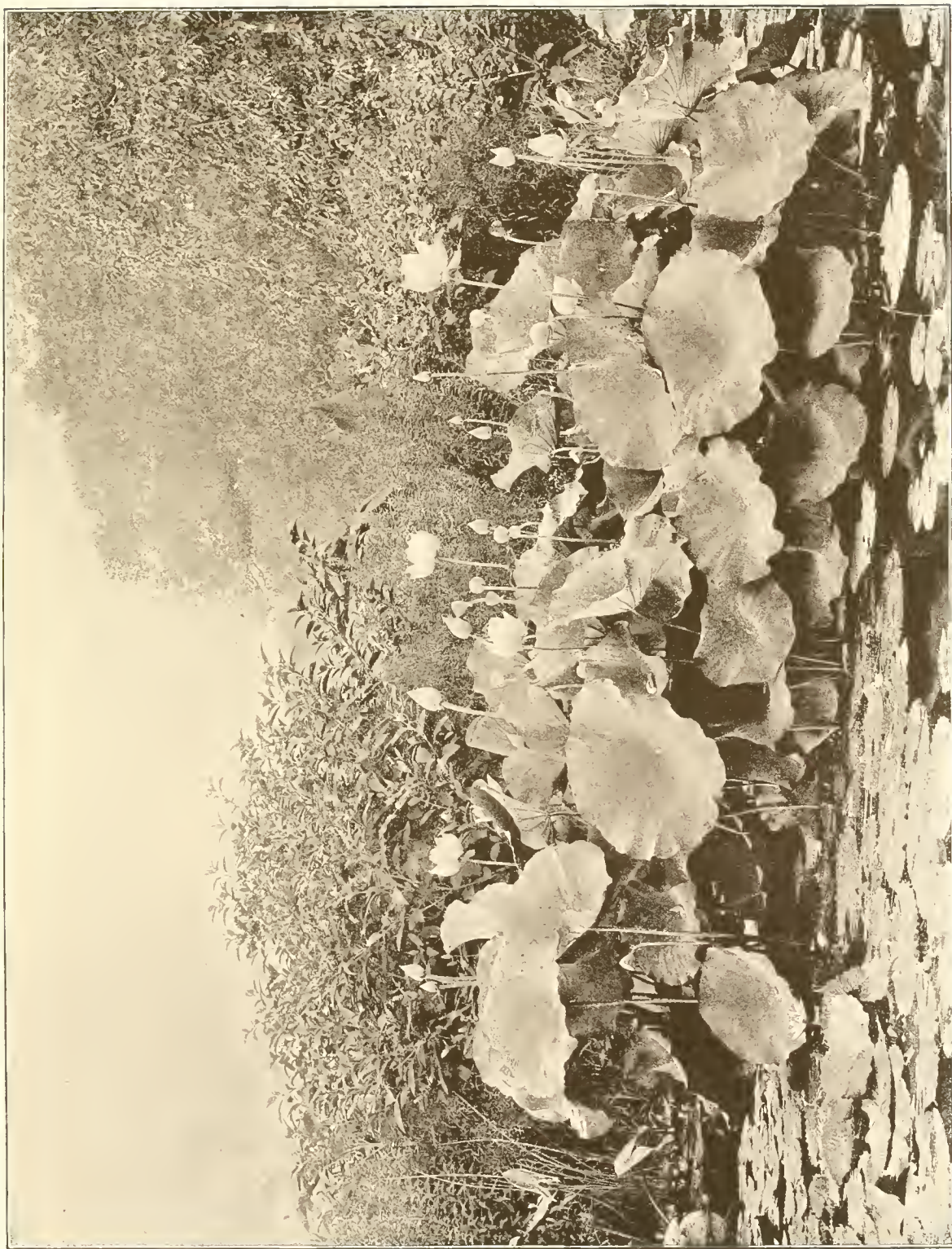


PLATE VI

EGYPTIAN LOTUS.

This handsome clump of Lotus was grown in the Victoria pond, at the Water Gardens, Clifton, N. J. The roots are confined to a given space by a concrete wall. In the early stages of growth no assistance by artificial heat is afforded. Prominent in the background is a clump of "Pokeweed," *Phytolacca decandra*, which attains a height of over 6 feet, and in autumn is covered with clusters of dark purple berries; on either side are plants of Golden Rod, and on the left of the Lotus is to be seen *Sagittaria Montevidiensis* and *Scirpus zebrinus*. No better arrangement could be conceived.

being desirous of securing it I determined to try a new field for supply, and during the winter, 1893-'94, received from a European house some seed purporting to be of the true *Victoria regia*. Some of this was sown about the 10th of March under precisely the same conditions as other *Victoria* seed, and in water at a temperature of 85° to 90° Fahrenheit. After waiting a month and seeing no signs of germination, I gave up hopes of securing a plant for that season; but at the same time I examined another portion of the same lot of seed which had not been subjected to a higher temperature than that of the house, and was greatly surprised to find several had germinated. The seedlings were potted off singly, and treated as other young *Victoria* plants; subjected to a temperature of 85°, and re-potted at intervals until planted in permanent quarters on May 20.

From the first these seedlings exhibited a feature which marked them as entirely distinct from the original form, the leaves being light green and mottled with reddish brown on the face, purplish below. The rapid growth and the early cupping of the leaf were also very noticeable. In its permanent quarters the growth of the plant was still more remarked, and it was soon evident it would outrun the older plants of the other variety, which in fact it did, at a very early date. The first flower was produced about July 15, and during August the same plant produced twelve magnificent flowers; these on first opening were pure white, and on the second day of a lively rose color. At one time as many as nine flowers and buds were visible in different stages of development, while var. *Randii* produced but half that number, and seldom had more than five presentable leaves at one time. The illustration on page 55 represents the first plant of the variety as grown at Clifton, N. J., where it made such a record and proved to be so entirely distinct from anything before seen in the United States.

The same characteristics of the plant have been manifest during the past two seasons, and it has exhibited a tendency to flower at a very early stage. Last year a few plants that were not wanted were allowed to remain in eight-inch pots, where they produced flower buds and one perfect flower, and would have continued to flower had they not been removed. Last season one plant of this variety produced some pods of seed, one of which bursted earlier than was expected, and not having been bagged the seed was scattered. So far as was possible the seeds were picked up, but a number escaped notice and sank. Early in July, 1897, a number of seedling *Victoria* plants made their appearance on the surface of the water (which is about two feet deep).

During the winter but little water remained in the pond, and at one time what was there must have been frozen nearly solid; in spring the water was drawn off, the bottom, consisting of pure stiff clay, was pounded firm, and a layer of sand put upon it; the young plants referred to above are firmly rooted in the clay bottom and have every appearance of being strong and vigorous.

The partiality for a comparatively low temperature is a remarkable feature of this variety (which we distinguish provisionally as "Tricker's variety.") In no case has seed germinated when subjected to a temperature of 85° to 95° ; it enjoys a temperature similar to that which is usually afforded tender *Nymphæas*, and there can be no doubt whatever but that it will become a universal favorite, as it can be grown successfully under precisely the same conditions as the tender *Nymphæas*.

Another variety of *Victoria Regia* is recognized in England as Dixon's and is characterized by the deep coloring of its flowers.

Thus far we have records of at least three distinct forms beyond the type, but so far their exact standing has not been determined. Provisionally classed as varieties of Schomburgh's original plant, it may be that at least one of them is worthy of specific distinction, but that can only be determined on a fuller and longer acquaintance.

Victoria regia is of easy culture; coming from a tropical country, it requires a summer temperature all the season, to grow it successfully. In its native habitat, it is a perennial, but with us, the best method is to treat it as an annual. It forms no tuber, nor rhizome, as do *Nymphæas*. It produces seed freely, and if the season be sufficiently long, or if artificial heat be supplied, the seed will ripen, but it takes from two to three months to ripen the seed. After it is ripe, it should be kept in water continuously, and in a temperature not below 60° .

The seed should be sown during February and March, according to the season of the country, or facilities for growing the plants. The water temperature for starting the seed should be 85° to 90° ; the seed sown in pots, or seed pans and placed in shallow water, will develop the seedlings in about twenty days, although occasionally, some will make an appearance in ten days. These should be potted off singly into thumb pots as soon as the second leaf appears; the water temperature for potted plants need not exceed 85° ; the young plants should be repotted at intervals, keeping them steadily growing until they are planted out in their summer quarters. Sufficient room must be given at all times, so that the leaves are not crowded so as to overlap each other.



VIGOROUS GROWTH OF PAULOWNIA IMPERIALIS.

The picture represents the strong growth of a young plant, or new growth from a young plant that has been cut back; in this stage it forms a most pleasing and striking object in the background or surroundings of the Water Garden, its large tri-lobed downy leaves having a beautiful, tropical appearance. The growth may be cut back each year.

The *Victoria* requires a depth of eighteen inches to two feet of water above the crown of the plant, and to grow it in a pond with *Nymphaeas*, a pit must be made for it; this must be one foot below the bottom of the pond, and should be large enough to hold about one hundred and fifty cubic feet of soil, such as recommended for growing *Nymphaeas*.

In a pond of sufficient size, large enough to grow a *Victoria* and *Nymphaeas* together, it is necessary for an attendant to walk between the plants, and the depth of water must, therefore, not greatly exceed two feet; this, with boxes one foot deep for the *Nymphaeas*, will give about one foot of water above the crowns of those plants, but a foot of water is not sufficient for the *Victoria*, twenty to twenty-four inches is necessary; this additional depth of water is obtained by sinking the pit to hold the soil one foot below the bottom level of the pond. This pit should be 12x12 feet wide and 2 feet deep inside measurement. The walls may be built of 4-inch brickwork, with an 8-inch buttress in the center of each wall; the bricks should be laid in cement, and the walls—which should be one foot above the level of the bottom of the pond—should be faced with Portland cement on both sides; the bottom may be laid in concrete or puddled with good clay; it must be water-tight throughout. As this is intended for early planting—say first week in May—the pond, and especially the pits, must be heated and a temporary cover provided, the latter may be made of ordinary lumber, similar to a hotbed, made in sections and fastened together with hooks—the width of the pit requires two 6-foot sashes to cover it. The frame may be made one continuous pitch, the sashes overlapping each other, but a better way is to make a frame, the sashes pitching in opposite directions making an equal span roof. This will be found easy to handle for ventilation and inspection of plants.

Where two or more *Victorias* are to be grown in one pond, it will be better to grow them on in pits covered with frame and sash as above described, and these heated separately until about the first of June, or until the plants become too crowded and need more space. At this date the tender *Nymphaeas* should be planted; these should be strong plants that will give immediate effect. The *Victoria* plants must receive first consideration, and additional firing may be necessary during cool spells to maintain the desired temperature. This temperature will also be highly beneficial for the *Nymphaeas*.

The system of heating the water must be decided upon before the pits are built. If in conjunction with a heating plant already on the ground it may be practical and economical to utilize the same, whether steam or hot water, but

it very often happens that this cannot be done, and an independent system has to be adopted. The best for the purpose is hot water. The site for the boiler house must be near-by, practically out of sight, hidden by rockery or shrubbery, as nothing would be more objectionable than an unsightly chimney or building in the landscape.

Steam may be used for heating, but it is not to be recommended unless used for other purposes. Exhaust steam from an engine or pump must not be emptied into the pond, as the oil contained in the same would be very objectionable. The best method is to use live steam direct from the boiler; one one inch pipe is ample for each pit. This should enter at the top of the pit at one end, and cross diagonally on the bottom, rising at the opposite end, and terminating just below the top of the brickwork with a pit-cock. A valve will be necessary to regulate the supply, also to blow out the exhaust which may empty into the pit. Cover the pipe with drain tiles or insert in a soil pipe or cover with boards, the object being to keep the soil clear of the pipe, and allow the heated water to rise. Cover the exposed main pipe with asbestos, felt, or non-conducting material. This system of heating has worked very satisfactorily.

In the case of hot water heating, flow and return pipes are necessary, and two-inch pipes preferable.

The pits are to be heated separately and independently of the pond proper, until the *Nymphaeas* are planted out about the first of June, earlier in Southern States. A 1-inch pipe may circuit the pit, but if a 2-inch pipe is placed the same as advised for steam heating it will be found very beneficial. In this case the return pipe must necessarily be under the bottom of the pond proper; great care must be exercised that the wall where the pipe is carried through is perfectly water-tight as serious trouble will result from a leaky tank.

Towards the middle or latter part of June the plants will have attained considerable proportions; the frame will be full of leaves, and every means should be used to "harden off" the plant previous to full exposure, which it is not prudent to allow before the latter part of June. Care must be exercised in this performance, and the weather must be settled warm; a chill and a check to growth at this time would annul all the care and attention previously bestowed, and the plants would probably be ruined. With the water at a temperature of 80°, or even 75° during a cold spell, the *Victoria* will pull through, and the tropical *Nymphaeas* will doubly repay for the care and attention bestowed on them; the *Nymphaeas*, indeed, will attain such perfection that they will surpass anything seen under ordinary conditions.

In the neighborhood of Philadelphia and New York, *Victoria* plants may be planted out from the first to the middle of May; but from this date until warm settled weather arrives, the plants will need protection and artificial heat, for a water temperature of 80° to 85° must be maintained.

It must not be inferred that the *Victoria* cannot be grown at all without artificial heat. There are instances of plants doing well and even producing flowers, though they are exceptional; but there are exceptional localities. As a general rule, the season is too short, as it is not safe to plant without artificial heat until the end of June, and the summer will be declining by the time the plant has attained fair proportions; and there is then the possibility of a cold spell, and the plant may not make any decent showing. But if grown with artificial heat, a plant will have attained good proportions, in fact, equal to the whole season's growth of a plant without artificial heat, by the time it is safe to plant out.

Victoria plants are very succulent, and will not bear the confinement in a packing case in the same manner that a Palm will, yet they will travel long distances, and withstand a journey of two or three days without suffering, but only the strongest plants should be subjected to a long journey, small plants would succumb, but can be safely shipped on a two days' journey.

When plants are received from a distance, and have been subjected to a comparatively low temperature during the journey, they should not be at once submerged in water at the temperature before recommended for growing *Victorias*, but proceed as follows: On opening the case, place a thermometer inside the packing for a few seconds, to ascertain the existing temperature, then unpack and place the plant in water but a few degrees higher, also shade the plant during the day, gradually increasing the temperature as the plant recovers its normal condition. The plant should be shipped in the pot in which it has grown, and should remain undisturbed until it shows signs of growth, which it should do in two or three days; after this the plant may be repotted or planted in permanent quarters.

