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SUCCESSFUL FLORICULTURE,

BY

DAVID R. WOODS,

NEW BRIGHTON, PA.

ILLUSTRATED.

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"Thorough Knowledge is the only positive Key to success, without
it we walk as one blind, who oft' mistakes his way, with
it we can not err in any of the pursuits of life."

1881.

Published for the author, to whom all orders should be addressed.

Brighton, Pa.

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INTRODUCTION.

“Flowers,” says a writer, “flowers, of all created things, the most innocently simple, the most superbly complex, playthings for childhood, ornaments of the grave, and companions of the cold corpse! Flowers, beloved by the idiot, and studied by the thinking men of science! Flowers, that unceasingly expand to heaven their grateful, and to man their cheerful looks; soothers of human sorrow; fit emblems of the victor’s triumph and the young bride’s blushes! Welcome to the crowded ball, and grateful upon the solitary grave! Flowers are in the volume of nature what the expression ‘God is love’ is in the volume of revelation! What a desolate place would be a world without a flower; it would be a face without a smile—a feast without a welcome. Are not flowers the stars of earth, and are not our stars the flowers of heaven? One cannot look closely at the structure without loving it; they are the emblems and manifestation of God’s love to the creation, and they are means and ministrations of man’s love to his fellow creatures, for they first awaken in his mind a sense of the beautiful and good. The very inutility of flowers is their excellence and great beauty, for they lead us to thoughts of generosity and moral beauty, detached from, and superior to all selfishness, so that they are sweet lessons in nature’s book of instruction, teaching man that he liveth not by bread alone, but that he hath another than animal life.”

The love and admiration of flowers is universal. All

CHAPTER I.

SOILS FOR POTTING.

SOME years ago it was believed by many that certain plants required a certain compost in which to grow, and that they *would not grow* in anything save this one particular preparation. Some of the florists in this country, but more in the older countries, still maintain that unless Silver Sand is used, cuttings cannot be rooted with any great degree of success, and if anything but Peat and Silver Sand is used for potting Camellias, Azaleas and like plants, they will not do well. This might have been believed up to the present time, if all plant culturists had lived where these two ingredients were in abundance, but this was not the case, and from necessity some were compelled to try to grow these and kindred plants in other composts, and the success attending these trials exceeded their brightest hopes. We confess that plants *do better* in a soil suited to their wants than in one not congenial to their nature, but it is ridiculous to argue that they will not grow and do comparatively well in another composition, provided of course that the other composition is not directly opposed to what their nature demands. An eminent florist claims to use but one compost, and grows *all his plants* equally well in it, but he *don't grow all kinds* of plants, and he has every opportunity to satisfy the cravings of the plants in *all* other respects,

which would at least to a considerable extent counteract the effect of an unsuitable soil. To the amateur, who almost universally labors under a host of disadvantages, it is necessary that he, to be successful, must take advantage of every point; hence we describe the different substances that are generally used for potting soils, and in our Specific Directions we tell you what preparation our experience has taught us to be the most suitable for the different plants *when grown in pots*. If the compost we recommend is not readily obtainable, approximate it as nearly as you can, and you will have landed pretty safely on *one* of the stepping stones to success.

LEAF SOIL is *not* half-rotted wood, but is *thoroughly* decomposed leaves. It is easily obtainable in the forests, can be found in the valleys or in hollow places where the winds have blown the leaves. Scrape ~~off~~ the top and you will get the deposits of former years. It ~~is~~ very rich and invigorating.

PEAT is a black or nearly black soil found in swamps and other low places; is very rich in vegetable fibre and as a rule contains some sand. Where it cannot conveniently be obtained, leaf soil will prove a good substitute.

MANURES No manures are suitable for potting purposes until they are *at least half decayed* (such as have been used in a hot bed) they are better when they are sufficiently decomposed as to sift without much difficulty.

SAND should be free from all foreign substances; if it is not, it can be washed by putting it in a tub or some other vessel, and rinsing it through several waters. The ladies will understand what we mean by this.

Moss from the woods or sphagnum from the swamps is very good to mix in the compost for Ferns, Pitcher Plants, Orchids, etc. It should be torn or chopped into small pieces before using, and be mixed in the soil.

LOAM. This word is often used to mean quite different substances; we intend it to mean in this case rotted sods and rotted manure prepared as follows: In the spring, or at any other convenient time, cut from an old pasture field, on the roadside or anywhere you can get them, sods; cut them small enough to handle conveniently, and about two inches thick; lay them in a heap, grassy sides together; between each alternate layer of sods put one layer of manure; (cow dung is best) in a few months chop as best you can with a spade, and mix the compost thoroughly; the heap should be turned and mixed several times during the season, until it becomes friable, when it is ready for use.

The reader may think it will cost considerable time and may be some funds to have a small supply of these soils on hand, but they can be obtained at odd times in spare moments that might not be otherwise used to advantage, and we feel confident that the enthusiastic culturist will have them. They can be mixed to suit the requirements of any plant. By referring to our Specific Directions you will discover what proportion to use of each of the above substances, we may say loam eight, sand one, peat one; this means eight parts of loam, and one part each of sand and peat will be the soil in which this plant should be grown.

FIG. 1.—BOTANIC CASTLE.

CHAPTER II.

POTS AND POTTING.

WE desire to say a few words in regard to the pots or vessels in which plants are grown, before we proceed to the operation of potting. We know that *thousands* of plants annually sicken and die because the vessels in which they are grown are not suitable. We are aware that in many sections of the country, pots such as florists use are not to be obtained without a great deal of trouble, hence, as soon as plants require potting they are put in tin cans, glazed stone ware, boxes, old paint buckets, and in fact anything that is handy that will hold earth and water. We wish to enter our protest just here by saying that nearly all plants *require air at the roots*, consequently such treatment is radi-

FIG. 2.—FLORIST'S POT.

cally wrong and positively injurious. The above statement

is the rule, but certainly there are exceptions to it. Some plants will live in water; *they* will not object to growing in anything that will supply their particular wants; if this want be water, then grow them in something that will contain water; if the want is air, then they must be grown in a *porous* vessel, that will admit a copious supply of air.

The best pot is the kind most Florists use. (See Fig 1.) They are made from the finest fire clay, made in moulds, and are "turned on a jigger;" this mode is superior to the old way of "pressing" as by this mode the pot remains porous, while by the old way the clay was made quite solid and only very slightly porous. The pots are then burned to a brick red; if burned any harder than this the clay vitrifies, and all the pores are closed; these pots, when burnt harder than usual, are used for Aquatic plants, but for most plants they are but little better than a wooden box or tin can.

Anticipate the needs of your plants, and have some of these pots on hand for the plants you have or those you may buy. When it is utterly impossible to get pots of the above description, it then becomes necessary to use a substitute. We would advise that the bottom of the vessel used be perforated with a number of small holes, say $\frac{1}{4}$ inch in diameter and not more than an inch apart. We prefer wooden boxes of suitable sizes for small plants, cigar boxes cut in two or three equal parts will answer.

DRAINAGE. We advocate drainage, and claim that it is beneficial to plant-life, when plants are in larger than what is called a four-inch pot. The reader, who has perused other works on this subject, may fear that we are now getting into hot water and may demand our reasons for making such a statement. Well, suppose we own a piece of low ground in a town or village; it is surrounded by an embankment from five to ten feet high; when it rains our

ground is covered with water, which will not drain off for several weeks. We say to our friend the "no drainage" florist, we will allow you to use that piece of ground for planting out *all* your flowers. His reply would be, "I don't want it." Why? "Because the water does not drain off." We reply that it does; that all the land surrounding mine is higher, and the water drains off into that, and some goes into the clayey subsoil, and in a few weeks the water will all be gone. "Yes, that is true; but it don't drain off *fast enough*, and before the water is all gone the soil is sour, and if my plants were in it they would be injured if not destroyed; the roots on many of them would rot in that time." The above would undoubtedly be in substance the replies of the "no drainage" florist, yet it is only going to the extreme to show the absurdity of his doctrine. Had we said to him he could have the ground for planting out his Callas, Caladium Esculentum and like plants, the offer (had he needed the ground) would have been accepted. The fact is if there is no drainage, or if the drainage is defective, the water does not pass away *fast enough*.

We have seen in green-houses where the roof was not thoroughly water-proof, after a long, heavy rain, some of the pots in which plants were growing filled to the rim with water, which did not pass away for 48 hours. The pot was porous, but the pores were filled up with muddy water, so that it was difficult for the water to filter through and it remaining so long in the pot would be injurious to ninety-nine plants out of one hundred.

For plants in small pots drainage is not essential to their welfare, because the pot does not contain but a very small amount of soil, and at the most there is but little water in the pot, which will drain off in a short time, even though the pot be not porous, if there is a hole in the bottom of it. But for plants in large pots, good and sufficient drain-

age should be provided, and especially so for such as are grown in tin cans, boxes, buckets, tubs, glazed earthenware, old kettles, etc., because when the soil is thoroughly saturated all the air is expelled, and as the water evaporates the air again enters the soil; hence if air is necessary for the roots of plants, and if when the soil is saturated with water there is no air in it should we not supply a channel or series of channels in the shape of drainage, by which the fluid may pass off rapidly and permit the health-giving air to enter without unnecessary delay. It is almost as absurd to claim that the surplus water will pass off through the pores of the larger pots in a sufficiently short space of time to do no injury to the plants, as it would be to claim that the fluids we take into our body will all pass off through the pores of our skin and we not suffer any in consequence of our involuntary retention of these fluids. We think we have said enough on this subject to convince the reader that it will be better to use drainage. We may touch on it again in the chapter on Temperature and Moisture.

POTTING. In the previous chapter we have enumerated the ingredients that will form soils for potting. If the plants are small the soil should be pulverized, either chopped or crushed so there will be no lumps to break or bruise the tender young roots. For most rooted cuttings a pot two inches high and the same in diameter will be sufficiently large. Geraniums, Feverfew, and a few other plants, if very well rooted, will require a two and one-half or three inch pot, but for the great majority a two inch pot will suit. Our mode of potting is as follows: The pots and soil ready, the cuttings (when rooted) are taken from the cutting bed and carried to a bench or table in the potting room; we then take the pot, fill it about one-fourth to one-third full of soil, then place the stem of the plant in the center of the pot, allowing the roots to touch the soil in the pot; we fill in all around until the pot might be said to be

filled to overflowing; then with the thumbs compress the soil, leaving a space of about one-third of an inch from the top of the pot to the surface, to hold water. When large pots are used for repotting, leave more space, say for a four inch pot leave one-half inch space. Some operators begin to pot cuttings by filling the pot with soil, then punch a hole in the loose soil with the finger, and push the roots into this hole, it being perhaps not more than three-fourths of an inch in diameter; the soil is then pressed down and the hole is thus filled; a gentle tap on the side of the pot with the knuckles, and the operation is complete. We claim that our mode is superior for these reasons: The natural tendency of the root is downward and spreading. The cutting sends out its roots all around in search of nourishing food; when it is taken from its bed common sense will tell us its roots should be allowed to remain as nearly as possible in every respect in the same position, viz: *Pointing downward and spreading*; this can be accomplished by the mode we practice, but not by the other, because in the first place, the hole made by the finger is too small in most instances to admit the roots without bending the points of them, consequently they must be *pushed* into the hole; hence they will point upward, which is unnatural; and secondly, by the mode of procedure by which the hole is closed up; the roots, instead of being allowed their natural spreading habit, are crushed together; and although in the hands of the skillful operator the plants will grow and in course of time flourish, it will take some time to overcome this unnatural and consequently wrong mode of treatment. The practical florist may say our mode consumes more time. Our reply is try it and see for yourself; if it does (which we deny) the greater success attending our mode would more than compensate for it. The object in pressing the soil rather solidly in the pot (now we don't mean to make it *hard*) is that the young roots may "catch hold" of the

soil and obtain nourishment from it at once, instead of being compelled to go in search of the soil before the plant can receive any food whatever. We now suppose the plant to be in a two inch pot; it must have a thorough watering; that is, the space from the surface of the soil to the rim of the pot should be filled with water; this may be done either at the potting table or after it has been placed where it is to grow, for the time at least.

We now come to the process of "shifting," that is, changing the plants into pots of a larger or smaller size. When a plant has been growing in a pot that is large for it, florists say it is "over-potted;" if the pot is too small, it is "pot-bound." When you wish to discover if the plant needs a larger pot, turn the plant top side down, just as a lady would a cake or piece of pastry to get it out of a mould, and placing the stem of the plant between the first and second fingers of the open hand, with the other hand raise the pot and tap the rim of it on the edge of a solid substance; as a rule one or two taps will loosen the roots from the sides of the pot, when the ball of earth will fall into the operator's open hand. If the ball of earth refuses to come out with two or three taps, give the plant a thorough watering and allow it to stand until the water drains off, when it can be removed quite easily, and by the way, it is better that the ball of earth be quite moist, for if it is dry the roots will cling to the pot and may be broken, and the soil being dry, it will crumble and fall to pieces, thereby disturbing the roots and oftentimes breaking them.

It is not necessary to give a larger pot until the roots become pretty well matted around the ball of earth, yet it should not be allowed to remain in the pot until the tender white succulent roots become brown and hard, or "woody." If, according to the above, the plant needs a larger pot, select, if the plant is of slow growth or "hard wooded" (such as Camellias, Azaleas, Daphne, etc.,) a pot

one size larger; if the plant is "soft wooded" (Geraniums, Fuchsias, etc.,) a pot two sizes larger will do just as well. Fill the pot to the depth of one inch or more, according to the size of pot, with broken pots, pieces of bricks, or anything that water will readily drain through, put in a little soil and then put the plant in the centre of the pot, fill up the space between the ball of earth in which the plant has been growing and the side of the pot with soil; press it in solidly with the thumbs or a stick, give the bottom of the pot a sharp rap on the potting table and the operation is complete.

If plants are in pots larger than necessary, take them out of the pots, *carefully* shake all the soil from the roots and wash them in clean water and re-pot in as small a pot as will hold the roots without crowding them; use great care in re-potting, so that the roots may not be broken. If there is much tops on the plant they should be shortened until the roots begin to work in the new soil; this shortening process will encourage a strong young growth. When, after their season of blooming is over, Pelargoniums, Fuchsias, and all other plants that should be cut back, as soon as they have started to make a new growth, they should be treated the same as plants that have been over-potted, inasmuch as they have not the same tops and flowers to support for the time being, they will not need so much pot room. Plants that have been growing in the garden, when potted should be *severely* cut back, and the branches and foliage thinned out. Pot in as small pots as the roots will admit of; give one thorough watering afterward keep the foliage sprinkled but the roots rather dry, until the plants begin to grow.

Plants that are grown for the beauty of their foliage and not for flowers will give better satisfaction if allowed plenty of pot room all the time they are growing. Under these conditions the foliage will be larger and richer than

if the roots are cramped for lack of room. While if flowers are wanted they will be more freely produced if the plants are not allowed so much pot-room. We wish it understood that plants that are grown mainly for the production of flowers should have plenty of pot room while making their growth and as the season for flowering approaches they should not be shifted into larger pots but be allowed to flower in the same pots in which they have perfected their growth.

We believe we have only one more caution to add to complete this chapter. When re-potting, the plant should not be buried any deeper in the soil than it has been; give the roots the additional food in the bottom and around the sides of the pot; they don't need it on the surface.

FIGS. 3 AND 4.—FANCY FLOWER POTS.

CHAPTER III.

TEMPERATURE AND MOISTURE.

TEMPERATURE is a subject which demands our especial attention. Many cases of failure result from an uncongenial temperature; it is too high or too low. The effect of too high a temperature will soon be visible in the weak, sickly growth of the plant; and some plants, Camellias for instance, will drop their flower buds. If the temperature is too low, the plant ceases to grow and the foliage drops off. There must be sufficient heat to excite the roots into action: all plants will grow better if the roots are five degrees warmer than the atmosphere in which the plants are growing, as it produces a strong sturdy top growth that is always desirable. Many practical florists fail in the production of cut flowers in winter because the tops are warmer than the roots, thus exciting a growth at the tops which the roots in their semi-dormant condition cannot support, consequently the growth must necessarily be weak, and the result is no flowers, or perhaps a few may be produced, but they are poor, colorless, and very pitiable looking. Especially is this the case when the plants are not in pots but are planted out in the greenhouse in a great body of soil that it rather difficult to heat. The mode of heating must be governed by circumstances and surroundings. Few of us would like to put an oil blast stove in our bay windows; an alcohol lamp would look better, and sufficient heat would be generated by it; in very cold weather it might require two such lamps; in a small conservatory the oil stove would be decidedly preferable. But the great

majority of plant growers have neither bay windows or conservatories, and their plants must be cared for. They receive as a rule just such treatment as can be given them, without in the least discommoding the occupants of the room or suite or rooms in which the plants may be growing; as a rule the temperature is too high during the day and too low during the night, and the plants in most instances look very badly. One cause for this is the owner does not know what heat the plants require. In the after part of this book, among other things, we propose to give this information; having acquired this knowledge, the culturist will be better prepared to give the plants more appropriate places, as some parts in rooms are warmer than others, they will be occupied by the plants requiring a higher temperature, while the now vacant cooler places will be occupied by the plants from the temperate zones. Plants that are grown in the window, where they might possibly get frosted, will be greatly protected at night if papers are spread over them; if perchance they should be frozen, plunge the tops in a tub of cold water and in a few minutes the frost will all have been extracted; if this cannot be done, place them where the sun cannot strike them, and allow them with the rising temperature of the room to gradually thaw out; in either case they should be shaded from sunlight for several hours after the frost is all gone. As we stated above, we will give the temperature in which plants of the different species will flourish. A variation of a few degrees either higher or lower will not materially injure them, especially if the temperature is higher and is caused by *sun heat*, still we recommend as nearly as possible the heat indicated. It must be understood that the temperature we give is for cold weather, say from October to May, earlier and later as the climate may demand. It is impossible to keep the temperature in a house down to sixty degrees if the heat outside is ninety degrees; how-

ever, we can put these plants in a shady place, which will be more agreeable to them.