When a plant has been shipped but a short distance, it may at once be placed in permanent quarters, or submerged as received, and planted out a little later; the condition of the plant and the surroundings must direct the operation. After planting, keep both water and atmosphere at a temperature of 80° to 85°, giving air on all occasions when the weather permits. Keep a thermometer on hand, in the water is preferable, so as to know what the temperature is at sight.

THE VICTORIA.

Little or no labor is attached to the culture from now. Occasionally some water should be added to replace loss by evaporation, and for this it is well to have a hose attachment at hand; such will also be useful for flushing the pit and washing off any scum that may arise from fermentation or other cause. Toward the end of June the plant will be getting somewhat crowded, and will need more room. As it reaches this condition more air should be given, and the plant exposed to the full sunshine, and air should be left on during the night, so that the plant will not suffer when the frame and sash are finally taken off. If this be not carefully attended to, the plant is likely to suffer; the leaves will scald or scorch with the full sunshine, which will both check the growth and disfigure the plant. Early in July the first flower should be produced and if the weather permit, other conditions being satisfactory, the plant will bloom continuously for the season, throwing up a flower every third or fourth day, and occasionally in very warm weather every second day.

If seed be desired, leave one or two capsules to ripen, and cut off all other dead flowers as soon as withered; the seed takes from eight to ten weeks to ripen, sometimes longer, much depending on the existing temperature and conditions of the weather.





PLATE VII
A CHARMING NOOK.

The truest art is that which conceals itself, and of the creation of the scene it may be truly said "This is an art which does mend nature, change it rather, for the art itself is nature." This beautiful rock garden with pool and aquatic plants and marginal planting so beautifully natural, is the work of Mr. J. F. Johnson, for H. A. Page, Esq., of Orange, N. J. The ground was previously a pasture devoid of rocks, shrubs and flowering plants. Special attention should be given to the treatment of the edge of the pool.

CHAPTER X.

THE AQUATIC HOUSE.

AQUATICS of all kinds, even the most tender, including the *Victoria regia*, can be grown in the open air during the summer, but it is necessary to have strong plants, more especially of the tender ones, when the season arrives for planting out. The advantage of having suitable quarters in which to propagate and grow the plants, is therefore at once apparent.

An equal span roof house, twenty to twenty-five feet wide is best adapted for the purpose of an aquatic house, as it gives all light possible. In place of the usual table have in the center of the house a tank, built of masonry, concrete or brickwork, the latter preferred. The length of the tank or house must be determined upon in each individual case, but whatever it is, the tank should have a division wall across the center, thus making two tanks, as, with a large collection, it is always best to have one tank that can be heated ten or more degrees above the other, and in winter one tank can be used for stock, the other for flowering plants, or if not wanted for Water Lilies, the tank can have a temporary covering and be used for any purpose. Build an eight-inch brick wall, eighteen to twenty-two inches high, the last two courses tapering, and finishing off with a four-inch single course. The walls being above the ground level, will require to be laid in cement and faced on both sides with Portland cement, troweled off. The bottom must receive a good flooring of concrete, or a layer of bricks grouted with cement, and afterward a coating of Portland cement. Such a tank will be found very accomodating, both for small and large plants.

A temporary bench can be easily arranged with a few inverted flower pots and slates; this is most convenient if placed near the tank wall and the space in the center utilized for large plants in pots or boxes.

Provision should be made for heating the tank; one two-inch pipe through the center will be sufficient, as the greenhouse will be heated, and should be

pipcd to maintain a minimum temperature of 70°. Steam or hot water, which ever is most convenient, will answer. If steam be used, insert a small steam pipe—one-half or three-quarter inch—inside the two-inch pipe, which should be perfectly water-tight, thus forming a hot-air space the entire length of the tank and equalizing the temperature. If hot water be used, one two-inch pipe is sufficient, entering at one end and connecting with a return at the other. A good plan is to build a short piece of pipe into the wall, through which to pass the pipe, afterward corking tight; this will prevent breaking the wall to make connections when the piping is done. In the case of steam heating, no break in the wall is necessary, as the main pipe can be overhead and drop into the tank at one end, and the exhaust can empty into the tank, or it may be connected with an exhaust pipe and be conveyed through the wall as recommended for hot water return pipe.

An overflow and outlet pipe should also be provided. Any size, from one to two inches will answer the purpose; this should be built into the masonry at the bottom and connected with a drain; the inlet should be a few inches from the wall, with an L piece fitting level with, or slightly below the floor of the tank, the upright piece of pipe should screw easily into the fitting, and should reach to within half an inch of the top of the tank.

Where only a moderate number of plants is needed, a tank on the side benches may be sufficient for the purpose, yet two would be better than one. They may be twelve feet long, more or less, as the case demands; one should be eight inches deep, the other twelve. These should be made of white pine two inches thick and lined with 16 ounce copper, brazed. To afford means for heating, the wooden bottom may be omitted, save at the ends and one or two cross-tie pieces between, and the tank placed directly over the pipes, which should be boxed in with lumber, to confine the heat, and light T iron bars should be used across the bearers about nine inches apart, making a substantial rest for the bottom of the tank. Should it be required, arrangements can be made to have a part of either tank heated several degrees higher than the rest by having a one-inch division board in the tank, fitting it moderately tightly, and making a drop door in the front. An oil lamp or stove can be used for additional heat, and for use during the time when the pipe heat must be shut down in the day when the sun is shining, and ventilation is necessary.

If no bottom heat be used, the tank will need a two-inch bottom which may be made of hemlock; the tank being lined with the copper as before advised. Such a tank being portable can be used in any convenient place



AN AQUATIC HOUSE.

The structure here shown was 60x32 ft. The Victoria tank in the centre measured 26x31 and was pear shaped. The rest of the house had several smaller tanks devoted to *Nelumbium*, various *Nymphaea*, *Ourivandra*, etc., with a setting of *Palms* (*Phoenix*), *Cycads*, *Ferns*, and other plants.

during winter and spring, and may be placed out of doors in summer, or when not wanted inside.

A tank provided with bottom heat is a useful adjunct to any place, and when not needed in winter for aquatics, it may be used for propagating, or for plunging plants that need bottom heat, using such a medium as cocoanut fibre refuse, which indeed is the best for such a purpose. If a tank of more than twelve inches depth be desired, one built of masonry is to be preferred; this not necessarily occupying all the central space, but one end of the centre table, and that where it will derive the full benefit of light and sunshine.

Do not put plants into new tanks immediately after they are finished and filled with water; but allow the water to stand for three or four days, then allow more water to run in, and with the hose wash off any scum, or anything that has gathered on the surface. Do not change the water if it be thick or cloudy, it will settle in a short time.

OUVIRANDRA FENESTRALIS (LACE OR LETTUCE LEAF PLANT).

Among all the submerged water plants there is not anything that rivals this unique plant. It is indigenous to sluggish streams in Madagascar. Its introduction dates back to the year 1855; although known to cultivation for upwards of forty years, it is yet a rare plant, and when seen in good condition it is one of the most beautiful and attractive of aquatic plants. The leaves may be termed skeletonized; they are

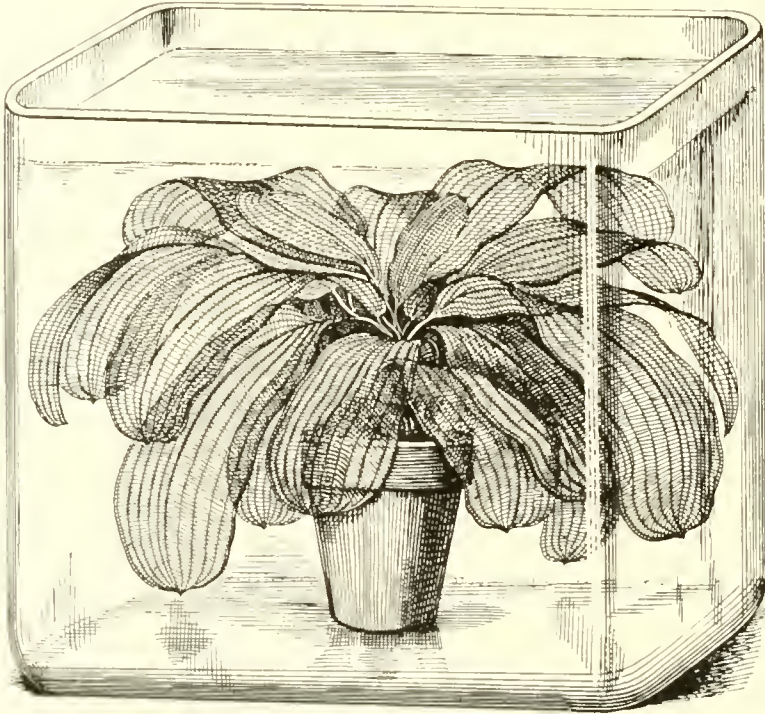


INDIVIDUAL LEAF OF OUVIRANDRA FENESTRALIS.

a mere net-work resembling lace, and on a well-grown plant measure from twelve to eighteen inches in length, and four to six inches in width, oblong, with an obtuse apex, and spreading out nearly horizontally beneath the surface of the water; they are bright green in color in the early stage, changing to deep green when fully grown, with a greenish yellow midrib; the flowers are white, the stem being split at the top into two spikes.

OUVIRANDRA FENESTRALIS.

The plant delights in a rich soil similar to *Nymphæas*, a warm house, the water temperature from 65° to 75°, partial shade, and a wooden vessel in preference to anything else. Some of the finest specimens seen have been grown in tubs—half kerosene barrels. It is unnecessary to change the water,

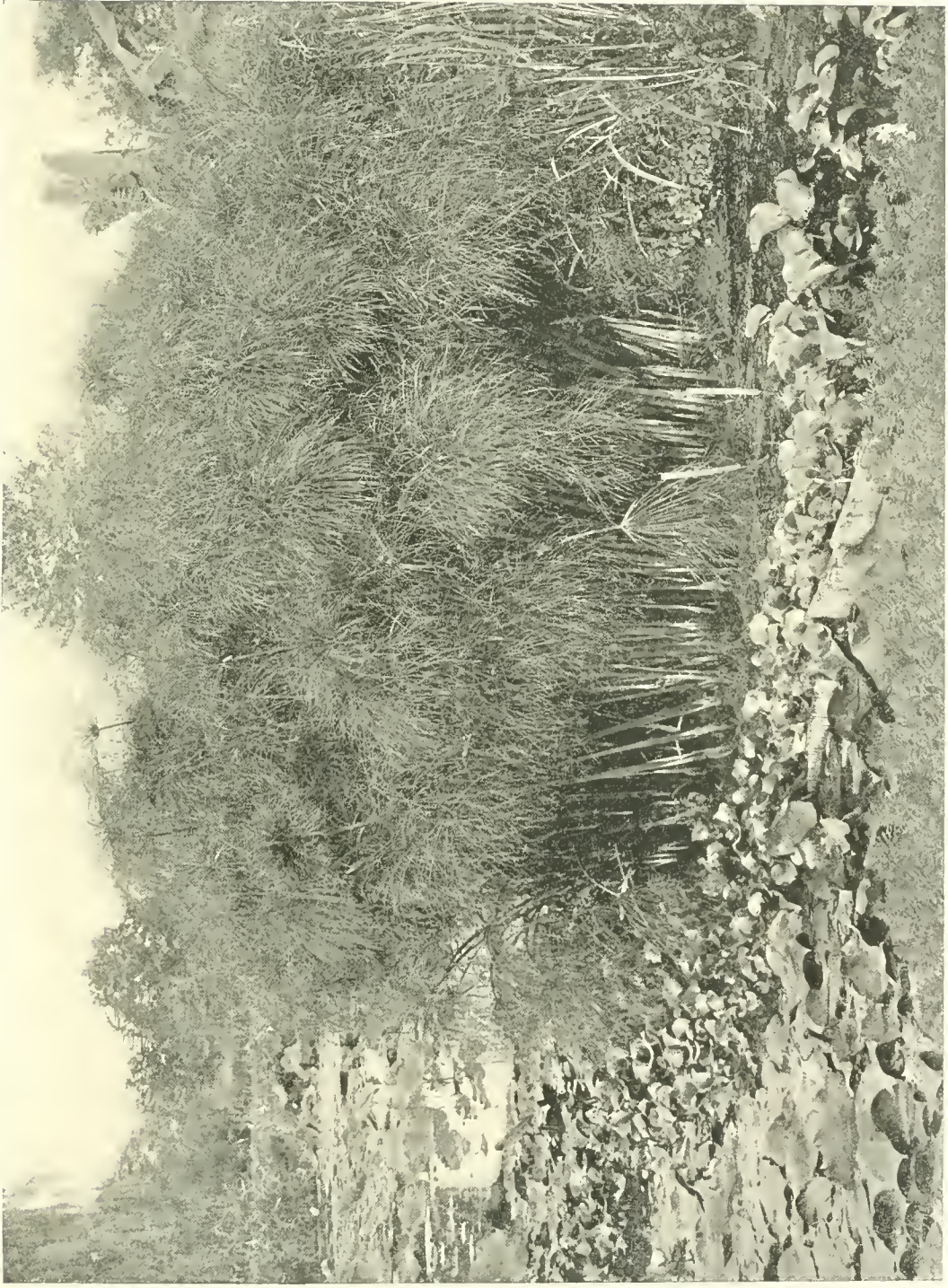
*OUVIRANDRA FENESTRALIS.*

as when the plants are in a healthy condition they oxygenate the water and keep it clear, but *confervæ* will occasionally appear. The best means to clean this off and add to the health of the plant is to introduce a few tadpoles or water snails.



AN AQUATIC GARDEN AND FISHERY COMBINED.

The three panels show the same spot at different seasons of the year. The upper picture represents the pond in fall and early spring protected with frame and sashes. The central picture winter with its canopy of snow. The lower section shows the pond in summer with aquatic plants: Nymphaeas, Cat Tails, Rushes, and Cyperus, and the juvenile attendant feeding the fish. This system of covering the aquatic tank or pond is to be commended.



PL. VII. VIII

A MAGNIFICENT CLUMP OF PAPYRUS ANTIQVORVM.
(Egyptian Paper Plant.)

The clump here depicted is planted in good rich soil wholly under water. There being from 4 to 6 inches of water above the crowns of the plants.

CHAPTER XI.

THE AMATEUR'S WATER GARDEN.