MOISTURE. Plants need moisture, not water. A soil that is suitable to grow plants in is composed of innumerable minute particles of earth kept separated by an equally large number of air spaces. One object in pulverizing the soil is to reduce a hard, solid mass of earth to numerous small particles, and render the soil very porous. The object in making the soil comparatively firm after potting is to make the air spaces or pores small and very numerous. When a plant has been watered these air chambers are filled with water, and so long as the water remains the roots of the plants cannot work, because the particular food is absent, but as soon as the water drains off (and this is why we advocate drainage) the air made moist on its passage through the soil fills these air chambers with a moisture from which the plant draws its main support. If this be true, and we have had sufficient evidence to prove to our entire satisfaction that it is true, is it not absolutely necessary that we provide channels whereby this surplus water can pass a way, just as soon as all the earth in the pot has been moistened by it.

We have oftentimes been asked by amateur culturists "How often should plants be watered." Our reply has invariably been "just as often as they become dry." We will define as best we can what is meant by the word dry. Sometimes we speak of a thing as being "as dry as dust." To allow the soil in which plants are growing to get to that degree of dryness is almost sure death; it certainly is to most hard-wooded plants, while its effect on soft-wooded plants would be to stagnate their growth. Perhaps we can better define the word by comparison. The word *dry* (the appropriate time for watering) bears the same relation to dried or parched as moist does to saturate. A little experience will greatly assist in determining if water is re-

quired, but until the reader has had this experience we must give a little more information. Take two pots of the same size and fill both with dry soil; saturate the soil of one of them with water, then with the knuckles strike the sides of the pots alternately, and observe the difference in the sounds produced; this tapping may be repeated a number of times, until you become pretty familiar with the sound, then by testing the pots in which your plants are growing you can readily decide which to water; these should receive a sufficient amount of water to moisten all the soil, and should not be watered again until the soil is in the same condition it was prior to having been watered.

Rain water is considered the best for watering plants because often times spring or well water contains too much foreign substances, such as minerals, alkalies, etc., which might prove injurious to the tender roots of many plants. While it is better that water for plants should be about the same temperature as the atmosphere in which the plants are growing, it does not matter to ten or fifteen degrees inasmuch as that even though the water be ten degrees cooler than the air in the room, when it is applied to the plants, in fifteen minutes the earth in the pot will be of the same temperature by the absorption of heat from the atmosphere, as it was before the water was applied. If the watering by cooler water kept the earth for *hours* cooler than the temperature in the house then such a plan would prove injurious to some extent, but for only a few minutes no serious results can follow.

Thus far we have only alluded to moisture at the roots; we now wish to call your attention to moisture in the atmosphere in which plants are grown. There are many plants such as the Cacti and succulents, that will flourish admirably in a dry atmosphere, but nearly all plants of rapid growth and those that carry a great quantity of foliage, require a moist atmosphere. This may be produced

in different ways; first by placing shallow pans filled with water among the plants or on the floors; by placing damp moss or earth on the shelf or table where the plants are growing; or by sprinkling the foliage of the plants; either way will work satisfactorily. Among the benefits to be derived by a moist atmosphere are, first—the plants will not require more than half the quantity of water at the roots, or in other words, the moist atmosphere will not consume the moisture that is in the pots *i. e.*, the food of the roots. Second, the insect known as the “red spider” cannot live in it. Third, it produces an effect upon the health and growth of house plants so great that after being grown in this way for a few months they are scarcely recognizable as the plants that were grown formerly in a dry air; The luxuriance of the foliage is sometimes astonishing.

Elastic Plant Sprinkler.

Is made with a flat bottom perforated, detachable, brass top. Is valuable for Window Gardening, Boquet Sprinkling, etc., etc.

FIG.. 5.—ELASTIC PLANT SPRINKLER.

CHAPTER IV.

INSECTS.

GENERAL Jackson is the author of the phrase that "Eternal vigilance is the price of Liberty," the truth of which is doubted by none in the sense in which he meant it. We wish to repeat it in relation to the freedom of plants from insects.

We scarcely know what words to use in order to impress upon the mind of the reader in the most forcible manner the importance of keeping the plants free from insects. These parasites will attack plants that are in perfect health, though they are less liable to attack than plants that are diseased, and unless they are annihilated right speedily, the plant, being robbed of its life-blood, will become diseased, and death will inevitably follow. Some of these vampires are so small as to be scarcely visible to the naked eye, but under a powerful microscope they appear to be monsters. Since microscopes can be procured now by a trifling outlay, we would advise the reader to obtain one; the study of the life and habits of many insects will prove interesting, and by examining your flowers when highly magnified, a world of beauty will be unfolded to your gaze of which you never dreamed you were the delighted possessor; but to return to the insects. The ancient adage that "an ounce of prevention is worth a pound of cure" is so very appropriate and truthful in this connection that we cannot refrain from quoting it; in fact we want to quote it because it is the doctrine we desire to teach. Perhaps the best preventative that can be used is to keep the plants *perfectly clean* and *well syringed*, and

see that all their other needs, such as moisture, heat, air, soil, etc., are supplied; in fact keep your plants in good health, and you will not be troubled so much with insects. The benefits to be derived from having the plants in good health, is that they will be better prepared to repel the enemy or support it until its ravages become visible. You may ask, "How can I best keep my plants clean?" All plants that have smooth, glossy leaves may be cleansed by the free use of *warm water* and a sponge; cold water will do equally as well if the leaves are not greasy or glutinous, still we believe that with water heated to about blood heat the blemish can be more speedily removed. The leaves, both the upper and under sides, and in at the axils of the leaves and the stem of the plant, should all be carefully washed; if other than pure water is used, the foliage should be well syringed to thoroughly cleanse the plant. For those plants whose leaves are soft, and feel rough and hairy, better use a brush with rather stiff bristles; after the plant has been carefully brushed, syringe it with clear water; this will wash off the eggs of the insects, if there are any deposited on the plant. Another general rule is to submerge the *tops* of the plants in clear water heated to *no more than* 120 degrees. If this mode is to be pursued, proceed as follows: Pour the water in a vessel of sufficient depth that the tops of the plant may not be broken; test the heat of the water with a thermometer; if no more than 120 degrees, turn the plant top down and immerse the *tops only* in the water, withdrawing them as rapidly as possible without breaking any of the branches; lay the plants on their sides, so that the drippings may not enter the pot. The above treatment is one of the best for amateurs who have but few plants to take care of. It will not injure the plants if the growth is natural, but if the plants have been grown in the shade, and the new growth is very weak and tender, it may be damaged; however, this will not

injure the plant, as it would be decidedly better without such a sickly growth. We would caution the operator to be very careful about the heat of the water, as well as the very short space of time the plants are in it, for we don't want anybody to cook their plants through carelessness and then accuse the author for giving directions that could lead to such a result. The above might be called hydropathic treatment. We will now describe the little animals that are the source of so much annoyance and trouble, and prescribe some allopathic medicine to assist them in leaving this mundane sphere; and while we give the remedy to destroy these insects do not forget that it is easier to prevent than to destroy.

Green Fly or Aphis is known to all or nearly all Floriculturists, nevertheless, for the benefit of the new beginner we will briefly describe it as we have seen it, with and without the aid of a microscope. In color, as is indicated by its name, it is green, its size varies from a scarcely perceptible object to one-eighth of an inch in length of body, which is egg-shaped; on either side are three legs which are jointed and have at the end two claws which form a hook-shaped foot, the head is small, eyes prominent. We think from this short description you will know the animal at first sight. The hot water remedy will kill him The fumes of tobacco smoke will prevent and kill, but it is obnoxious to most people, especially ladies. The smoke may be produced as follows: Procure some tobacco in the shape of stems, smoking tobacco or stumps of cigars; dampen with water to keep it from blazing and burning too rapidly. Have a few shavings to start your fire, put these in a common flower pot or tin can, (with holes in the bottom) or anything that will not burn; better, however, have something that can be devoted exclusively to this purpose, say an old tin bucket, that in its youthful days would have held one or two gallons of water. Around the sides of this, about an inch

from the bottom, punch a row of holes about $\frac{1}{4}$ of an inch in diameter to allow a draught. Inside the bucket may be placed three or four 2 inch pots, on these place a circular piece of seive or screen, have a funnel-shaped lid for the bucket, with a hole in it two or three inches in diameter through which the smoke may escape. A cover should be provided for the hole in the lid so that when sufficient smoke is diffused the supply may be cut off. This fumigating bucket may be made at a small cost and without much trouble. Light your shavings, drop them in the bucket, and on them put the tobacco, the quantity of smoke may be determined by noticing that when the smoke leaves the the bucket it is warm, and rises to the roof or ceiling, then falls. When it has fallen sufficiently to encircle the pots nearest the floor or table a sufficient dose shall have been administered for that time. Fumigating should be done not less than once a week, and one dose as a *preventative* will be more efficacious than two given as a cure. Other modes of fumigating may be adopted, if the above is not practicable, such as using a shallow dish for the tobacco instead of the bucket we have described, and putting the plants under a barrel or tub with the tobacco, or the fumigating bucket will prove serviceable if a pipe made of tin is attached to the hole in the lid of the bucket and let down to the bottom of the barrel or tub. When the barrel is filled the smoke will escape at the bottom; as soon as you notice this allow no more smoke to enter.

BLUE APHIS. This is identical with the Green Aphis, save in color which is dark blue or lead color. This pest is more dangerous than the green fly, for while the latter is extracting the juices from the tender tops where it is readily discernable, this vampire strikes at the *roots only*, and the first intimation we have of its presence is when we see our pets, especially Verbenas, Asters and other annuals, withering and dying without any cause appearing for such

ungrateful action. When you notice any plant in this condition make up your mind that some hundreds, at least, of Blue Aphis are at work sapping its life blood. This *may* not be the cause, but ninety-nine times out of one hundred it is the cause. The only remedy that has proved beneficial at this stage is tobacco water. Steep some tobacco in water, use enough of the "weed" to make the decoction the color of strong tea. Apply this to the roots, completely saturating the soil every day for a week or ten days. We advise in addition to this that the tops of the plant be cut back some, and all superfluous tops be cut off. This will relieve the roots considerably and will enhance the chances to succeed, which are perhaps very meagre when the injury is discovered, as the insects may have been at work for weeks and may have destroyed all the tender working roots. If the plants are in pots take them out carefully, remove all the soil, wash the roots in clear water and re-pot in fresh soil.

RED SPIDER is fully as formidable an enemy to plant life as the Blue Aphis, whilst the latter is secreted beneath the soil, and consequently invisible. The former secrets itself, on the *under* side of the leaf, and being exceeding small, may do a vast amount of injury before its presence is noted. Its presence will be indicated by the leaves of the plants turning brown as though they had been scorched; on many soft wooded plants, the leaves will fall off. A hot, *dry* atmosphere will produce *millions* of these in a very short time, and a *moist* atmosphere will effectually prevent their appearance. Frequent syringing and hot water (120 degrees) baths will kill them. The vapor arising from *heat-ed* sulphur will operate successfully both as a preventative and cure. Do not *burn* the sulphur, simply heat it. If the spider attacks some plants as Dracenas, Palms, Camellias, etc., wash as directed in the beginning of this chapter. This little pest is very troublesome, and is usually found on

plants grown in the house. The only remedy when it attacks plants in the garden is to syringe frequently, say every morning and evening as long as any can be seen. Remember the insect inhabits the under side of the leaf and that is the place that should receive the largest part of your attention whilst sprinkling.

MEALY BUG is a white or downy looking insect, in shape oval; in size, when full grown, of about one-fourth inch in length. From its color and size it can readily be seen if present. It seems to enjoy tobacco as well as the most inveterate smoker, at least the smoke does not seem to be disagreeable to it for it don't even make the creature sick; but just take a feather, dip it in kerosene, (refined coal oil) touch the little thief with it, and he will loose his beautiful white robe and give up the ghost. We have used the above remedy for more than eight years with unvarying success. Gently brush the feather over all the mealy looking substances that surrounds the bug and the neighboring axil of the leaves, or else you will have a large stock of these insects in a short time. This remedy has operated so successfully that we now use no other, even on the most delicate plants, which should be syringed after the insects are destroyed, to remove them from the plants. Alcohol slightly diluted will answer the same purpose as the kerosene, but the latter is cheapest, and is usually in the house, and can be used immediately.

THRIP. We have not seen for several years and had almost forgotten there was such an insect. It varies in size from an object scarcely visible, to one the size of an aphid; in color nearly black, with creamy white rings; it is very active, and if disturbed will jump around quite lively. Tobacco smoke will kill it, but it requires a strong dose to produce the desired effect. Moisture is an excellent preventative.

SCALE, OR SHIELD LOUSE. A person must look for

these in order to find them. We frequently see green flies, mealy bugs, etc., while looking at our flowers, but the brown scale permanently settles down on the leaves and bark of the plants, and some species being about the same color as the stems of many plants, the culturist, unless he examines it closely, may suppose it to be a dormant bud or perhaps a "swelling" caused by the sting of some insect; hence we say you must look for it. In shape it is oval, not quite so large as the mealy bug; it varies in color from white to almost black. One remedy is to carefully wash, rub, or scrape them off; we advise that they be washed off using a sponge or a stiff tooth brush and strong soap suds. You will find that they are very tenacious in their hold on the plant, and it will take considerable time and patience to entirely eradicate them after they are strongly entrenched. If the operator prefers to scrape them off he must be careful not to wound the bark of the plant; the rubbing process will not come in general use, especially where ladies are the cultivators, as it is not a pleasant performance to mutilate the scales with the fingers; nevertheless, if you see one or more on your own plants destroy them at once, even though it be done by crushing it with the finger, for all these insects multiply with amazing rapidity. Kerosene may be used instead of soap-suds; it will kill the insects, but it should not be allowed to drain off the plant into the soil, as it might prove injurious; syringe the plant after either operation with clear water.

VAPORIZER.—This is the best article made for spraying cut flowers, and applying Whale Oil Soap and other compounds for the destruction of insects on plants.

FIG. 6.—VAPORIZER.

BLACK RUST. We are in doubt whether or not we should mention this "Rust" in this chapter. The "Greeks" are at war; some claim that it is caused by an insect called the Verbena Mite, whilst others equally eminent are positive that it is of fungoid origin. We do not propose to discuss the disease; we only wish to describe the "Rust" and how to avoid it. We feel perfectly safe in saying that if the plants are in good health, not suffering from any cause whatever, they will not be attacked. The presence of this disease will be noticed by the young leaves becoming blackened, and in course of time, if the disease is not checked, the young growth will be gnarled and knotty, and the plant will eventually die. If the plants are in high temperature, by removing them to a cooler place the ravages of the disease will be checked, and when first noticed the part affected may be pinched or cut off; this will allow the side shoots a chance to push out; they may not be affected. See to it that the plants have sufficient pot room, moisture, etc. It is said that pulverized charcoal applied to the rust spots will prove a successful remedy. This we have never tried, for as soon as a plant gets rusty, we throw it away; better lose the plant than run the risk of having all affected. We believe this to be the best plan. Keep your plants in health and they will not be attacked; if they are badly diseased, throw them away and get healthy ones.

MILDEW attacks principally Verbenas and Roses. It is a fungi which is deposited on the foliage, when the plant is suffering for want of something essential to its welfare; this may be heat, air in winter—particularly cold draughts of air, moisture, or it may be suffering from an excess of these things, or an excess of one and an absence of another of these requisites. Mildew has the appearance of a white powder or mould deposited in spots or blotches on the leaves; in severe attacks it will entirely cover the leaves, and not unfrequently the stems also. Put some flour of sulphur

in a dredger and dust all the foliage until the whole is pretty well covered; in a short time the mildew will have disappeared, when the sulphur may be removed by syringing.

WORMS IN POTS may be removed by the use of lime water. Dissolve a pound of lime in about four gallons of water. When the water has become perfectly clear, saturate the soil in the pots with it; usually one application will be sufficient, but it may be repeated if necessity requires it without injury to the plants. Another mode is to turn the ball of earth out of the pot and remove all the worms that can be seen.

ROSE SLUGS. This insect varies in size according to age, from one-sixteenth to one inch in length, in color is a light green; they increase very rapidly and soon destroy all the upper surface of the foliage, leaving the veins and skin underneath, which looks browned or scorched. The better way to deal with this slug is to anticipate his attack and fortify against him. In the spring, as soon as the buds begin to swell, syringe the plants well with a preparation made by dissolving one-half pound of whale oil soap in five gallons of water. As soon as the leaves make their appearance, use this daily for two weeks, or longer, if you notice any slugs on your bushes. Where this soap is not obtainable, the foliage may be dusted pretty thoroughly with road dust, ashes, sulphur, plaster of paris or tobacco ashes. There is another species which attacks the young monthly roses; it consumes the whole of the leaf; they do not appear in as large numbers as the species which attacks the hardy roses, hence are more easily subdued; the most effective remedy is hand picking.