NO BRANCH of horticulture is calculated to give more healthful recreation to both young and middle-aged persons than a water garden, even if only on a small scale. The additional attraction, and one of the essential occupants of the pond, is fish; with these we have an ideal source of pleasure and recreation which may be enjoyed by all lovers of nature, and especially the children. Few persons, young or old, but have pets or some other hobby, and when children can indulge in the care of fish it is a delightful aid toward their recreation, instruction, and profit. Fish, in a very short time, become as much a pet with the young as does a kitten, and how pleasurable to a child to have them eat from its hand, or congregate when the water is disturbed.

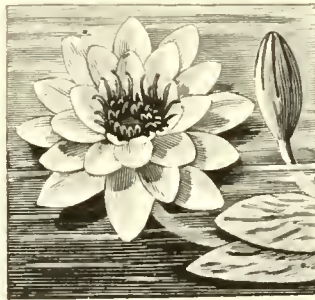
Fish of any kind are desirable in the pond, and should certainly be provided. Gold fish are always very attractive in small ponds, fountain basins, and tubs, where plants are growing, as are also Japanese fan-tails, and others in variety.

The presence of frogs, tadpoles, and water snails is very essential, but the fish are liable to eat both the larvæ of and the young snails themselves; sunfish are especially destructive and should not be put in the same water as the snails, unless for the express purpose of eradicating them.

The illustration shows a small water garden built for the culture of fish as well as aquatic plants; this is located in one of our Western States, and subject to severe weather in winter, the thermometer occasionally falling to 20° below zero. The size of this pond is 4 ft. x 16 ft. and 3 ft. deep, divided into 3 sections, the centre one being 3 ft. deeper for the fish in winter. The size and depth is not binding, but can be made to suit individual requirements. I have, in another place, described one 5½ ft. x 12 ft., and 20 inches deep. The plants can be grown in tubs or boxes, or in soil deposited in the bottom of the pond.

A few Water Lilies, Grasses, and Cat-tails, with such plants as *Myriophyllum*, *Cabomba*, etc., will furnish the pond. A few Water Hyacinths are essential in the pond, as the fish will deposit their eggs on the roots of these plants, which are easily lifted out of the water and placed in jars or other vessels to hatch.

The illustration represents the pond at different seasons of the year. The uppermost picture shows the mode of protection in early fall and spring, a removable frame and sash over the pond protecting the plants from early frosts and prolonging the season. On the approach of winter weather, leaves, salt hay, straw, or similar material are packed around the frame, and the sash is to be covered with straw or straw mats, while a shutter or waterproof canvas is very desirable to keep the materials dry. Then let Dame Nature finish the work as shown in the central picture. On bright sunny days, and during a warm spell, the frame may be partly or wholly uncovered to allow the sun to warm the atmosphere inside and the water, and, as the days lengthen, the covering on the sashes may be dispensed with, and air admitted on bright days. The plants will start into growth and have leaves and flower buds long before our native varieties make their appearance on the surface of the water, and early in summer the water garden will take on an appearance as represented in the lower panel.



Nymphaea Marliacea chromatella.



AN AMATEUR'S AQUATIC GARDEN.

The Water Lilies in bloom in the foreground are *N. Ieyoumensis* and *N. dentata*, and a glimpse is had of some *N. odorata* and *N. chromatella* beyond. The corner of a Lotus bed, *Nelumbium speciosum*, is seen on the left, and at the opposite corner Water Hyacinths; connecting the two pools is a small channel with Water Poppies. The Palm Grass, *Panicum eximium*, is a very handsome and excellent border plant, also the *Enhalias* as seen in the clump behind the Lotus.

CHAPTER XII.

INSECTS, RATS, DISEASES, AND ENEMIES.

FEW, IF ANY plants are absolutely free from insect pests, and Water Lilies and other aquatics are no exceptions, though they are comparatively free. Aphides (green and black) will put in an appearance, and will generally be observed first on the young leaves of Nelumbiums, especially if other plants in the vicinity are affected. The syringe or hose should be brought to bear on them when quantities will be washed away if not killed; the plants may also be dusted with tobacco dust, but this makes them very unsightly, and should only be used when other means fail. Green fly and black fly have their natural enemies, which after all are the best remedies; among these are the lady-birds, of which there are many species, all are carnivorous, with almost insatiable appetites, and very destructive to aphides. It is not so much the pretty little beetles that render assistance in the extermination of the aphis as it is the unsightly dusky brown larvæ; these fellows live to eat, and eat voraciously. They are met with on trees, shrubs, and plants in every section, and many persons not familiar with them and their mission, and believing that a bug is a bug, and that all bugs deserve the same fate, without any hesitation crush the life out of one of the greatest benefactors to the gardener.

Another enemy to aphides is the lace-winged or golden-eyed fly; these are equally as destructive as the lady-birds, and in this case, also, it is the larvæ that do the work. The perfect insect has four delicate, transparent, whitish wings, netted like fine lace, bright golden eyes, and a beautiful green body. While not so common as the lady-birds, they are frequently to be met.

Other beneficial insects are the Syrphus flies, the larva of which are quite blind, but the eggs are deposited in the midst of colonies of plant lice, where, on hatching, the young grope about and obtain an abundance of food without much trouble. All horticulturists should be familiar with these insects, and avoid using insecticides anywhere within reach of them.

Another destructive insect that attacks the Lotus is *Botis nelumbiiis* this makes its appearance early in the season, and while the first leaves are just floating on the water, it is somewhat of a leaf-roller, as it eats the surface of the leaf near the edge, rolls the edge over, and envelopes itself in a slight web; but later, as the insect matures, it finds its way into the centre of the leaf and enters the stalk, where it remains during the pupa state. The only known remedy is hand picking. Fortunately, this pest is not common, and though known for several years I did not see it until the season of 1896.

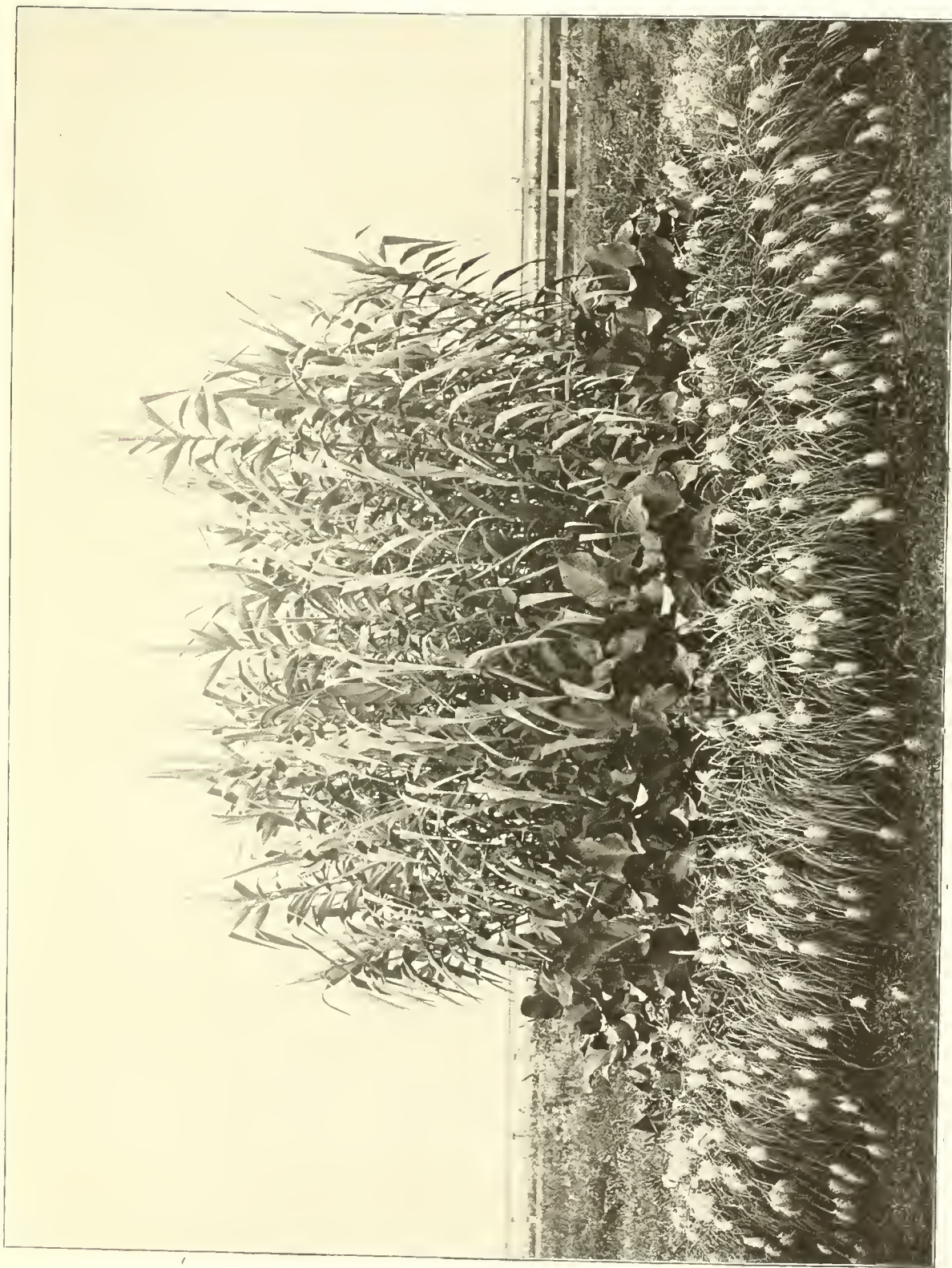
There is also another very similar insect which made its appearance on the *Nymphaeas*, but in this case the larva cuts a piece off the edge of the leaf, and uses it for a covering in the early stage; later, as it matures, it uses two pieces, between which the insect is sandwiched. As it is thus hidden and the covering or shield is the same as the leaf, nothing is noticeable but the perforations of the leaves; the best remedy is hand picking, and by keeping a constant watch, the colony of young ones may be destroyed by taking off the entire leaf as soon as possible after the insects appear.

The *Nelumbiums* have still another enemy and probably the worst to combat, and that is the muskrat. Wherever these are known to exist every means must be employed to eradicate them, they not only do much damage to the banks of the pond, but they eat the tubers of the *Nelumbiums* in winter or when in a dormant condition, but they do not molest the growing plants. They are also very partial to some *Nymphaeas*, especially *N. chromatella*. *Nelumbiums* growing in stiff, clayey soil are better protected against muskrats than are others growing in soft soil in which it is easy for the rats to burrow. Trapping is probably the best means to get rid of them, but they are very wary and scent danger; often a trap set where one was known to have recently passed acts as a danger signal and wards off others. If the muskrats are known to be in the vicinity, hunt them down, never allowing them to make a settlement or colony.

Mice are destructive to both seed and tubers of tender *Nymphaeas*; these can always be kept at bay, but ceaseless vigilance is necessary, and if you have valuable tubers, watch them.

Turtles should never be allowed in the ponds, at least in artificial ones, in some natural ones their presence cannot be avoided. They destroy young growth of both leaves and flowers, and are particularly destructive to the seed crop, even if the seed pods are tied in muslin bags.

Algæ and confervæ of various forms are occasionally troublesome, and though not a "disease" are injurious, being of a low order of plant life, some,



ARUNDO DONAX (GIANT REED).

To be seen in its true character this should be grown in a clump 12 ft. to 15 ft. in diameter, as ~~best~~ represented. It delights in fairly rich loamy or sandy soil and plenty of moisture. In northern sections it should receive the protection of a mulching of leaves, Ferns, or such-like. A row of dark leaved *Canna* surrounds the *Arundo*, but they are insignificant and lost by the side of this giant, yet, with the border of *Pennisetum longistylum*, add to the grandeur of the whole.

parasitical, choke the life out of the plants on which they prey. Some forms are like strong, green threads, and in some instances, when allowed to go on unchecked, it is impossible to separate or disentangle the plants or leaves without breaking some; but in most cases such a condition is only found where few or no fish are in evidence and plants are in an undisturbed condition. Confervæ will form on some plants in stagnant water, especially on seedlings that have not arrived at a stage when floating leaves are attainable, and when fish cannot



LEAF OF HARDY NYMPHÆA AFFECTED WITH CEROSPORA.

be allowed in the water. In such instances the best remedy is Bordeaux mixture, one-third less than the usual strength as applied to other plants; use with hand syringe, merely wetting the plants on the surface of the water; but this must not be used for confervæ on *Ouvirandra fenestralis*, or it will kill the plant as well; this will also check a certain damping off or rot on small seedlings. But this latter trouble is often the case of over-heating, and a lower temperature will prove beneficial.

A sporadic trouble or blight has recently made its appearance to annoy aquaculturists, it belongs to the order *certosporæ* and is similar to the celery blight. A few light-colored spots appear on the oldest leaves, which spread rapidly, and the leaves soon after commence to rot where the spots appeared. As the leaves are thus destroyed the plant is considerably weakened and nothing like maturity can be obtained; the plant gets weaker and smaller, and would ultimately die. Bordeaux mixture is the best remedy; the new mixture, Potash Bordeaux, is preferable as it leaves no chalky or white-washed appearance. Apply with a fine spray or dip the leaves where plants are in a portable state. After treatment the leaves will, for a time, have the appearance of having been whitewashed, but as new leaves quickly replace the others in a healthy or vigorous plant, those that were affected can be taken off in the course of a few days, but if more spots appear another application of the fungicide will be necessary.

There are several kinds of water snails, all more or less beneficial to the cultivator, but one species, with a long black colored shell, is particularly fond of the green leaves of *Hydrocharis* and *Aponogeton*, as well as of the decayed leaves of other plants, *confervæ*, etc. Should the plants be found to be eaten in this way, it is best to remove these plants to another tub or compartment by themselves, and introduce a sunfish or two, which will clear off the snails and their larvæ in a remarkably short time. Sunfish will not only devour such snails as are injurious, but will take all kinds, and as all snails are beneficial (even those that eat *Hydrocharis*, etc., will not eat the leaves of the *Ouvirandra*), care must be taken in this respect, and sunfish must be kept in their proper place. It is questionable whether they should be kept at all in an artificial pond, tank, or tub. Water snails have other enemies besides sunfish; the larvæ of the great dragon-fly will attack and destroy them, but as their season is limited in duration, and the mature insect is more or less beneficial, and they are difficult to exterminate, we must patiently bear this apparent injury, knowing they cannot do much, if any, injury indoors.

Frogs and tadpoles are of great service and should be encouraged in and around the ponds; these, too, have their enemies, the domestic cat should never be allowed near the tanks, as pussy will surely find out the frogs as well as the fishes, of which she is particularly fond.

In the natural ponds, water snakes will put in an appearance, these reptiles will devour both fish and frogs, and, until we are visited with a plague of the latter, destroy all snakes possible.