ROSE BUG OR CHAFER. This bug is exceedingly fond of the flowers, and will eat nothing else so long as these can be procured; they come without warning, and almost before we are cognizant of their presence, our queens of the garden are

robbed of their crowns. This enemy eats a hole in the blossom or half open bud, and conceals itself therein as long as it can find something to eat, but it is not the least bit bashful, for it soon consumes the whole flower, and if there be no more Roses near, it flies to pastures new. We have found it very destructive on some of the hardy shrubs; one season especially they destroyed nearly all the flowers on *Deutzia Crenata Flore Pleno*. We know of nothing to prevent the attacks of this bug, nor anything to kill them without injuring the flowers, except hand picking, or a speedier mode will be to spread sheets under the bushes, shake the bushes and the bugs will fall on the sheets; they can be collected and destroyed.

SNAILS. Scatter air slacked lime all over the surface of the table, and the snails will not travel over it; if caught or seen, sprinkle salt over them; it is a positive kill every time.

ANTS. These are sometimes very annoying. The easiest and most effective way to get rid of them is to lay a fresh bone near their haunts; in a short time this will be covered with the ants, when the bone may be dropped in boiling water. The bone may be used a number of times, so long as the ants remain.

The remedies we recommend the reader will notice are familiar to us all, and are such as may be found at any time in almost every home in our land. We might have offered more remedies, but we consider one good one is sufficient for each insect. Another fact please notice; the remedies spoken of we have experimented with and *know* that they will produce the desired effect if used as we recommend.

CHAPTER V.

WINTER BLOOMING PLANTS.

E have shown that in another chapter plants breathe; this is not the only particular in which they resemble the human family. They also need rest, just as we do. It seems to be the mission or work of many plants to produce flowers, others to produce their beautiful foliage. We can not expect these plants to produce their flowers or foliage all the year without any rest. Those that are grown for their flowers, such as Geraniums and Fuchsias, in the autumn cease blooming and take unto themselves a season of rest. Those that are grown for their elegant variegated foliage, while many of them retain their leaves they do not grow, if at all, with that vigor they do at other seasons. All plant culturists have no doubt noticed this. From it we learn that if we would have flowers all the year we must select those which naturally, in our climate, bloom at different seasons. It is true that we can force some varieties into bloom out of their usual season, but this is the exception, not the rule, and they must be rested before we begin to force them, or our efforts will result in failure. We will suppose first that we will get those that will naturally bloom in our winter, such as Bouvardias, Carnations, Stevia, Eupatoriums, &c. It is best to get young plants in the spring; as soon as danger from frost is over these should be taken out of the pots and planted in the garden; during the summer these must be kept free from weeds, and if the plants will not grow bushy without it, the tops should be pinched out several times during the summer, this

will keep the plants short and stocky and tend to strengthen the branches. As a rule the flowers are produced on the points of the branches, so the more strong branches there are the more flowers will be produced. The plants intended for winter blooming should not be allowed to flower during the summer, as some varieties would if permitted; as soon as the flower buds appear they should be pinched off. These plants should be lifted and potted at least a month before it is necessary to permanently remove them to their winter quarters.

In our latitude we usually have plentiful rains in September. After the soil in the garden is pretty well saturated we begin to lift these plants; many of them are not potted, but are planted out on the benches in the greenhouses. All are lifted very carefully, allowing all the soil to remain on the roots that will. After the plants are lifted and before they are potted we remove all the soil we can without greatly exposing the roots, the object in this is to put the plant in as small a pot as the roots will admit of. In this operation great care and judgment must be used not to seriously injure the roots by breaking or exposure. Remember that the plants will need but little pot room for new roots, and that if the pots are too large some of the plants will grow too much and bloom but little, and also that if there is more soil in the pots the plants will feel just like a person who has eaten too much and is suffering from an overloaded stomach. Such a person is not in fit condition to do much work, and neither are plants in such a condition. They will be potted in accordance with directions given in the chapter devoted to that subject. Immediately after potting they should be thoroughly watered and placed in a shaded position in as moist an atmosphere as possible, protected from drying winds. In about a week or ten days they will have partially recovered and may be given sunlight until nearly noon; after another week they may

be given full sunlight. We always prefer to lift the plants in dull, cloudy weather. When the season has so far advanced that at night the thermometer indicates forty degrees or less the plants should be protected by removing them to a warmer place for the night. During the day when the thermometer in the shade outside indicates fifty degrees or more, the plants will be better in the open air until evening. The plants should not be allowed to become *chilled*, as at this season it might blast all hopes for future flowers. The plants that require a winter temperature of sixty degrees will chill at a higher temperature than those that only require forty-five degrees of heat, so you must be governed according to these requirements.

If you have no garden in which to grow these plants in summer they can be grown successfully in pots, (and perhaps this is the best mode for the amateur to pursue,) in fact such plants as Camellias and Azaleas are seldom planted out, and only need re-potting while young once a year. Large plants are only re-potted every alternate year or only once every third year, and always immediately after they have done blooming. Roses for winter blooming should be grown in pots all summer. The following treatment is suited for all soft wooded plants that are grown in pots for winter blooming: The young plants are potted in what we call four inch pots. A bed is arranged in the yard or garden, (where the plants will have morning sunlight,) by digging and pulverizing the soil to the depth of six inches or more. After the plants are potted the pots are sunk in the soil until the top of the pot is level with the surface of the soil. These will require more care in watering; they should never be allowed to suffer from want of moisture; if draining has been properly attended to they cannot suffer from excess of it. Probably twice during the season they will require shifting into larger pots, when, you can readily tell from the appearance of the roots. The

pots must be moved around occasionally to prevent the roots from coming through the hole in the bottom of the pot. The plants should not be shifted into larger pots later than September, as by that time they should be in large enough pots to keep them all winter; neither should the tops be pinched out later than the first of September; let them develop flowers after that time; later in the season protect from chilly weather in the same way as before recommended, and for general and specific treatment see other parts of this book.

FIG. 7.—GLASS AQUARIUM AND FLOWER STAND

CHAPTER VI.

WINTER PROTECTION.

IN other parts of this work we give directions how plants and bulbs may be *grown* during the winter. The object of this chapter is to suggest means to save or preserve those plants that we have become so attached to that we do not like to see them killed by frost; we cannot hope to do more than keep them in a comparatively dormant condition; they would not be ornamental in the parlor or window-garden, so they must be consigned to the cold-pit or cellar. If a large number of plants are to be cared for, a cold-pit or frame may be prepared as follows: Select the driest situation in the garden, and excavate the soil to the depth of from three to five feet. If water is found at this distance, it must be drained off, as it is of the utmost importance that the atmosphere and soil be moderately dry, otherwise the plants will mould or rot off, and the deciduous plants and bulbs will start to grow and will consequently be damaged if not entirely spoiled. The pit may be made any size desired; the inside may be boarded up, or if the intention is to make it permanent, it should be built of brick or stone. The south walls may be built two feet above the level of the soil, and the north wall eight to ten inches higher; the east and west walls gradually rise from the level of the south wall to the level of the north wall. This shape gives a southern exposure, which is preferable, but not necessary for the plants, Shelving should be made for the inside; this should be arranged two feet from the floor or bottom of the pit; if the pit be five feet in depth two rows of shelves may be used

under this shelving we can "heel in," (that is plant or bed out just as we would in the garden,) such deciduous plants as Lemon Verbenas, Hydrangeas, Pomegranates, Pampas Grasses, Crape Myrtles, etc. On the shelves we can keep tender bedding and pot plants, such as Geraniums, Heliotrope, Fuchsias, Pelargoniums, Monthly Roses, Carnations, Abutilons, etc. These plants should be potted at least a month before it is necessary to put them in such a pit. As we have said, this pit is only intended to keep them in hence in order to be successful they must be well established, strong and healthy. The pots may be sunk in ashes, saw-dust, or some other porous substance; this will save them from drying out so fast, for the less water you give them, without allowing them to wither for want of it, the better they will be. The surface or roof of the pit must be of glass; in building the pit take this into consideration, and make it of a size that you can get sash to cover it, sash are usually made six feet long by three feet wide this is a very convenient size to handle. When the weather will permit, the sash should be raised to give the plants air and dry up the damp. For cold weather straw mats or board shutters, or both, should be provided to cover the sash, and in very cold weather it may become necessary to use additional covering. The cooler the frame can be kept the better, not allowing the temperature to go below thirty-five degrees nor above fifty degrees. On the approach of cold weather the wall should be banked up to a level with the glass, with soil or manure. If but a few plants are to be wintered over, they may be kept in the cellar. Such as we have said will do *under* the shelving of the cold pit, will do very well in a comparatively dark, cool, dry cellar. Those that we have allowed to *live on* the shelves must have some light, or they will perish. Erect shelves near the cellar windows; on these shelves put the plants; they should be in the same established state as if they were to be placed in a

cold frame. Enough water to keep them from withering is all they need. The temperature should be from forty to forty-five degrees, not higher, or they will make a weak blanched growth, which may prove fatal.

FIG. 8.—TEFFRA COTTA STATUE FOR LAWN, PARLOR OR VERANDA ORNAMENT.

CHAPTER VII.

PROPAGATION.

ERE we intending to write all that might properly be written on this subject we would need a good sized volume for it alone, but as our object is to treat of it only so far as it relates to flowers and that for the benefit of the amateur we will write as briefly as the importance of the subject will permit.

We shall take into consideration four distinct methods of propagating, viz: By cuttings, layers, root cuttings and offsets. To propagation by seeds we will devote a separate chapter.

PROPAGATION BY CUTTINGS is the source from whence most of the plants sold by our florists are derived, It is in many respects a simple operation yet one which requires constant care and attention, from the beginning to the end. Those plants which in other chapters we have designated as "soft wooded" are most of them readily increased by cuttings of the branches, these cuttings may vary in length from two to five inches owing to the nature of the plant. As a rule the softer the wood is, the sooner the cutting will root and the roots will be stronger and healthier. All these cuttings are prepared in about the same way a new shoot or branch is selected and with a sharp knife is severed from the parent stem, it is immaterial whether it be at a joint or not (however in most instances joint is preferable providing the wood is not too old or hard) the lower leaves are trimmed off and the cutting is ready for insertion in sand or anything else that will hold moisture and not become hard, we prefer sand as it is so clean to work with and answers the

purpose as well as anything that we have tried. There are now two systems that we may pursue. The first we recommend for cuttings in the autumn and winter, the second for spring and early summer. The presumption is, the reader has no greenhouse and these cuttings must be propagated without bottom heat that is without means to supply a few degrees more heat at the bottom of the cuttings than at the top. The first mode is, obtain a wooden box or any other porous article say four inches in depth any width and length desired see that there are sufficient holes in the bottom to secure good drainage cover the bottom to the depth of one or one and one-half inches with broken pots, moss, charcoal or anything that water will readily pass through, now fill the box with sand and give a thorough watering after which the cuttings may be inserted avoid over crowding leave enough space between the cuttings to allow a free circulation of air. The cuttings should never be allowed to get so dry that they wilt, nor should the direct rays of the sun be permitted to shine on them give plenty of light but not sunlight, the majority of them will be rooted in from ten to twenty days and should be potted as soon as the roots are from one-half to one inch in length. Cuttings from old wood and half ripe wood will root in these conditions but they will require a longer time and the amateur need not expect to be quite as successful with them.

The second system is, instead of using a porous vessel to use one that will hold water, a glass or queensware vessel two to three inches in depth will answer, fill this with sand insert the cuttings and saturate the sand with water *and keep it thoroughly saturated* until the cuttings are rooted, these cuttings should be placed where they will obtain all the sunlight possible.

The reader who has or can have a hot bed made in the spring will find it very profitable for rooting cuttings, pre-

pared in the usual way and two inches of sand being placed on the soil in which the cuttings are to be inserted and in which the rooted cuttings can be plunged after they are potted. At this time of the year, the plants we have been keeping in the house over winter should have plenty of wood on them that will be suitable for cuttings and we can propagate enough for the garden, and for house plants the next winter which should be propagated in the spring and grown in pots all summer so they may be large enough to give us plenty of flowers through the winter and by the way this bed will still have some heat in it in September, when we can propagate from half ripe wood roses and hardy shrubs of various kinds as well as most of our soft wooded plants which if well cared for through the winter will make fine large plants for bedding out in the spring. The treatment of these cuttings is precisely the same as that recommended for system first.

INCREASING by means of layers in the best mode for the amateur to pursue when the plants can be rooted by this means as failure is almost impossible. In some varieties this is not practicable but in many it is such as Hardy Roses, Shrubs of different kinds many vines and in fact most hardy plants. Nature seems to have provided this plan for the increase and perpetuation of some plants so readily are the roots emitted, this is especially noticeable with Honeysuckles, Strawberries, Violets, Hydrangea *Paniculata grandiflora*, and others we might name, where all that is necessary is to allow the branches to touch the soil, when in a short time they will be sufficiently rooted to bear removal with impunity. It

FIG. 9.

PROFOGATION.

will frequently aid nature materially if we will peg down (see Fig 9) the layer to prevent its position being changed by the wind as well as avoiding mutilating the young roots. If more than one plant is desired from each branch the whole branch may be pegged down (FIG. 10) and covered

FIG. 10.

to the depth of two to three inches with soil if this is done in autumn, in the spring following almost every bud will sprout, throw up a stem, (FIG 11) which in the autumn will be

FIG. 11.

ready for removal to the place it is to ornament. In the plants just spoken of, nature will make a rooted plant from a layer without the assistance of man yet with other plants man's aid is required, a familiar example of this is the rose, a branch of a rose may be bent and pegged down to the earth and if the bark be not injured it may never root but continue to derive it's nourishment from the parent plant. To overcome this the operator performs what is called "Tongueing" this is done by cutting the branch about half way through extending the cut along the branch from two to three inches, this cut to be made at such a point that it will be in the soil when the branch is pegged down. After the cut is made the branch is slight twisted so that the tongue will be partially free

from the parent stem, this slight twist will restrain the flow of sap and thereby encourage the early formation of roots. In order to be successful with this mode of propagation we must take into consideration the condition of the layer and the time for doing the work. The cut should be made where the wood is a month to six weeks old, in this condition the roots will be emitted more rapidly and will be stronger than if the wood is older; the operation may be performed at any time when the wood can be found in the condition above stated but the earlier in the season the better as the layer will have time to have formed plenty of roots in the autumn.

The better plan where the incision is made is instead of burying the cut portion of the branch in the soil is to plunge a four inch pot into the soil to the depth of the pot fill it with sandy soil and bury the cut portion in the pot when the layer is rooted all the roots will be in the pot and can be removed at any time without injury or check to the new growth of the young plant. If under any circumstances the layer will not reach the earth the pot can be imbedded in a elevated box of soil until the layer is rooted. We must be careful that the layer should not be allowed to become dry after being cut this would at least injure our chances of success, if not totally destroy them. Some plants may be increased by removing the sprouts or suckers that are thrown up from the root often in such quantities as to become a nuisance. We can greatly encourage the formation of roots by these sprouts or suckers by making a mound of soil around the plant partially burying all the plant as shown by FIG. 11, allow this to remain for one year when it may be removed in the early spring and almost all the sprouts will have developed roots sufficient to sustain life when each sprout may be removed to the place intended. We can hasten still more the formation of roots by slightly tonguing each shoot or by slitting the bark so

that the tongue or slit will be buried in the soil when the mound is made.

FIG. 11.

ROOT CUTTINGS. The roots of some plants such as Bouvardias among house plants, Calycanthus (sweet scented Shrub) among hardy plants, and Passiflora Incarnata among the vines contain latent buds which under suitable conditions become fully developed and in a short time a stem is produced. To increase our plants in this way select the thick fleshy roots cut into pieces about an inch in length sow or plant these just as we would seeds; cover with about a fourth of an inch of fine sandy soil the after treatment will be the same as for branch cuttings of young wood or for tender seed sown in boxes in the house only shading will not be absolutely necessary.

OFFSETS. Most bulbs are rapidly increased by offsets or bulblets, many produce seeds freely but at the best this is a slow mode of production and we cannot be sure that the seedling will be equal to the parent until it has bloomed. Some bulbs upon examination after blooming, when ripened will be found to have formed two distinct bulbs which though connected are susceptible of division without injury. The reader has perhaps noticed this; Lilies, Gladiolus, Tigridias etc., on a suitable soil these bulbs will at least be in-

creased 100 per cent each year. But even this mode is not as rapid as most culturists desire and if it were all bulbs will not increase in this way. Take the cyclamen for instance we can grow it for ten years and will not have any increase by natural division (except the crown decay) or offsets yet it seeds freely and the seeds germinate without any extra amount of care and in two years from the seed we can have a strong flowering bulb.

In treating of the propagation of bulbs we shall divide them into three classes. First the coated, such as the Hyacinth Amaryllis and Tuberose. Second, the solid bulb or corm such as Cyclamen or Gladiolus. Third, the scaly, of which the Japan Lily is a familiar example.

The first class naturally increase quite rapidly by offsets formed at the base of the bulb proper and grow up around the parent bulb. In the dormant season all these offsets should be removed and be planted out at the proper time. Some few of these offsets may produce a blooming bulb for the following season but most will not bloom until the second or third year it requiring this much time for the young bulbs to gain sufficient feculent matter to produce and support a flower stalk. These young bulbs will require the same treatment as a flowering bulb of the same species. In the second class, Nature plays an important part by dividing the bulb or rather when the bulb begins to grow two or more eyes are thrust into prominence which in the course of the season form bulbs many of which will bloom during the next season; frequently in addition to this a number of small buds will be found clustered around the base of the larger bulb, some of the bulbs in this class are not divided by nature such as the Gloxinia and Cyclamen, but these seed freely and the Gloxinia is readily increased by cuttings of the leaf, allow a portion of the leaf stem to remain insert this in sand treat it just as you would a branch cutting when rooted pot off in small pots and by

the time the blooming bulbs have completed their growth this will be found to have formed a bulb a half an inch in diameter. In addition to increasing this class by the modes above alluded to, the large bulbs may be cut, in pieces they will each produce other bulbs, which in time will regain their natural form and may again be subjected to the same course of treatment.