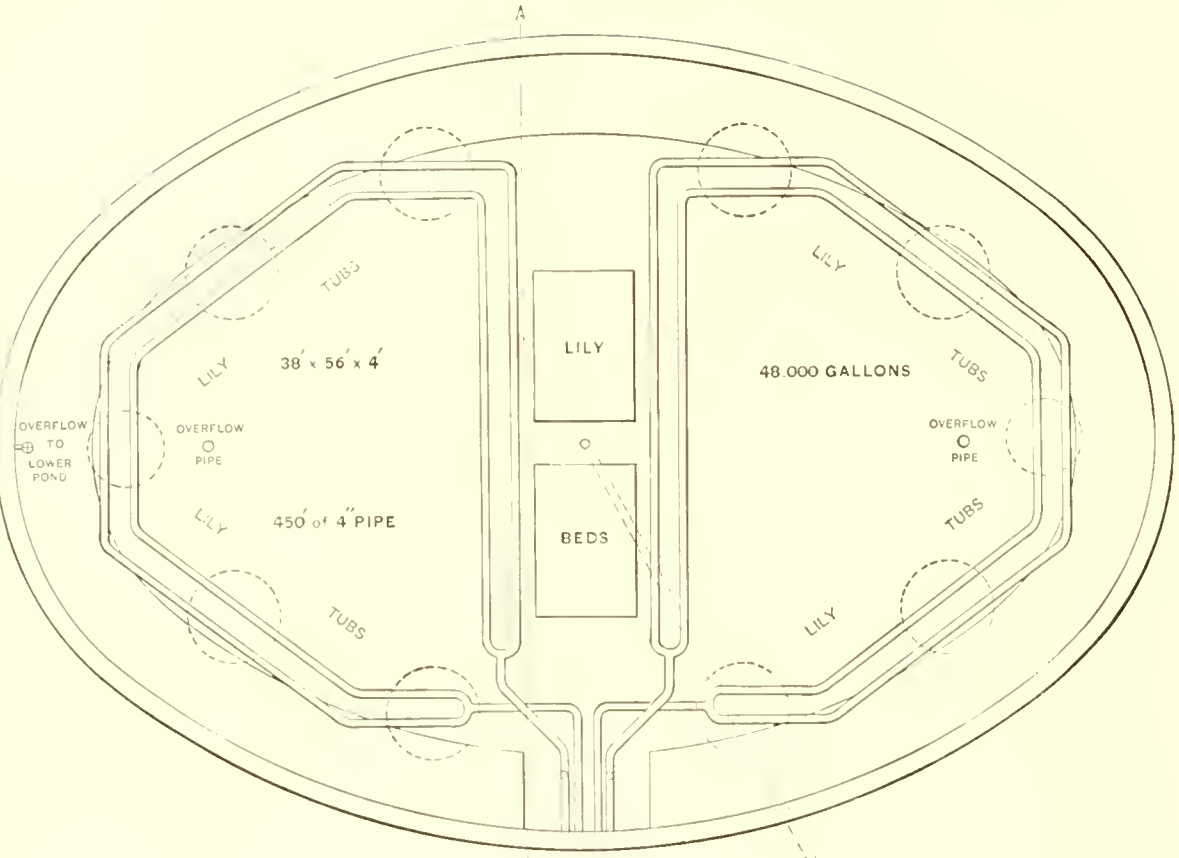
CHAPTER XIII.

HEATING PLANT FOR A VICTORIA OR TROPICAL WATER LILY POND.

THERE IS PROBABLY some one feature in any heated Lily pond which is peculiar to itself—circumstances are as varied as locations are numerous—yet, withal, the general underlying principles are the same. The intelligent constructor will be able to learn some useful hints from a detailed description of one successful heating system, and therefore reference is now made to one only—that of Prospect Park, Brooklyn, N. Y., where an extensive water garden is to be seen. A space has been laid out in the park for three ponds, which are walled up with concrete and provided with a water supply and an outlet. One pond is used for the hardy native Water Lilies, another pond is exclusively used for the Egyptian Lotus, while the third pond, which is of absorbing interest to the multitudes who visit the park, is used for tropical species, the principal plant being *Victoria regia*. The water in this is heated, and the construction of the pond and its system of piping are set forth in the accompanying figures.

The water in the pond is heated by contact with the piping through which hot water is circulated from the boiler. The pond is oval in form, fifty-six feet long, thirty-eight feet in width, and about four feet deep. From the sectional view it will be seen that the sides of the pond slope inward to the bottom, commencing at a point about two feet below the surface. A water line is maintained about three feet six inches above the main bottom, and the pond holds approximately forty-eight thousand gallons. The water is heated by a No. 10 Invincible hot water boiler, which presents a grate surface of about eleven square feet, and the boiler is rated to carry about two thousand five hundred square feet of direct radiation for heating buildings. The piping is four inches in size, of the greenhouse cast-iron variety, with greenhouse fittings and rust joints. Two flow and two return mains are taken from the

PLAN.



BOILER

B

SUPPLY VALVE

SECTION ALONG LINE A B.



HEATING A LILY POND—PROSPECT PARK, N. Y.

boiler to the piping in the tank. The flow mains rise from the side of the boiler, which is of the sectional type, and run on a brick foundation inclosed in a wooden box to the Lily pond.

On reaching the pond the two flow mains have a stand-pipe, which serves both as an air vent and an expansion pipe. From this point the piping has a fall all the way back to the boiler. After passing the standpipe the flow main drops down and runs around to a point near the main Lily bed where it connects with a Y, from which two four inch pipes are run around the pond, turns being made by means of 45° ells, as shown. On reaching the point where the return main leaves the tank, the two four inch pipes are connected into a Y and from it to the return main. This method of piping is followed in each end of the pond.

The requirements laid down by the Park Commissioners were that a temperature of 90° should be maintained in the water, regardless of the temperature or amount of water that it might be necessary to turn into the pond. The fires are first lighted early in June. The water, which had been taken from the street mains to supply the pond and change the water in it, has varied in temperature from 40° to 50°, and the specified temperature in the pond has been readily maintained, sometimes running as high as 96° when the weather was bright and clear and the sun strong.

When an outlet at one end of the pond draws off the hot water to reduce the temperature, cold water is brought in to restore the proper temperature and level.

An overflow pipe is provided at each end of the pond to prevent the water rising above the desired height. In operation it has been found that it is only necessary to attend to the fire in the boiler twice a day, and in damp, dull and cloudy weather, when little heat benefit is derived from the sun, no difficulty has been found in maintaining the temperature at 90° or higher, with the water in the flow main seldom exceeding 120°. The water in the pond is heated by contact with the pipes, in order to avoid a deposit of mud in the boiler that would be probable with the water in circulation, owing to the earth for the plants in the pond and the dust that would blow into the pond and settle, both of which would be carried into the boiler.

CHAPTER XIV.

DESCRIPTIVE LIST OF WATER LILIES, WITH CULTURAL MEMORANDA.

I—HARDY NYMPHÆAS.

Nymphaea alba. (White Water Lily). This species, native of Great Britain, has long been in cultivation. It is a vigorous growing plant, with dark green glossy foliage, and large, white, cup-shaped flowers. It is well adapted for use in either artificial or natural ponds, and shallow or deep water, but is being superseded by new varieties and by hybrids of greater merit.

N. a. candidissima is like the preceding in every way, except that it has larger flowers with broad petals. It is one of the best for planting in large ponds where bold effect is desired, its massive foliage and flowers standing out well above the water, as seen in the illustration on page 11.

N. blanda is a vigorous and free flowering species, somewhat similar to *N. a. gigantea*; flowers of dazzling whiteness in which respect it is unsurpassed by any other white flowered Water Lily in cultivation.

N. candida. (syn. *semiaperta*). A Bohemian species, similar to *N. alba*, but of moderate growth. Flowers of snowy whiteness, two and one-half to three inches across; sepals tinged with green.

The LAYDEKERI VARIETIES are among the choicest of hybrid Nymphæas; their flowers are medium sized (two and one-half to three inches in diameter), the plants are vigorous, but not robust like the Marliacea forms. They are admirably adapted for ponds of moderate size, where space is limited and the greatest variety is desired; they are also well adapted for growing in tubs.

N. L. fulgens, as the name indicates, is of a glowing brilliant color; petals crimson magenta; stamens garnet rose. Flowers beautifully cupped, glowing like a brilliant in the sunshine.

N. L. fulva has large star-shaped flowers; the four sepals are greenish yellow; petals creamy yellow suffused with red, stamens golden yellow. Leaves dark green, mottled with red.

N. L. lilacea has a delicately formed and chaste flower of a soft rosy lilac color with yellow stamens. It is exquisitely fragrant, resembling a Tea Rose. Leaves deep glossy green, with occasional dark blotches.

N. L. purpurata is somewhat larger than the others of this group and the

petals longer and more sharply pointed; flowers very symmetrical; of a rich rosy crimson color; stamens orange red.

N. L. rosea has proved a universal favorite, the peculiarity of the flowers changing from a rosy pink to rose purple as they age, affords most pleasing combinations and gradations of hue. Where several plants are grown together the numerous flowers of various shades give a charming feature, not elsewhere known in Water Lilies. This variety is well adapted for large aquariums and will produce its dainty flowers even when growing in a four inch pot, but its true character, size and color are seen only when planted in a natural pond and left undisturbed for at least two seasons.

N. L. lucida has large flowers of a rosy-vermilion color with orange stamens. Leaves beautifully mottled with chestnut red.

N. Robinsoni with flowers larger than those of the Laydekeri varieties is distinct and unique in color, the yellow ground color is overlaid by a purplish violet-red, deepening toward the center of the flower; the stamens form a crown of orange red color. The leaves are dark green, spotted with chestnut brown.

N. Seignoureti, flowers delicate yellow, shaded with soft rose and carmine, borne on erect stems and stand about six inches above the water. Leaves spotted with chestnut brown.

THE MARLIACÆA HYBRIDS mark the introduction of hybrid hardy Water Lilies, and include the very best forms. Although other gems have since been introduced, they do not compare with these for general utility; the plants are vigorous and robust, flowers large, very effective in groups and masses in large ponds, or as single specimens.

N. M. albida has all the good qualities of *N. alba candidissima*; the flowers are larger and fragrant, of a dazzling, sparkling whiteness, and produced very freely until frost. The stamens are occasionally flushed pink, especially when grown in stiff soil.

N. M. carnea is in every respect, save color, similar to the preceding variety. The flower is of a soft flesh pink color, which deepens toward the base of the petals, sepals rose pink: with a delicate fragrance of vanilla.

N. M. chromatella has flowers of a lovely canary yellow, with deep yellow stamens, large and handsome, and is undoubtedly the best yellow hardy Water Lily. Leaves bronzy green, with chocolate red markings. Plant very vigorous, inclined to be bunchy or crowded, and should therefore have plenty of room and be in permanent quarters where it is not likely to be often disturbed. The water should be two or more feet deep.

N. M. rosea has the same vigorous habit as the preceding varieties, the flowers are of the largest size and a beautiful deep rose color, the young foliage is purplish red, changing to deep green. All things considered, this is the best hardy pink Water Lily; large flowers, fine color, and free flowering.

N. M. flamma and the following varieties are of recent introduction, and are yet but little known in the United States. The flowers of *flamma* are

bright anaranth red, shaded white; the outer petals pink, the color deepening toward the center; stamens deep orange.

N. M. ignea, one of the most striking of recent introductions, has flowers of magenta red and stamens orange red. It is a brilliant flower in the sunshine, and is highly spoken of in England, where it apparently does well. At present it has not proved to be a vigorous grower, nor so satisfactory under cultivation in the United States.

N. M. rubra punctata has a beautiful flower of moderate size, flowers of deep rosy purple, spotted carmine, with orange stamens.

N. odorata, Our native sweet scented Water Lily, is widely distributed, and can be found in many ponds, lakes and slow running streams. Under cultivation, associated with other species, it has been fertilized from them by insects; in this way and also by other means several forms and gradations (some very choice) in size and color have resulted. The best forms are very desirable for their large, pure white flowers and delicious fragrance. The sepals are very often edged with pink, giving the appearance in bud of a pink flower. A grand Water Lily for naturalizing.

N. o. caroliniana. A natural cross that originated with Dr. Henry T. Bahnsen, of Salem, N. C. The petals are of a delicate soft pink and the golden stamens reflect a lovely salmon tint. It varies through several shades in color under certain conditions and soils. The flowers are of the largest size. A very choice and select variety, and has proved a great acquisition where it has remained undisturbed for two or three seasons.

N. o. exquisita has large, rosy carmine flowers, much deeper in color than those of *N. o. rosea*, and is the darkest colored Lily in this group. Foliage dark red. Moderate grower. A hybrid of French origin, and very beautiful.

N. o. gigantea, sometimes called the Southern *odorata*, being common from N. Carolina to Florida, and the only white variety indigenous to this section, differs from *N. odorata* in being a more vigorous grower. Large, handsome, green foliage, under side bright red. Root-stock occasionally very large and hard. The flowers are large and pure white, somewhat incurving, and lacking the delicious fragrance peculiar to the type. It requires a deeper water than the type to grow it to perfection.

N. o. maxima. This is entirely different from the type; the flowers are large and cup-shaped; petals broad at the base, and without a tinge of red on either sepals or petals. A most beautiful variety, found in New Jersey. This is probably the same as the variety *N. o. superba*. (Some doubts exist as to this and the preceding variety belonging to the *odorata* group).

N. o. minor is, as its name implies, small. Leaves only two to five inches across, and flowers two to three. A very pretty plant, and well suited for growing in tubs. It is found true in some sections of New Jersey in shallow water of cold bogs and poor soil. There are other forms of *N. o. minor* with somewhat cup shaped flowers, and only slightly fragrant.



PLATE IX
MUSA ENSETE.

Probably the most noble of all our subtropical plants, its full beauty and true character can only be seen in large specimens as here shown. The plant being indigenous to Abyssinia and warm climes, requires protection in winter. The plant shown above is about 10 ft. high, with leaves 6 feet long and 2 feet broad. The Giant Elephant-Ear plants and Eulalias are insignificant under its shadow.

N. o. rosacea. In habit and general appearance resembles *N. o. exquisita*; it is, however, more vigorous. Flowers bright rose, lighter toward the center, the rich yellow stamens producing a soft salmon shade of color; the petals are narrow and pointed, the flower being like a pink star floating among the leaves. A very desirable variety.

N. o. rosea. The well-known Cape Cod pink Water Lily; is indispensable in any collection. Flowers deep pink and very fragrant. Early and free flowering; its season is somewhat shorter than that of some varieties. It produces seed freely, and to prolong the season the dead flowers should be taken off and no seed allowed to ripen, which can be easily accomplished where only a few plants are grown. In extreme hot weather the flowers are apt to bleach, but in cool sections and districts like Eastern Massachusetts the plants and flowers are to be grown in perfection.

N. o. sulphurea is distinct from any of this class. The large, handsome yellow flowers stand about six inches above the water; the young leaves are beautifully mottled with chestnut. A free and vigorous plant of French origin.

N. pygmaea. This is the smallest species in cultivation; the flowers, which are pure white, are among the first to be seen in spring, and continue a long season. The species is well adapted for tub culture, also for the aquarium, and it will produce its dainty white flowers in a four inch pot. When planted out and left undisturbed for two or three seasons the flowers are larger and very pretty, making a beautiful contrast to the other giant species. It forms no runners or side shoots, and does not spread rapidly.

N. p. Helvola. This is in truth more of a pygmy than the species; flowers, however, a trifle larger, canary yellow, produced very freely. Especially recommended for cultivation in tubs and aquaria. Leaves beautifully mottled with reddish brown, and smaller than in the type.

N. sphaerocarpa (Caspary's Lily). The true Swedish Lily. A distinct and beautiful species, and very unlike *N. alba*, of which some claim it to be a variety. While it is a very desirable form and highly spoken of in England and in Europe generally, it is very scarce, and does not flourish as do others under general cultivation. It has been flowered in the United States, but is apparently very impatient of removal, the least disturbance causing a check to its growth and stopping its flowering. Another drawback to its cultivation is its dislike to hot weather; if it was plentiful it would doubtless succeed in ponds where cold springs are a hindrance to the successful cultivation of other desirable species. It blooms quite early in the season; the flowers are rosy carmine, with orange stamens, deepening in color the second and third days.

N. tuberosa (syn. *reniformis*) is a native species of the Western and Northwestern lakes, where it grows in deep water. A strong and robust plant. Leaves eight to fifteen inches wide; flowers white, four and a half to nine

inches in diameter; slightly fragrant. The root-stock bears numerous spontaneously detaching, often compound, tubers. This should be excluded from small ponds, and should be planted by itself.

N. t. plena. Flowers white, large and full; petals very numerous, the stamens being converted into petals, which are fluted in the center of the flower. Plant less vigorous than the type. All *N. tuberosa* forms should be grown in deeper water than other types.

N. t. rosea. A natural cross. Flowers are a lovely pink, standing well above the water, somewhat less vigorous than the type.

II.—TENDER WATER LILIES—DAY BLOOMING.

Nymphaea caerulea (syn. *stellata*). This is the ancient blue Lotus of the Nile, but is not a *Nelumbium*. The flowers are light blue; petals long and narrow; sepals greenish white, suffused blue; stamens light yellow, tipped blue; leaves light green, spotted in the young state, changing to green; the underside of leaf also green. A distinct and beautiful species.

N. elegans. A pretty Mexican Water Lily of moderate size, three to four inches over. Color, white tinged with purplish blue; the stamens yellow, tipped blue. A charming flower. Leaves long and narrow, deep green, spotted purplish brown. Well adapted for tub culture, and producing its dainty flowers very early in the season.

N. flava. The well-known Florida yellow Water Lily, and the only known yellow species. This has been introduced into many States and sections of the country, but has not been a success under any kind of culture. It is hardy as far north as New Jersey, a moderate grower, and produces numerous runner-like shoots forming young plants. Its greatest merit consists of its being undoubtedly one of the parents of Marliac's magnificent yellow hybrids which are now widely known and are many times more desirable for all garden purposes.

N. gigantea, the Australian species, is sometimes confounded with *N. odorata gigantea*. This is probably the finest, most handsome and distinct of all Nymphæas. The color is a soft satiny purplish blue, shading to white at the base of the petals; the stamens are silk-like, soft yellow, incurving, unlike any other species. The flower is carried well above the foliage on a stiff stalk, and is of the largest size. The leaves are green, with purple reverse. This species is very impatient of removal, re-potting, or transplanting, during its early stages. It should not be allowed to get pot bound, nor subjected to sudden changes of temperature, which will cause a check and a suspension of active growth. Plants, seedlings, or tubers in their early stages should be grown in a temperature of 80° to 90°; later, a temperature of 75° to 80° will suit them. (See plate facing page 40.)

N. gracilis. A Mexican species of great merit, has large, handsome, star-shaped white flowers, which are borne on stout stems well above the foliage.

It is worthy of special note as being the only white day-blooming tropical or tender species; a very vigorous plant, free flowering, the flower possessing a delicate fragrance, resembling Lily of the Valley. (See plate facing page 24.)

N. mexicana. This is possibly a form of *N. flava*, which it resembles in most respects. The habit is the same, but the runner plants not infrequently produce flowers during the first season. The plant is altogether freer flowering, and the flowers are brighter and deeper in color. The plant is the same in hardiness as *N. flava*.



STELLATE FORM OF NYMPHEA.
Seedling of *N. gracilis*.

N. pulcherrima. Very vigorous and free flowering; possibly no other equals it. The flowers are very large under high cultivation—ten to twelve inches across—of a beautiful light blue, with deep yellow stamens tipped blue; the sepals are irregularly striped dark red. Unlike *N. zanzibarensis*, this variety opens its lovely flowers at early morn, and remains open until other species are mostly closed. The leaves are large, and often exceed two feet in diameter, having long tapering lobes and irregularly crenated margin. Garden hybrid of American origin.

N. scutifolia (syns. *versicolor*, *cyanea*, *radiata*). This is a beautiful star-shaped distinct species. The flowers are clear pale blue, shading to white at the base of the petals. Flowers very fragrant. Leaves variable, green, sometimes with a purplish tint, the underside occasionally bright red, with brownish red markings; margin smooth. Native of Cape of Good Hope.

N. zanzibarensis (the Royal Purple Lily). This and its several forms are among those that might be styled everybody's flowers. They are the simplest to manage, easily raised from seed, will flourish in a tub even if the leaves are high and dry. Tubers and plants are no longer held at an exorbitant price, and they give the greatest amount of pleasure for a trifling cost. Flowers of the true form are of the largest size under high culture; the sepals and stamens are purple, with red margin; petals intense blue. One of the most beautiful and free flowering of all Water Lilies. Highly fragrant. The foliage is dark green, with blotches of reddish brown and bright purple underneath.

N. z. azurea. Similar to the type, but varying in color from a light to dark blue; sepals never purple; leaves green, with dark markings; the underside green, shaded more or less with purple.

N. z. rosea. Similar to the type save in color, varying from deep carmine to pink; leaves shaded red on the under side. All the Zanzibar Water Lilies are very free flowering, and are accommodating either for tub culture, ponds, or lakes.

III—TENDER WATER LILIES.—NIGHT BLOOMING.

Nymphæa columbiana. A deep, rich, dark red flowered variety of medium size, six inches across; stamens cardinal; the color deepens each succeeding day. Foliage dark bronzy red. Plant of moderate growth.

N. Deamiana. A robust plant with large bronzy green foliage; petals of a beautiful pink, with darker sepals; stamens red. Very free flowering, requires plenty of room for leaf spread and a depth of water twelve to eighteen inches above the crown of the plant. Hybrid of American origin.

N. delicatissima. A delicate and choice flower of a distinct and pleasing carmine pink color; the foliage has a bronzy green lustre. The plant is vigorous, yet moderate compared with some others. Desirable for all purposes and has proved one of the best for cutting, and also for winter culture.

N. devoniensis. This, one of the oldest, is also one of the choicest night-blooming Water Lilies in cultivation, and is indispensable in any collection of moderate size. Under liberal cultivation a single plant will cover about two hundred square feet of water surface, and produce numerous flowers. One plant has been known to have on it at one time as many as thirty-six flowers and buds in different stages of development. The flowers are large, ten to twelve inches across, of a brilliant rosy red, a most pleasing color by artificial light, and are borne on stems well above the water. The leaves are red chang-

ing to bronzy green. The first hybrid of note, and was raised at Chatsworth, England, and named in honor of the Duke of Devonshire.

N. dentata is the largest and best white of this class. It has long pointed buds, and flowers of the largest size, opening horizontally, and measuring ten to twelve inches over. The leaves are deep green with serrated edges. Native of Sierra Leone.

N. kewensis is not generally met with, but it has established itself as a first-rate and desirable variety in any collection. The flower is a beautiful rosy red of the first size. Plant vigorous, with bronzy green foliage, purplish underneath. A hybrid of English origin.

N. lotus. (syn. *thermalis*). An ancient species, indigenous to lower Egypt, and is associated with the Egyptian and blue Lotus, being held sacred to Isis and was engraved on the ancient coins. The flowers are white with sepals and outer petals flushed pink, large and incurving; somewhat cup-shaped. A strong and vigorous plant, with leaves of deep green, with serrated edges.

N. O'Marana is of recent introduction, and has achieved a grand reputation. The flower is above the average of large flowers, attaining a size of from 12 to 15 inches across; it is borne well above the foliage on a stout stalk, and as it opens to the full, the sepal and outer petals droop. The color is a beautiful rosy red with an indescribable glow produced by the rays of the rising sun. The leaves are large and of a dark bronzy red heavily dentated. Under high cultivation it is a robust plant without any appearance of coarseness, and is also very free flowering at a very early stage. The largest and best of the red Nymphæas. Hybrid of American origin.

N. rubra is a beautiful red species, somewhat resembling *N. Devoniensis* but the sepals are broader at the base and deeper in color, the petals being less pointed. The leaves are rounded at the apex and mottled purplish on the reverse; otherwise the plant is similar to *Devoniensis*.

N. rubra-rosea in general characteristics resembles the preceding, and is liable to be confused with it. The flower is much the same, but is larger, and brighter in color, with longer buds and is more pointed.

N. Smithiana. All the tropical Water Lilies delight in a high temperature, and if this one can be grown in a Victoria pond or in a temperature corresponding, the true character and chaste coloring will be very greatly developed. The flower is of medium size, perfectly cup-shaped, creamy white with yellow stamens; petals broad and of great substance; the reverse or outer side of the petals is delicate pink. The higher the temperature the deeper and brighter the color. American hybrid.

N. Sturtevantii. A superb variety, with large bright rosy red flowers of massive proportions, petals broad and the flowers more cup-shaped. Requires a high temperature to develop its true character. Plants should be started early, as they do not flower until well developed. A magnificent Water Lily

and worthy of additional care to bring it to perfection. American hybrid. (See plate facing page 48).

IV.—THE VICTORIA (THE ROYAL WATER LILY), AND EURYALE.

Victoria regia. This is the most wonderful of all water plants. It inhabits the tranquil bays and lakes of the great streams of South America, and details of its discovery will be found on page 53. The plant is of gigantic proportions, the leaves grow to an immense size—from six to seven feet across—with a vertical rim from three to eight inches high. The flowers are from twelve to fifteen inches in diameter, with very numerous petals. The color of the flower is white on the first opening day, changing on the second day to rosy pink.

V. regia var. *Randii* was discovered and introduced by Edward S. Rand, Jr., of Para, Brazil, and it differs from the original in several particulars. The whole plant is more robust; the young leaves are of a darker bronzy color; the vertical rim on well-grown plants is five to six inches high, giving the plant a striking and novel appearance. Leaves are produced six to seven feet in diameter. The flowers of this variety are white on the first day, changing on the second day to a deep crimson.

Victoria regia, *Tricker's variety.* A new distinct *Victoria* with well-marked characteristics provisionally named as here given, but may be differently entitled on further knowledge. Among its peculiarities are: first the early cupping of the leaves, the turned up rim being shown by quite small plants; the full grown leaves are large, of a lustrous bright green color, and the rim is from six to eight inches deep. The flowers are also produced much earlier than on the other *Victorias*, and are larger, measuring from fifteen to eighteen inches over, they are white on opening changing to a lively rose pink on the second day. The sepals in this variety are smooth, whereas the others are spinous to the tips, another striking characteristic is that it can be successfully grown in a much lower temperature than is usually advised for other *Victorias*. The seed will also germinate in a lower temperature, in fact the plant does remarkably well treated precisely the same as the tropical *Nymphæas*.

Euryale ferox was the noblest aquatic in cultivation prior to the introduction of the *Victoria*, its large circular leaves are from two to three feet in diameter, with prominent spiny veins on the rich purple underside, the upperside being olive green, puckered and spiny. Flower small and insignificant, of a deep violet blue.

V.—NELUMBIUMS—EGYPTIAN AND JAPANESE LOTUS.

Nelumbium album grandiflorum. A magnificent large white Lotus, its pure white flowers tower above the handsome foliage and contrast conspicuously against the carmine pink of other *Nelumbiums*. Given the same soil as *Nymphæas* and located in a warm sheltered spot, and not removed too frequently, this plant will produce flowers in plenty.

N. a. striatum. A large and bold flower; petals white, tipped and striped rosy carmine; it is a vigorous and robust variety, and flowers very freely under liberal culture.

N. luteum. The well known American Lotus or Water Chinquapin has flowers of pale yellow, though occasionally in stiff clayey soils, the color is as deep as in *Nymphaea chromatella*. Plant but a moderate grower, and under artificial conditions should receive liberal treatment. Where established in natural ponds and lakes, it is vigorous and free.

N. roseum. The flowers of this have the deepest color of any Lotus in cultivation, in form they are more globular than others. Deep rose pink. Plant vigorous and not as tall-growing as in *N. speciosa*.

N. Shicoman. A Japanese Lotus of recent introduction; of robust growth, producing leaves and flowers of gigantic proportions. The leaves are from thirty-six to forty inches across, supported on stout stems five to six feet high; the large double white flower is a marvel of nature's production; as free flowering as any single form and deserving of the best and most liberal cultivation.

N. speciosum. The world famed Egyptian Lotus now so well known throughout the United States, and as hardy and as easily grown as the native Water Lily, except, perhaps, in extreme northern sections. The flowers are rose pink, creamy white at the base of the petals, but on first opening the flowers, or rather the buds, are a lovely shade of deep rose pink; the flowers are not fully expanded till the second day, when they are in their best form. Nelumbiums like *Nymphaeas* are three-day flowers, but unlike *Nymphaeas* they only partially close at night. See plate facing page 56.

N. Kermesianum. A Japanese plant of great merit; the flowers are of a beautiful carmine rose color and satiny texture, of large size. Vigorous, free flowering, and early.