The Third class or scaly bulbs are propagated by division, offsets, scales and in some species by stem bulbs produced on the stem either above or in the soil, all being susceptible of increase by seeds. When the bulbs after blooming are ripened, which is indicated by the foliage and stem dying, we lift the bulbs, we will find that many of those that have flowered will have formed two distinct bulbs which can be separated; this will double our stock, then we will find probably from five to ten bulblets attached to the flower stem at the top of the bulb these may be carefully removed from the stem and taken care of in the same way as Lily scales. A careful examination of a scaly bulb will show us that the scales in and around the centre of the bulb form a solid bulb while the scales around the outside are loose and easily detached or broken off and may be removed without injuring the bulb; each of these scales if planted in a sandy compost will form in from two to three months one or two bulblets which if cared for will form blooming bulbs in from two to four years. These scales and bulblets grown in shallow boxes filled with a sandy soil for one may be year after which they may be planted out in the garden.

Before closing this chapter, we desire to add a few words on the subject of temperature in relation to propagation. Our observation has been that while some cuttings will root under almost any treatment, yet we should be governed by some law or rule in order that when we begin to propagate we can rest assured that success will crown our efforts, *providing* we do our share

of the work. We submit the following rule, the correctness of which has been demonstrated to us by actual experience.

Cutting of plants can be rooted in the same temperature required to keep the plant in a healthy growing condition. This may appear to be a small matter, but in reality it is an important one. One winter, some years ago, a friend of ours put in the cutting bench of his greenhouse several hundred each of Coleus and Carnations, in a temperature of about 75 degrees. He succeeded in rooting all the Coleus and killing all the Carnations; whereas, if his Carnation cuttings had been placed in a temperature of 45 to 50 degrees, they would have rooted. This difference in the amount of heat would have killed the Coleus. We can only judge of the amount of heat by what is required for our plants in winter and in summer, we recommend the propagation of nothing save tropical plants which will bear an abundance of heat.

FIG. 12.—GRANITE CASTLE.

CHAPTER VIII.

VENTILATION AND LIGHT.

PLANTS breathe. This fact has been ascertained by the carefully conducted experiments of very eminent scientific botanists. We do not consider it necessary to adduce arguments to prove that which is acknowledged by all who have studied the subject, to be a fact. Plants, like human beings, receive considerable nourishment from the contents of the atmosphere, for it, like water, contains life in many forms, and is composed mainly of oxygen, nitrogen and carbonic acid gases. We, by the process of respiration, consume oxygen, and from the lungs and through seven millions of pores diffused over the skin, are incessantly pouring out a deadly poison, carbonic acid gas. Vegetation consumes this gas as well as nitrogen, and through the pores of the leaves and stems of vegetable life is emitted oxygen. Hence we see how necessary to the health of each other are the components of the two kingdoms, viz: the animal and vegetable. To use an old expression, "We can kill two birds with one stone" by giving the plants we grow in our homes pure air. While benefitting our plants we benefit ourselves. If the air we breathe is impure, its inhalation will certainly be followed by a feeling of lassitude, languor and irritability; the nervous system becomes affected, the intellectual faculties weakened and if the cause is not removed, disease will sooner or later follow. Since plants breathe much after the same manner as we do, (though consuming a different component of the atmosphere) it certainly follows that we

both require in this respect the same stimulent, pure air. As we have arrived at this conclusion, we now come to the subject of Ventilation; and while we endeavor to get pure air for the plants, we also want the pure air for the fair owner of these plants, that he or she may live long to enjoy their rich beauty and delightful fragrance. When the breath of the body issues from the lungs, it being heated, is rarified, and consequently is specifically lighter than the surrounding atmosphere, hence it immediately ascends, and before the next respiration it has given place to a purer air. This vitiated air that has risen can only ascend to the ceiling; and there remains only so long as it is of a higher temperature than the air nearer the floor. When it has gradually given out its excess of heat, it becomes of the same density as the rest of the atmosphere, mingles with it, and as it falls to our level we are in danger of inhaling it a second time, or perhaps oftener. From this it is evident that the aperture through which this impure or vitiated air escapes should be near the ceiling of the room, or if for plants in a window, it should be near the top, but it must be remembered that no air can escape from any room unless an equal quantity enters to supply its place; hence it is necessary to make provision for the admission of pure air. A very good mode for the emission of foul air is to make a funnel shaped hole in the chimney, and have a zinc funnel made to fit it; securely fasten the funnel in the hole; through this funnel most, if not all, the impure air will pass, and will be carried off by the upward current in the chimney; to supply the place made vacant by the egress of this air, a door may be opened, or if this is not practicable, some other mode will suggest itself, but recollect that *cold draughts* are injurious to yourself as well as to the more tender plants; the upper sash of the window may be lowered, or if the weather is mild, the upper may be lowered and the lower one raised, or one or

both may be taken out. You cannot give plants too much fresh air, provided the air is not chilling to their nature.

LIGHT is as needful to the health of plants as air, and its absence in sufficient quantity is the cause of a great disappointment to many amateurs. All plants need light: some, we know, cannot endure the direct rays of our summer sunlight; they are the inhabitants of our woody vales and hill-sides, where they are protected by the foliage of the lords of the forest; there they grow to perfection; among these may be noted the Ferns and Mosses, some of which, if exposed to the fierce rays of old Sol for one half hour, would not recover from the effects of the injury for months. There are other plants that will delight in the sunshine in the morning, but prefer to have some shade in the afternoon. Among these may be noted the Golden Tricolor Geraniums; they need some sunlight to bring forth their bright colors, yet if exposed too much, the delicate tints which make them so lovely, will fade away like the mists in the morning. There is still another class that want all the light they can get, and if they don't get it, they will soon show their displeasure by refusing to produce their beautiful flowers, and by doing other naughty things. Among these may be mentioned Roses, Zonale Geraniums, and nearly all other bedding plants. Where plants are grown so that only one side is exposed to the light, they should be turned around every few days, else they will all grow toward the light and become as gardeners say "one sided." Wardian Cases, Ferneries, Hanging Baskets, etc., should also be turned frequently, or all the beauty will be facing the light, and the occupants of the room will receive but a little share of it.

CHAPTER IX.

THE WINDOW GARDEN.

PERHAPS there will be no chapter in the book that will be more thoroughly read than this, and no other will contain any information that is needed so much as the information that this one should contain. We will endeavor to make it as concise and complete as our limited space will allow. While the financial condition of the great majority of us will not admit of our being the happy possessors of conservatories filled with rare exotics, we can each have our window garden, from which we will derive as much pleasure as those who have been more highly favored. It is not necessary that the window have a southern or eastern aspect; certainly this is preferable for *blooming plants*, yet if our window is toward the north we can grow our Palms, Musk, Saxifrage, and many others. In this respect then, no person is debarred from cultivating window plants; in fact we can grow plants with moderate success in every window in the house. Some of our friends have a bay window in which to grow their plants. They are a great improvement on the old style. We have heard some complain about the trouble of moving the plants when they desire to close the shutters. If the reader is bothered in this way, let him have a stand made, the top of which will just fit in the space in the window; this stand should be on castors; it can be pulled back into the room until the shutters are closed, when it may or may not be pushed back into the window. If the window is wholly devoted to floriculture, it can be more easily and successfully managed if the window is divided off from the

room by glass doors hung on hinges, that may be opened or closed at will; this will keep dust and noxious gases from the plants. And just here we wish to say it is almost impossible to grow plants in a room where coal gas is burnt, unless precautions are taken to protect the plants from the atmosphere while the gas is burning. This is perhaps the cause of most failures in the attempt to grow plants in the

REVOLVING PLANT
STAND FOR BAY
WINDOW.

house. If the glass doors we have already spoken of cannot be used as we have recommended, then before the gas is lighted lower the curtains or window shades; this will usually prove sufficient. We have already given all necessary directions for the treatment of the plants; this will be found in the other chapters under their respective headings. The extent of the cultivation of plants for window gardening must be governed by the resources of the culturist. If space inside and out is limited, and he cannot remove his plants when out of bloom, he must be contented with such plants as will be ornamental for the longest time. Usually, however; there are windows enough to accommodate a large number of plants. One or more of these windows occupy the most conspicuous place or places; in these we certainly want it, have our prettiest plants. By exercising our judgment we can have these windows looking admirably all the time true, it will be at the expense of the windows less favored by position. Yet the effect will be more pleasing, and no doubt more satisfactory, to see one or two windows looking grand than to see five or six looking only moderately fair. The use of either plantstands illustrated by FIG. 13 or 14 or an Aquarium will add greatly to the beauty of a bay window. When flowering plants are out of bloom transfer them

to another place to recuperate, and supply their places with others just coming into bloom. This will require some forethought to have a continued succession of flowers all

FIG. 13.—FLOWER STAND.

through the seasons. Gain a knowledge of the time the plants should bloom and then make your selections accord-

FIG. 14.—FLOWER STAND.

ingly. In making these selections bear in mind that a variety, especially in colors, is essential to make the effect pleasing to the eye.