N. Seihakuren. A pygmy among Nelumbiums, has leaves six to eight inches across, on stalks about one foot in length. The flower is pure white, the long pointed bud resembling a large tulip. Can be grown in a small tub or large pot standing in water.

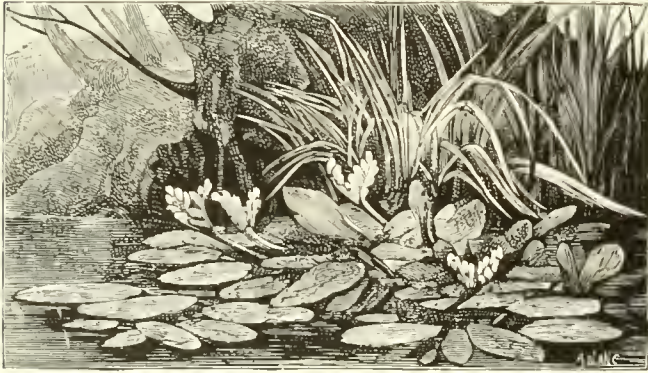
CHAPTER XV.

MISCELLANEOUS AQUATIC PLANTS.

I.—TENDER.

Aponogeton distachyon. (Cape Pond Weed). Flowers white, fragrant; produced freely at all seasons; especially to be recommended for winter flowering.

Aralia papyrifera. (syn. *Fatsia papyrifera*). The Chinese Rice Paper plant. A valuable plant for subtropical work, especially in the sub-aquatic garden. It delights in a moist, half-shady spot. A native of the shady swamps of Formosa.



Aponogeton distachyon.

Cyperus alternifolius. (Umbrella Grass). A desirable plant for pot culture; also for planting on the edges of the ponds, or submerged in water.

C. a. variegatus.
Similar to the preceding

type, but having a distinct variegation of white; a desirable variety, but inconstant.

C. a. gracilis. A small form of *Cyperus* with narrow foliage; dwarf and distinct.

C. natalensis. An ornamental species, with long Pandanus-like foliage.

C. papyrus. (syn. *Papyrus antiquorum*). The ancient Egyptian paper plant. It grows in marshy places, and on the banks of rivers, and is indispensable in the water garden.

C. pungens. Similar to *C. alternifolius*, but is a deepgreen in color; grows taller, and is much stiffer.

Eichornia azurea. (Blue Water Hyacinth). This species is a rampant grower in congenial quarters and it flowers more freely than *E. c. major*, producing larger spikes of flowers of a lovely shade of lavender-blue.

E. crassipes major. (Water Hyacinth). A floating plant forming rosettes of curious leaves, having stems swollen at the base which contains numerous air cells; flowers soft rosy lilac. Advisable not to plant where it will not be winter-killed, as it will block navigable streams, and be a source of much trouble and expense to eradicate.

Hedychium coronarium. (Garland flower). An exceedingly ornamental plant; flower white, sweet scented.

Jussiaea longifolia. A very attractive and desirable aquatic plant, growing two to three feet high; erect and slightly drooping at the points. Flowers bright yellow, somewhat resembling an Evening Primrose.

Limnanthemum indicum. (syn. *Villarsia Humboldtiana*). Floating heart, commonly known as Water Snowflake. Flowers pure white, covered with hirsute glands; very pretty, interesting and attractive flower.

L. trachyspermum. (The Fairy Water Lily). Flowers pure white, small, borne on the same stem with the leaf.

Limnocharis Humboldti. (The Water Poppy). Flowers are beautiful clear yellow with black stamens; leaves oval, floating; requires shallow water.

L. Plumieri. This is an erect growing plant; standing two feet out of the water. Flowers straw color; leaves elliptical, light green.

Maranta zebra. While not an aquatic, it is valuable as a subtropical plant; its handsome green foliage is barred with deep greenish purple, the under side of leaf dull dark greenish purple.

Musa ensete. The most picturesque of all our subtropical plants, from three to ten feet high, leaves two to six feet long and two feet broad, midrib bright red. Indispensable from the water garden, its broad magnificent foliage adding a tropical effect quite in harmony with the tropical *Nymphaeas* and *Victoria*. See plate facing page 88.

Myriophyllum proserpinacoides. (Parrot's Feather). A graceful half-hardy aquatic, with pretty feathery appearance. Makes a beautiful hanging basket plant, and for filling a vase or fountain is unequalled.

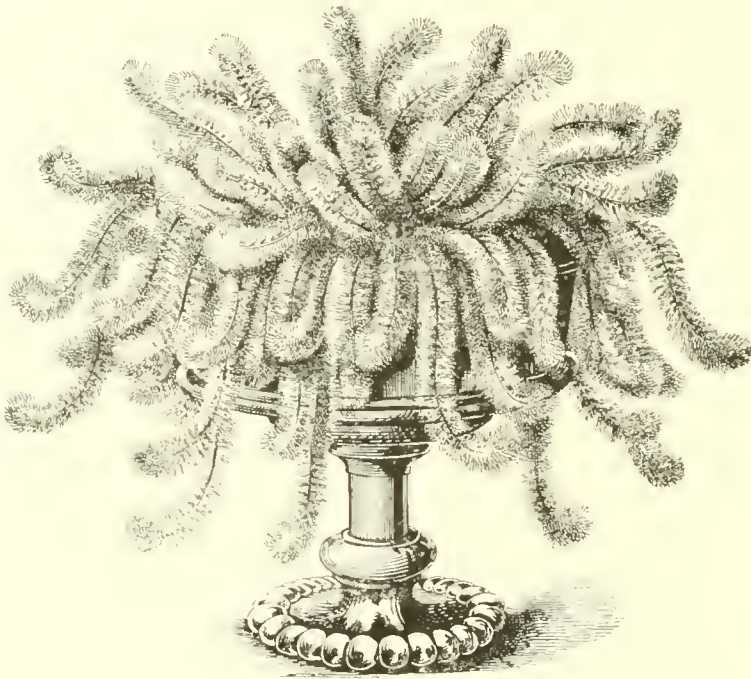


Limnocharis Humboldti.

Pistia stratiotes. (Water Lettuce). A floating plant; leaves wedge-shaped, two to five inches long; of a delicate pale green, covered with fine hairs. Delights in warmth and shade.

Sagittaria lancifolia, (syn. *S. falcata*). A strong grower; and, unlike the more familiar species, the leaves are lanceolate, never sagittate; the scape three to five feet high, and covered with large, pure white flowers.

S. montevidensis. (Giant Arrowhead). Truly, a Giant Arrowhead; leaves fifteen inches long on tapering stalks four to five feet high; flower



Myriophyllum proserpinacoides.

scape massive and taller than the leaf stalk. The flowers are pure white, with a dark blotch at the base of each petal.

Thalia dealbata. A sub-aquatic plant; very ornamental as a subtropical subject; leaves ovate on long petioles; flowers purplish, small.

II. — HARDY.

Acorus calamus. The well-known Sweet Flag.

A. gramineus variegatus. A diminutive form like *A. calamus*, with grass-like leaves, beautifully variegated, constant. Will not scorch in summer, and is equally good in shady spots.

A. japonicus variegatus. (Variegated Sweet Flag). Foliage beautifully striped white; it grows well in dry or moist soil. One of the finest variegated plants in cultivation.

Alisma natans. A small aquatic with elliptical floating leaves and numerous three-petaled white flowers.

A. plantago. (Water Plantain) Flowers delicate pale rose color; scape branched; branches whorled, compound.

Asclepias incarnata. Flowers flesh pink; umbels numerous; stems erect; height two feet. A beautiful and effective plant on the banks of ponds, etc.

Brasenia peltata. Leaves peltate, one to four inches across; flowers small, dull, purple.

Butomus umbellatus. (Flowering Rush). Flowers rose colored. A very handsome perennial aquatic of easy culture.

Calla palustris. (Water Arum or American Calla). Flower resembling the cultivated Calla, only smaller, six inches high; root stock long and creeping.

Caltha palustris. (Marsh Marigold). Flowers bright yellow early in spring; very showy and attractive.

C. palustris flore-pleno. Similar to the preceding, save that the flowers are perfectly double, resembling the double flowers of tuberous rooted Begonias.

Hibiscus moscheutos. (Swamp Rose Mallow). A most desirable plant for the aquatic garden, four to six feet high; flowers five to six inches in diameter, rose-colored or white, with or without a crimson eye.



Iris Kaempferi

Iris Kaempferi. (Japanese Iris). Indispensable plants in the water-garden. They should be planted on the margin of the pond, or where they are

occasionally submerged. Flowers measure from ten to twelve inches in diameter, and present the greatest variety of color, from pure white to the darkest shades of royal purple, many with various colors marbled with white and gold mixed.

Iris pseudo-acorus. The yellow Iris of European marshes; flowers bright yellow; leaves linear, long.

Iris orientalis. Fine ornamental foliage; rich violet-blue flowers.

Juncus conglomeratis fol. variegatis. A variety of the common Rush, with foliage beautifully striped golden yellow.

Limnanthemum lacunosum. (Floating Heart). A small aquatic with marmorate foliage, much like a Cyclamen, and small white flowers.

L. nymphaeoides. (Villarsia). Leaves Nymphaea-like; flowers golden yellow, produced in profusion. Seeds very freely, and where it is not winter-killed is liable to become a pest as it is of such vigorous growth.

Menyanthes trifoliata. Flowers white, resembling those of the Horse Chestnut; very free growing.

Myosotis palustris semperflorens. (Perpetual flowering Forget-me-not).

Orontium aquaticum. (Golden Club). A very attractive and pretty plant with beautiful velvety green leaves, and a curious yellow spadix early in spring.

Peltandra virginica. (The Water Arum). Large, narrow-shaped foliage; white spadix.

Pontederia cordata. (Pickerel Weed). A free flowering plant, growing about two feet high, and producing spikes of closely set blue flowers.

Sagittaria sagittifolia. (The Common Arrowhead). Flowers white.

S. japonica fl. pl. Very similar to our native species, but producing numerous spikes of large, pure white, double flowers.

Scirpus Holoschoenus variegatus. A Siberian Rush, with stems twelve to eighteen inches high; alternately banded with green and white.

S. tabernaemontana var. zebrina. (Japanese Porcupine Plant). A very ornamental rush, growing three to four feet high; delicate green, barred alternately with white.

Typha latifolia. (The Common Cat's Tail).

Zizania aquatica. (Wild Rice). Aquatic annual; very ornamental in the



Sagittaria

water garden. Its graceful panicles are produced on stalks five to ten feet high. To be grown in shallow water; seed should be sown in fall.

III.—PLANTS FOR AQUARIA, SHALLOW WATER, ETC.

Azolla caroliniana. (Floating Moss). Color deep green, reddish or autumn tints in full sun; resembles a Selaginella or Moss.

A. filiculoides. Similar to the preceding, but a stronger grower; color brighter, and spreads rapidly, soon covering the surface of the water.

Cabomba caroliniana. (syn. *C. viridifolia*). The Fanwort, one of the most pleasing of submerged plants; leaves glossy green, finely cut. See illustration.

C. rosafolia. Similar to *C. caroliniana*, but the color of the leaves is brownish green; stems carmine.

Cyperus alternifolius. (Umbrella Grass). See description, page 96.



Cabomba

C. a. gracilis. (Small leaved dwarf). See description, page 96.

C. a. variegatus. (Variegated). See description, page 96.

Callitriche verna. (Water Star-wort). Leaves light green; submerged plant.

Hottotia palustris. (Water Violet). A submerged fern-like plant, with showy white flowers.

Hydrocharis morsus-ranae. (Frog-bit). Floating plant with light green cordate leaves, and fine silky roots.

Limnobium spongia. (American Frog-bit). Floating plant; larger and stronger grower than the preceding.

Ludwigia palustris. (Water Purslane). As a submerged plant is valuable for aquaria; grows also when partly submerged; leaves dark green, reddish underneath; flowers yellow; small.

L. Mulertii. Similar to *L. palustris*; leaves larger, dark glossy green, red underneath; one of the best oxygenators for the aquarium.

Myriophyllum heterophyllum. (Water Milfoil). Submerged plant; leaves green, crowded, often whorled and pinnatifid.

M. verticillatum. Leaves very finely pinnate, dark green; stems red.

Nymphaea pygmaea, white; *N. p. Helvola*, yellow; *N. Laydekeri rosea*, red. See descriptions, pages 87, 89. These Water Lilies are well adapted for large aquaria, and will produce their lovely flowers when growing in pots, four and five inches in diameter.

Pistia stratiotes. (Water Lettuce). Leaves two to five inches long, forming a rosette of light green velvety foliage.

Potamogeton crispus. (Pond Weed). Submerged plant; leaves bronzy green, crisped, wavy. Common in streams and stagnant water.



Stratiotes aloides.

Sagittaria graminea. Leaves broadly linear; flowers white; often profusely.

S. natans. Unlike the well-known Arrowhead the leaves here are strap-shaped and submerged, but in shallow water the plant produces floating leaves, which are occasionally spotted; flowers white.

Salvinia braziliensis. (syn. *S. natans*). A small floating plant; leaves soft green, covered with delicate hairs.

Stratiotes aloides. (Water Aloe or Water Soldier). A submerged plant; dark green spiny foliage, similar to that of a Pandanus.

Vallisneria spiralis. (Tape or Eel Grass). Ribbon-like grass, six inches to three feet long; a submerged plant, and desirable for the aquarium.

CHAPTER XVI.

ORNAMENTAL GRASSES, BAMBOOS, ORCHIDS AND PITCHER PLANTS

Arundo donax. A magnificent giant Grass, growing to the height of twelve to fifteen feet, and making noble clumps; invaluable for the water or bog garden. See illustration, page 79.

A. d. variegata. A variegated form of the above, and an imposing object in any position.

Bambusa aurea. A distinct and beautiful species, attaining from ten to twelve feet in height; stems golden yellow color, with light green foliage. This has proved quite hardy in Southern New Jersey, where the canes have remained evergreen during the winter, followed by new growth in the spring; the canes attaining a richness of color not to be seen the first season.

B. Metake. A handsome and perfectly hardy Bamboo, having large, deep green foliage; fine for margin of water. A popular plant; moderate height.

B. nigra. Another handsome species, having glossy black stems, with graceful foliage of a pleasing light green color; one of the most distinct.

B. Quiloi. A vigorous variety, growing eight to ten feet in height, but while hardy as far north as Philadelphia, does not retain its foliage as *B. aurea*.

B. scriptoria. The most distinct of any Bamboo; its slender canes, with deep green foliage, the under side a glaucous blue; is most pleasing and attractive.

B. viminalis. A distinct and dwarf-growing species, with dark green foliage; makes a compact bush.

B. violascens. A handsome and distinct species, having much branched stems, attaining seven to eight feet in height, clothed with graceful foliage.

B. viride glaucescens. A vigorous growing species, very graceful and ornamental; yellow stems; glaucous green foliage, resembling *B. aurea*.

Erianthus Ravennæ. A strong growing ornamental grass, resembling the Pampas grass, having bronzy foliage and purplish plumes; nine to twelve feet high.

Eulalia gracillima univittata. A very ornamental grass, not so tall as the well-known *E. japonica*, with narrow leaves, long and graceful, with a distinct silvery midrib.

E. japonica. A vigorous grower, leaves green, and with larger plumes than in either its varieties.

E. japonica variegata. This variety is similar in growth to the type, with a creamy white band running through each leaf; very striking and distinct.

E. japonica zebrina. (Zebra-striped Grass). A novel form of variegation; the long, graceful leaves having bars of yellow running crosswise, not longitudinally, as in the foregoing variety. It grows from six to nine feet high.



Lulalia japonica zebrina.

Gynerium argenteum. (Pampas Grass). One of the most effective of ornamental Grasses; its silvery plumes are produced on stems eight to ten feet high. Established plants can remain in the open ground if protected. It is not hardy except in the Southern States.

Panicum virgatum. A fine, stately Grass; four to six feet high, forming large tufts with many panicles of small flowers.

Phalaris arundinacea variegata. A reed-like Grass with a very distinctly white-striped leaf; two to three feet high.

Setaria magna. (Bristly Foxtail Grass). Annual. Inflorescence a dense panicle two to three feet long; pale green; a very conspicuous and ornamental plant; attaining a height of ten to twelve feet.

Uniola latifolia. One of the best of our native perennial Grasses; three to four feet high, with large flat leaves; flower heads in graceful drooping panicles.

PITCHER PLANTS OR SIDE-SADDLE FLOWERS.

Darlingtonia californica. A fine bog plant, found in cool springy places in California, with peculiar shaped pitchers and nodding purple flowers.

Dionaea muscipula. (Venus' Fly Trap). A curious plant, allied to *Drosera*, having a number of prostrate leaves furnished at the edge with a thick row of bristle-like hairs; while in the center of each, are three short hairs, which, when touched, cause the leaves to fold up, entrapping the insect, which soon dies; when this takes place the leaf again assumes its normal position.

Drosera filiformis. (Thread-leaved Sundew). A most curious and interesting plant from its peculiar arrangement for catching insects. It is covered

throughout with fine red hairs that are covered with a glistening drop, like dew. Should be planted in groups in a moist place.

Sarracenia Drummondii. Large erect pitchers or leaves; two feet high; light green in color, with the apex or hood, beautifully variegated white, red, and green; flowers white and purple.

S. flava. Yellowish green leaves; two to three feet high; having at the apex a large open throat, with a broad lid; large nodding yellow flowers.

S. psittacina. (Parrot-beaked Pitcher Plant). A very pretty and distinct species, its small pitchers having a curiously curved lid, or apex, of a rich purple and crimson color, handsomely mottled with white.

S. purpurea. A prostrate species, having broad winged pitchers three to eight inches long, the throat and lid very hairy, and beautifully veined and striped crimson; large purple flowers, nodding on a stalk a foot high; perfectly hardy, plant in full sunshine or shade, on the margin of the pond or stream.

S. rubra. Leaves ten to eighteen inches long, slender, with purple veins; reddish purple flowers.

S. variolaris. Leaves trumpet-shaped; six to twelve inches high, spotted with white near the yellowish apex, reticulated with purple veins within; yellow flowers.

With exception of *S. purpurea*, all are tender north of Carolina States, and need protection of leaves in winter, or may be grown in a greenhouse. They delight in boggy soil, and live sphagnum moss. If grown in pots, they should be set in saucers of water.



Dionaea muscipula. (Venus' Fly Trap.)



ORCHIDS.

Calopogon pulchellus. One of the most beautiful of our native Orchids, and most desirable for the water garden; leaf linear; scape about one foot high; two to six flowers; flower one inch broad, pink-purple; lip beautifully bearded toward the summit with white, yellow, and purple hairs.

Calypso borealis. A small showy flower, the solid bulb producing a single heart-shaped leaf; scape three to five inches high, bearing a large and showy flower, variegated purple, pink, and yellow.

Cypripedium pubescens. (Large Yellow Lady's-slipper). Leaves broadly ovate; stem two feet high; lip one and one half to two inches long, pale yellow.

C. spectabile. (Showy Lady's-slipper). Leaves ovate; stem two feet high; lip one and one-half inches long, much inflated; white, pink-purple.



Cypripedium Spectabile.

The most beautiful of the hardy *Cypripediums*. No genus of Orchids is more widely distributed than *Cypripedium*. Our native species are most beautiful, particularly this one, they are deserving of more general cultivation, and no better place can be found than the water garden, the natural or wild garden adjacent. They delight in a moist, peaty, or boggy soil, and partial shade.

Habenaria blephariglottis. (White Fringed Orchid). Stem one foot long; leaves lanceolate; flowers white; lip ovate, with an irregular capillary fringe.

H. ciliaris. (Yellow Fringed Orchid). Stem one and one-half to two feet high; leaves oblong or lanceolate; spike oblong, with numerous flowers, which are bright orange yellow; lip oblong, furnished with a very long and copious capillary fringe; our most handsome species.

H. psycodes. (Purple Fringed Orchid). A very

handsome and fragrant Orchid; one to three feet high; flowers purple, crowded in a spike four to ten inches in length.

Spiranthes cernua. (Ladies' Tresses). A delicate and beautiful white and very fragrant flower, produced on a stem six to twenty inches high; spike two to five inches long; more or less spirally twisted; flowers in September and October.

CHAPTER XVII.

FERNS SUITABLE FOR THE AQUATIC GARDEN.

THE FRINGE of the water garden is an ideal place for Ferns. As embellishments for shady spots where few other plants will grow, Ferns will give most gratifying results. On the margin of the pond where partial shade is afforded or not, on a bank by the side of a running stream, or associated with other plants on the rockery, their graceful fronds lend a most welcome and desirable change of foliage.

What Ferns do love—nay, demand—is plenty of moisture; in preparing a place for their reception, then, care should be taken that the soil be so drained that while the Ferns can have plenty of the moisture they need, there shall be no standing water about their roots.

As to soil, all Ferns thrive best in a light porous earth. If the soil is “made” the proportions should be about one-third sand and two-thirds good leaf mold, with, perhaps, some peat added. However, most Ferns in the following list will grow well in almost any garden soil.

Ferns love shade as much as they do moisture, and while there are several species that will grow in the open sunlight and present a fresh and green appearance, these very species do much better and throw up finer and larger fronds when in shade. Some, however, are not lovers of deep shade, and seem to attain their best development in open woods or half shade.

The best time for transplanting is either very early in spring or in the fall. Generally, any time after midsummer will do. The majority of Ferns produce in spring a set of fronds which last through the summer, no new ones being produced. These species should be transplanted if possible, while the plants are resting, but if not, they may be taken up carefully at other seasons. Those which send up fronds all summer may generally be transplanted at any time, and, if cared for, for a few days, will begin again to produce new fronds.

Ferns rather resent much digging about their roots, but if the soil, moisture, and shade are right, they will continue to grow larger and better each year.

In winter the species enumerated will need no protection except, perhaps, a light covering of leaves.



Adiantum pedatum.

Adiantum pedatum. (Maiden Hair). Eight inches to two feet high. Stem forked, the divisions once to thrice pinnate. Grows from a creeping rootstock, sending up fronds all summer. Rich leaf mold in damp shade. Found in damp woodlands and hillsides.

Asplenium acrostichooides. (Silvery Spleenwort). One to two feet high. Fronds nearly twice pinnate, in a circle from a short rootstock. Rich woods in leaf mold.

A. angustifolium. (Narrow-leaved Spleenwort). One to three feet high. Pinnate; fronds very thin, the fertile somewhat narrower than the sterile. In shade only. Found in damp rich woods. Fronds in a circle in early summer.

A. filix-femina. (Lady fern). Six inches to five feet. Twice pinnate; sometimes nearly thrice pinnatifid. Grows in clumps sending up fronds in early summer. Prefers rich open woods, but thrives in damp places in sunlight.

Cystopteris fragilis. (Fragile Bladder Fern). Fronds in clumps five to twelve inches high. Twice or thrice pinnate. Fronds fragile, produced during spring and early summer. Damp soil in rich earth, will stand some sun.

Dicksonia punctilobula. (Hay-scented Fern, Mountain Fern, Sweet Fern). Two to three feet long, from slender rootstocks that creep extensively. Fronds tri-pinnatifid, sweet-scented when crushed. Usually found in upland rocky woods and pastures. Grows well in leaf mold.

Dryopteris acrostichooides. (Christmas Fern). Evergreen. One to two and one-half feet long. Fronds thick, produced in a circle from a short thick root stock early in spring. Once pinnate. In damp shade in nearly any soil. Fronds used for Christmas decorations.

D. cristata. (Crested Shield Fern). One to three and one-half feet long. Fronds narrow and erect, in circles from a short rootstock. Pinnate, the pinna pinnatifid. Grows naturally in swamps and damp open woods.

D. c. Clintoniana. Is a larger form of the above.

D. Goldieana. (Goldie's Shield Fern). Two to four feet high. Fronds ovate, nearly thrice pinnatifid; from a short rootstock in circles in early summer. Deep shade in very rich leaf mold. A magnificent species.

D. marginalis. (Marginal Shield Fern). One to three feet high. Fronds in spring from a short, erect, rootstock; twice pinnate. Fronds in circles. Will stand some sun, but prefers shade, and will grow in almost any soil. Nearly evergreen.

D. noveboracensis. (New York Fern). Thin and delicate. One to three feet high. Nearly twice pinnate. Deep shade in rich earth. Foliage fragrant when crushed. Fronds in early summer.

D. spinulosa and its varieties *intermedia* and *dilatata*. (Spinulose or Bristly Shield Fern). One to three feet high. In circular crowns from a short, erect rootstock. Fronds produced in spring; about thrice pinnate, the pinnules tipped with bristles. Rich woodlands. Nearly evergreen.

D. Bootlii. Resembles the preceding.

D. Thelypteris. (Lady Fern, Marsh Shield Fern). One to three feet high. Bi-pinnatifid, produced from running rootstocks nearly all summer. Grows in

sun or shade in peaty soil or leaf mold. Its usual habitat being swamps and borders of streams.

Lygodium palmatum. (Climbing Fern). Three to six feet long. Pinnæ roundish, five to seven lobed. Grows in swamps near the Atlantic seaboard, twining about the bushes, usually in half shade. Rootstock slender, creeping.

Onoclea sensibilis. (Sensitive Fern). Sterile fronds one to three feet high. Broadly triangular, ovate, nearly pinnate. Fertile fronds produced late in the season, the divisions rolled up into berry-like objects. Both kinds of fronds from a creeping rootstock, the sterile produced all summer. Will grow in any soil, in sun or shade, its natural home being the borders of streams, swamps, and wet woodlands.

O. Struthiopteris. (Ostrich Fern). Our tallest Fern, one to ten feet high, in a crown of twenty or more fronds. Sterile fronds twice pinnatifid, oblanceolate in outline. Fertile fronds produced late in the season, their divisions rolled up much as in *O. sensibilis*. Banks of streams and wet open woods in sandy soil or leaf mold. Will stand sun all day, but grows best in partial shade, at least. Spreads by offsets at the ends of long runners.

Osmunda Claytoniana. (Interrupted Flowering Fern, Clayton's Fern). One to four feet high. Bi-pinnatifid. Fronds in crown of six to twelve, from a very thick rootstock in early spring. Fertile fronds, have part of the middle of the frond turned to spore-bearing organs. Found in swamps and pastures. Will stand sun or shade, but requires rather rich soil.

O. cinnamomea. (Cinnamon Fern). One to five feet high. Fronds in large crowns in early spring from an exceedingly heavy rootstock; bi-pinnatifid. Fertile fronds produced in early spring, from the midst of the sterile, but unlike them are short, thick, club-shaped, the green portion changed to myriads of little spore cases, of a bright brown color when ripe. Will stand sun or shade, if the soil is wet. Grows naturally in swamps, pastures, and low grounds.

O. regalis. (Royal Fern, Flowering Fern). One to six feet high. Twice pinnate, the pinnules usually orbicular. Fronds in circular clumps from a very thick, stout, erect rootstock. Fruiting panicle at the end of the fronds. Will grow in sun or shade. Its natural habitat is swamps and wet woodlands, where it is often found growing in shallow water; will grow also in drier situations. Fronds in spring and early summer.

Phegopteris Dryopteris. (Oak Fern). Three to twelve inches high. Frond ternate (like three Ferns in one), the division stalked and bi-pinnate. Rootstock creeping and producing fronds all summer. Moist rich places in shade only.

P. Phegopteris. (Beech Fern). Three to ten inches high. Fronds triangular, nearly twice pinnate. Rootstock running; fronds all summer. Damp woods, usually in stony soil in rich earth. Does not endure the sun.

Pteris aquilina. (Bracken, Brake, Eagle Fern). One to six feet high;

usually about two or three feet high. Fronds triangular, the divisions twice pinnate. Grows from a long, slender, running rootstock deep in the earth; fronds during early summer. Nearly any soil except clay; will endure full sunlight and dry soil, but is best in damp shade. Common throughout the world.

Woodwardia arcolata. (Chain Fern). One to two feet high. Fronds of two kinds; the fertile nearly pinnate with narrow divisions, the sterile broader, and produced earlier. Prefers salt water marshes and is found in America, mostly along the Atlantic seaboard.

W. virginica. (Chain Fern). Two to four feet high. Nearly twice pinnate. Rootstock thick, creeping; fronds produced in early summer. Prefers a peaty soil in half shade. Grows naturally in bogs in Eastern North America.

The *Botrychiums* or Grape Ferns, *B. virginianum* and *B. ternatum* with its varieties, are not true Ferns, but are sometimes cultivated. They have ternate, much divided fronds, and bear spores in a transformed part of the frond. They are natives of dark, damp woodlands, and will thrive if given the same surroundings in the Fern garden.



CHAPTER XVIII.

HARDY PERENNIAL PLANTS

SUITABLE FOR MARGINS OF PONDS AND MOIST GROUNDS.

Achillea filipendula. A vigorous showy species, with golden yellow flowers in dense flat corymbs, on stout stems, three to four feet high; foliage very handsome; flowers from July to October.

Amsonia taberna montana. Pale lavender-blue flowers in May and June in broad clusters.

Arisaema triphyllum. (Jack-in-the-Pulpit). An aroid, twelve to eighteen inches high, with a turnip-shaped corm. Spathe green, or often variegated with dark purple and whitish stripes or spots, and much hooded at the summit. An interesting and showy plant.

Armeria maritima. (Sea Pink). A pretty species, producing from a crowded tuft of leaves heads of bright colored flowers; and var. "*Pink Beauty*," a pretty pink variety.

Asclepias tuberosa. (Butterfly Weed). Compact umbels of brilliant orange colored flowers on stems two feet high; very showy and effective in masses.

Aster oblongifolius. Forms a compact bushy plant with numerous violet-purple flowers with yellow centers. Good for the wild garden.

Cassia marilandica. (American Senna). A plant growing from three to four feet high, bushy, with large panicles of curiously shaped, bright yellow flowers in abundant axillary clusters. The beautiful pinnate light green foliage is very pleasing. A very desirable plant.

Clematis Davidiana. A fine species, bearing large axillary clusters of fragrant blue Hyacinth-like flowers; grows three feet high, and is erect in habit.

C. erecta. (Upright Virgin's Bower). An erect species, two to four feet, with dense panicles of small white flowers in early summer.

C. integrifolia. An erect species, one to two feet high, with blue, very fragrant, solitary nodding flowers, one to two inches across.

C. tuberosa. A showy erect species, similar to *Clematis Davidiana*, but with dark purple flowers in summer.

Desmodium penduliflorum. This beautiful plant blooms in late summer, producing large clusters of reddish-purple, pea-like flowers.

Dicentra eximia. (Plumy Bleeding Heart). Leaves as graceful as those of a fern; flowers rose-color, in graceful racemes, appearing all summer. For beauty of foliage and its constant blooming qualities, one of the choicest of perennials.

D. spectabilis. One of the best known perennials, with graceful, drooping racemes of heart-shaped flowers, of rosy crimson and silvery white.

Doronicum plantagineum excelsum. A beautiful, spring flowering, hardy perennial, having large golden yellow flowers, four inches in diameter. Needs a rich moist soil.

Echinacea angustifolia. Flowers rosy purple, in summer and fall; eighteen to twenty-four inches high.

Epimedium alpinum. Neat foliage and airy clusters of purplish and yellow flowers of quaint shape.

E. macranthum. A very beautiful species from Japan; pure white flowers in spring. The handsomest of the genus and one of the earliest spring flowers.

Eryngium alpinum. A very pretty plant, with blue flower heads in July and August. Height two feet.

E. yuccifolium. A distinct native species, with Yucca-like spiny foliage and white flowers in summer; two feet.

Erythronium americanum. (Dog's Tooth Violet). Flowers bright yellow; nodding, spring, scape six to eight inches high; leaves pale green, mottled purplish.

Eupatorium ageratoides. A fine species, with corymbs of pure white flowers in midsummer. Two to three feet.



Funkia.

Euphorbia corollata. (Flowering Spurge). A tall branching plant, with pure white flowers or properly involucres. Fine for cutting from July to October. Two to three feet.

Funkia subcordata. (White Plantain Lily). Large, Lily-like flowers, pure white, in August.

F. "Thos. Hogg." One of the very best; foliage beautifully banded; with pure white and large purplish-lilac flowers in September.

Gentiana Andrewsii. (Closed Gentian). Flowers of a fine blue, an inch long, appearing in late autumn. In any good garden soil, especially sandy and moist, this attractive and native species improves greatly under cultivation.

Gratiola aurea. (Hedge Hyssop). A pretty, hardy North American plant with bright yellow flowers. It thrives in rich moist soil, but treated as an aquatic it does still better.

Gillenla trifoliata. (Bowman's Root). The reddish stems bear handsomely cut foliage and slender panicles of white flowers, sometimes tinged with rose. The branches of the panicles are so slender that at a little distance the long petaled flowers appear to be floating in the air. Two to three feet.

Gypsophila paniculata. A most beautiful hardy perennial and forms a mass, as broad as tall, of thread-like stems, with abundant small white flowers. Very graceful. Midsummer to early autumn. Two to three feet.

Helianthus Maximiliani. A large growing, free-flowering species which remains in bloom until late in autumn, and is not injured by ordinary frosts. Should be placed where it can have abundant room. Six to eight feet.

H. mollis. (Downy Sunflower). A downy white-leaved sort from Tennessee, with large heads of deep yellow flowers. Two to three feet.

H. orgyalis. (Graceful Sunflower). Flowers three to four inches diameter, produced in great abundance. Leaves long and narrow and very smooth. The habit of this species is erect and very graceful. Six to ten feet.

Hemerocallis aurantiaca major. A new Japanese variety of vigorous habit and free blooming. The large trumpet-shaped flowers are of a deep orange color, the best of all the Day Lilies. Supposed to be a natural hybrid.

H. Dumortieri. (Day Lily). A most beautiful and useful plant, with long, broad, radical leaves, and clusters of Lily-like flowers of a soft, rich yellow, exterior bronzy orange; of great substance and deliciously fragrant.

H. flava. One of the very best hardy perennials, and should be found in every garden. Golden yellow, very fragrant flowers on stems two and one-half feet high.

H. Kwanso variegata. Has broad, beautifully variegated foliage; very ornamental even when not in bloom.

Hypericum pyramidalis. (Great St. John's Wort). Three to five feet. A robust species, with flowers two to three inches across, which appear in summer; very showy and fine for borders.

Iris orientalis. Fine, ornamental foliage; rich, violet-blue flowers.

I. versicolor. (Blue Flag). A strong growing species, two feet high; with violet-blue flowers, with white and purple veins.

Lobelia cardinalis. (Cardinal Flower). One of the finest scarlet flowered hardy plants, of easy culture in any moist soil.

L. siphilitica. (Great Blue Lobelia). Grows in similar situations with the above, and, like that, is well worth cultivating. It has larger flowers than *cardinalis*, of a clear blue color of varying shades.

Lilium superbum. Flowers bright orange, with dark purple spots; fine for naturalizing in moist spots or planting among low growing shrubs.

Lisimachia clethroides. A fine hardy plant from Japan, with long dense, recurved spikes of pure white flowers in summer. One to two feet.

Mertensia virginica (Virginian Cowslip. Blue-bells). One of the most beautiful of our native spring flowers, growing about eighteen inches high; leaves bluish green; long drooping clusters of lovely blue flowers; the flower buds are a delicate shade of pink without trace of blue while the expanded flowers have no trace of pink.



Mertensia virginica.

Pardanthus chinensis. (Blackberry Lily). Iris-like foliage; orange colored flowers, spotted with crimson. The cluster of seeds when the capsule opens is exposed, and appears like a large ripe blackberry. The resemblance is so perfect that birds and insects are deceived by it. China, three to four feet.

Phlomis tuberosa. (Jerusalem Sage). A tall and vigorous plant, with dense whorls of purple flowers. Three to five feet.

Physostegia virginica. (Virginia Dragon-head). Numerous one-sided spikes of purplish-red flowers all summer. Three to four feet.

Pyrethrum uliginosum. (Giant Daisy). A grand fall blooming plant, growing five feet high and covered with large white flowers with yellow centers; needs a moist, rich soil.

Rhexia virginica. (Meadow Beauty). Eight to twelve inches; neat foliage with broad, rosy purple petals, against which the very large, bright yellow stamens show in strong contrast. A beautiful and remarkable plant.

Salvia patens. Brilliant blue flowers. About two feet.

S. Pitcheri. A very large showy species, with large deep blue flowers. Four to five feet.

Silphium integrifolium. (Entire Leaved Compass Plant). These plants are all tall and coarse growing, with yellow Sunflower-like blossoms. Fine for naturalizing in semi-wild places.

S. laciniatum. (Compass Plant). Has very large foliage, prettily cut. The largest flowered of all.

S. perfoliatum. (Cup Plant). The large opposite leaves unite around the square stem, forming a cavity or cup; large yellow flowers. Western U. S. Five to seven feet.

Spiraea aruncus. (Goat's Beard). Producing in summer long feathery panicles of innumerable white flowers, forming a graceful, gigantic plume. Three to five feet

S. filipendula, fl. pl. Numerous corymbs of double white flowers and pretty fern like foliage.

S. kamtschatica or *gigantea*. A gigantic species, with large panicles of white flowers and vine-like foliage a foot across; succeeds well in moist soil and partial shade. Six to nine feet.

S. lobata. A showy, red flowering species; very fragrant, growing four to five feet.

S. palmata. Japan; one of the most beautiful hardy plants in cultivation. The deep purple-red of the stems and branches, passing into the crimson-purple of the broad corymbs of flowers, will be found to contrast most exquisitely with the foliage, which assumes beautiful tints of brown and gold.



Spiraea palmata.

Thalictrum glaucum. A species from South Europe, with elegantly cut grayish foliage and large panicles of bright yellow flowers in June and July. Three to four feet.

T. purpureum. A tall, purplish, or whitish flowered species suitable for the wild garden. Four to eight feet.

T. speciosum. A fine, large, yellow-flowered sort, with handsome leaves. Three to five feet.

Thermopsis caroliniana. A showy native plant, with long spikes of Lupin-like yellow flowers in summer. Grows five feet high.

Trillium grandiflorum. One of our best native spring flowering plants. Growth ten inches high, with a single pure white flower three inches across.

Trollius europæus. (European Globe Flower). A pretty plant, with large, lemon-colored, Buttercup-like flowers, one to one and one-half inches across, and borne on long stems,

T. japonicus (Japan Globe Flower). Similar to the above, but with large orange flowers appearing in early spring.



Trillium.

Vernonia noveboracensis. (New York Iron Weed). Flowers of a dark purple, in large cymes in autumn; makes a fine plant for semi-wild garden or isolated positions in rich soil. Two to six feet.

Veronica subsessilis. This is, without doubt, the finest of all the hardy, herbaceous Speedwells in cultivation. The flower spike is large, as are also the individual flowers, the color of which is a brilliant, deep, amethystine blue, a color which contrasts strikingly with the rich green foliage. It is a Japanese plant, and perfectly hardy. One to two feet.

CHAPTER IX.

HARDY SHRUBS AND TREES

FOR WET AND MOIST SITUATIONS, MARGINS OF PONDS, LAKES, ETC.

Andromeda arborea. This makes a large shrub, being a more robust species than any other. Flowers creamy white, borne in large racemes, gracefully curved. The foliage assumes the rich autumn tints so much admired.



Clethra alnifolia.

A. calyculata. A low evergreen shrub, two to three feet high, blooming profusely in March and April. Flowers pure white, in curving racemes.

A. Catesbaei. A beautiful spring flowering shrub; two to four feet in height, with long spreading and recurved branches.

A. floribunda. A densely flowered shrub, two to six feet in height. May.

A. ligustrina. A large growing species; six to ten feet high, with large panicles of creamy white flowers in June.

A. Mariana. A very desirable shrub, three to four feet high, with dark, glossy leaves that turn to brilliant red in fall. The flowers are pure waxy white, appearing very early in spring.

A. racemosa. A species with foliage like an Azalea, and growing three to six feet high, producing countless racemes of pearly-white bell-shaped flowers in June, which are exquisitely fragrant, resembling Pond Lilies.

Azalea viscosa. One of the most beautiful of native species; five to eight feet high. Flowers pure white and very fragrant; blooming, June to August.

Calycanthus floridus. The well-known "Spice Shrub," "Sweet" or "Strawberry Shrub," commonly so called. The deep chocolate-colored flowers have a rich, fruity fragrance.



Kalmia latifolia.

Cephalanthus occidentalis. (Button Bush). A shrub of moderate growth; two to four feet high, producing dense heads of white flowers in July and August.

Clethra alnifolia. One of the best native shrubs, and very desirable; growing about three feet high, and covered with a great quantity of creamy white, intensely fragrant flowers in spikes six inches long.

Ilex opaca. (American Holly). This is one of our

finest native evergreens; its dark green foliage and bright red berries make it a most attractive and very ornamental tree.

Ilex verticillata. (Black Alder, Winterberry). A dwarf deciduous shrub; very desirable for the bog garden; fruit bright red.

Itea virginica. A fine hardy shrub; growing from four to six feet high and producing numerous racemes of pure white flowers in June. One of our finest shrubs, with beautiful red foliage in autumn.

Kalmia angustifolia. The Kalmias are unrivaled in beauty of foliage and flowers, and deserving of extended cultivation. A dwarf species; one to two feet high; flowers bright rose color.

K. latifolia. (American Laurel). The most beautiful evergreen flowering shrub in cultivation. Flowers profuse, large and very showy, varying from deep rose color to nearly white in June; height four to eight feet.

Liquidambar styraciflua. (Sweet Gum Tree). A very ornamental tree in the water garden and in moist places; leaves smooth and shiny, five to seven lobed, pointed, fragrant when bruised, and turning deep crimson in autumn. Young trees are covered with gray bark in deep corky ridges.

Magnolia glauca. One of the finest of the Magnolias; leaves deep green above and glaucous white on the under side. Flowers waxy white; three inches in diameter, and richly fragrant.

Nyssa multiflora. (Pepperidge. Sour Gum Tree). A most beautiful tree of striking and characteristic appearance. Foliage rich and glossy as though it were varnished; turning bright crimson in autumn.



Magnolia glauca.

Paulownia imperialis. One of the finest flowering trees from Japan; it is fine in leaf as well as the bloom; the leaves are about a foot long, trilobed and downy. The flowers are produced on erect spikes, resembling the well known Catalpa, but the flowers are larger and are a delicate mauve-purple, blotched aside with a deeper tint. As a foliage plant for the subtropical garden it is invaluable; the young shoots should be cut down annually, the young strong shoots making rapid growth and producing large handsome leaves. See illustration page 59. The Ailanthus is also a valuable tree, treated precisely the same; the long pinnate leaves are very ornamental, light, and graceful.

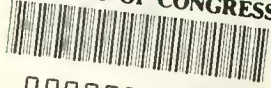
Pyrus arbutifolia. A dwarf shrub with elegant flowers like miniature apple blossoms; followed by clusters of bright red berries that remain until late in the winter.

Salix babylonica. (Weeping Willow). A most desirable tree near the water's edge; its long pendant branches and soft green linear foliage are most graceful and picturesque.

Vaccinium corymbosum. (Swamp Blueberry). This is a very ornamental shrub, either in blossom or fruit, but is mostly esteemed for its fine large fruit; height five to ten feet.



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