A MODEL WINDOW. ‡ Many persons who will read this may not have the luxury of a bay window, and may know by a sad experience how unsuitable are most windows for plant growing; the sills are narrow, (which may be greatly

FIG. 15.—WINDOW BOX.

improved by the use of the window boxes of which we illustrate two very neat and handsome designs FIGS. 15, 16,) and a plant of spreading habits has one side crushed

No. 4 WINDOW BOX.

FIG. 16.

by being pushed against the glass, and, if the weather is cold the plant is chilled, if not frozen, by contact with the

FIG. 17.

glass. We believe that many would have a suitable window made if it could be done at a slight expense. The one we are about to suggest is within the reach of all, and we feel satisfied that a true lover of flowers will never regret having adopted the plan. We cannot think how it could be improved upon for the

purpose it is intended. It will be seen by the engraving that the sill of the window is extended in breadth beyond the face of the wall of the house by brackets. It can be made movable or stationery. We prefer one that is so arranged that it can be drawn into the house in the evening or in cold weather. When drawn in, the sash that covers the garden will serve as a common window sash. In addition to what is shown in the engraving we recommend a glass door after the same style and to answer the same purpose as that recommended for the bay window. One of the great beauties of this window is that its construction is simple and the cost is trifling. Any carpenter of ordinary ability, by looking at the engraving, (FIG 17,) can see just what is wanted, and can make it without any directions from the author, who does not pretend to understand the art of window building. For the inside a shallow pan made of zinc, large enough to cover the bottom of the window, should be used to keep the water off the frame work; if this is not done the moisture will cause the wood to expand, when it will be difficult to move the window either way. This pan need not be more than two or three inches

deep; it can be partially filled with sifted ashes, fine gravel or any other material that water will readily pass through; clean brick will do admirably, and on these the plants can be placed. The water will remain in the pan, causing a moist vapor to arise which will greatly benefit the plants. The water in the pan should be taken out and the pan rinsed at least once a week in summer, and once in two weeks in winter, or oftener if the pan becomes filled with water. The plants are arranged and watered from the room within. On the whole, we can't help but say we like this window in every respect. By having such an one you will be enabled to give your plants more sunlight; by closing the inner doors you can keep dust and gases from them. you can fumigate without difficulty; in fact it is one of the greatest helps to assist you to victory.

With the assistance of some brackets we can utilize almost every inch of space in the window which will add very materially to the looks of it and enable us to grow so many more plants in the given space at a cost of very little more time and attention.

The question may be asked, What plants are best suited for window culture? It is rather difficult to answer, There are so many "ifs" about it; the best answer we can give is to refer the reader to the list of plants and their requirements. You can readily discover those whose wants you can supply. They are those for you to procure.

FIG. 18.—BRACKET.

CHAPTER X.

TRAINING PLANTS.

It is a rare occurrence to see in our commercial establishments well grown specimens of plants. True it is, that in many we see admirable specimens of Palms, Ferns, Dracenas, &c., but they become specimens without extra trouble, while the commoner plants are entirely ignored. In what establishment will you find Fuchsias grown from six to eight feet high and twelve to fifteen feet in circumference, or Lantanas grown four feet high without a branch, but at the top a globular mass of flowers and foliage six feet across? We are not prepared to say why it is so; our object in writing this is to call our reader's attention to the fact that in many instances we do not obtain from our plants all the beauty of form and elegant appearance that with liberal treatment we could. The American traveler in Europe notices in the many larger establishments plants trained in almost every conceivable form that is attractive. We have noticed *Hoya Carnosa*, trained on a balloon-shaped wire frame, five feet high and three feet in diameter, literally covered with flowers; *Azaleas* trained in the form of a quadrangular pyramid; others cone-shaped; others with a globular head, surmounted with another of different form two feet higher than the first. We can readily train many of our common house plants in these artistic styles, and while we do not say that this plan is an improvement upon nature, we do say the effect is highly pleasing. Certainly it takes some time to do this, and when in imagery we are forming our designs, we must be assured that the branches of our plants

will submit to this treatment, and also if its habit of growth is suitable for the purpose intended. For instance, the growth and habit of the zonal Geranium is scarcely susceptible of any modification, except to keep it in a spherical shape by pinching out the points of the branches that are growing fastest; while the Fuchsia, being a rapid grower and having slender branches, will admit of being trained in several distinct forms. This training, however, must begin while the plant is small and progress as it grows. Any cultivator who has patience to carry on this work will be amply repaid by the success that is bound to follow. Nor need this phase of the work be confined to house plants alone—let us take it outside and trim our trees so they will look tasty, and also our Roses. We can have pyramids of hardy Roses, and arbors and arches of our climbing roses and other hardy vines; fan-shaped Honey-suckles, and other devices almost innumerable. Nature does a vast amount for us in presenting to us her naturally varied growths, and calls on us to arrange them to suit our fancy, and if we arrange them properly and keep them in all their varied appearances so that the whole will harmonize, we will not regret having given our time and means to beautify our part of the world. But to return, we intended to speak of this only so far as it related to plants. Plants that are to be trained in any shape should be grown in pots. Not that this is necessary to train them properly, but when in pots they can be preserved from year to year, and removed from one place to another if it is desired. Very many of our people exhibit plants of their own growing at our state and county fairs, and plants grown in any odd way will prove particularly attractive at such places, and in not a few instances will prove sufficiently interesting to be awarded first premiums. In training many plants it will be necessary to have a wire or wood frame made, on which to tie the young branches

until they grow stout and strong and lose their elasticity, A wire frame is preferable, as it is more durable, and not so noticeable, especially if painted green. For some designs, or for simply growing the plant into a neat, globular mass, long pegs may be used, with a hook at one end, with which the branches may be hooked down to bring in shape; or small pegs may be driven into the soil. Take a string and tie the branch with a loose knot, and draw the branch toward the peg; keep in position by tying the string to the peg. In a day or two, it may be drawn a little closer, until it is in the position desired. If the branches of the plant are not naturally pliable, but are crisp or brittle, allow the plant to become so dry that the foliage begins to wilt, when the branches will be found to be sufficiently elastic to yield at least a little, and by pursuing the same mode a number of times, success will be achieved. We do not greatly like the above process, and do not recommend its practice on any but soft wooded plants, as in some cases the wilting might prove fatal to hard wooded plants, yet the ultimate beauty of perhaps an unsightly plant would warrant our pursuing it.

We do not think it wise to devote any more space to this subject, we only desire to bring it before you for your consideration, believing that it may perhaps open a new field to most of our readers, that will prove, if properly utilized, a source from which we may derive much pleasure.

CHAPTER XI.

BULBS.

WE do not know how we would get along without our flowering bulbs. Some of the most beautiful flowers are borne by our bulbs and bulbous plants. We can scarcely conceive of anything more magnificent than the golden-rayed Japanese Lily, (*Auratum*) yet we should not mention this one alone, for perhaps ere this book is distributed, another far more beautiful may be introduced such has been the history of the past; from one variety hundreds, yes thousands of varieties have been produced, until the latest productions would hardly be recognized as belonging to the same family. The culture of bulbs is still in its fancy; we believe the time will soon come when in this country thousands of acres will be devoted to the culture of bulbs, and that mammoth establishments will devote their attention wholly to this branch of business. Why should it not be so? While yet the earth is clad in her snowy robes the little snowdrop awakens from its sleep, pushing through the frozen soil, and greets us with its welcome announcement that spring is coming; from this time all through the spring, summer, and until "chill November's surly blast makes fields and forests bare," when the autumn Crocus, unmindful of the storm, produces its white or purple flowers, the last tribute of the season, there is no time that our eyes may may not be gladdened by these brilliant flowers, and our senses regaled by their delightful perfume. They come to us first and remain with us until the end—all this in the garden, year after year with very little trouble.

Dear reader this is a pleasant beautiful world; you may enjoy it if you will.

Bulbs play an important part in window gardening; their simple culture commends them to all. They bear the dry atmosphere with impunity, and the gases that would kill many plants, fall harmlessly upon them. They suffer but little from the attacks of insects, which is a great consideration. We can have flowers from these in the house all the year around. We begin with Hyacinths, in January, which are followed in quick succession by Snowdrops, Crocus, Iris, Anemones, Tulips, Narcissus, Lily of the Valley, Lilies, Gladiolus, Tigridias, Tuberoses Colchicum, until the Roman Hyacinths and Narcissus say Merry Christmas and a Happy New Year. We propose, for our own benefit, to divide the principal bulbs in four classes, viz:

1st. **TENDER ANNUAL BULBS.** Those that from a dormant state grow, bloom and mature their bulbs in one season, such as Gladiolus and Tigridias. They will not bear much frost, some of them none at all. Some that we designate as tender will, no doubt, prove entirely hardy in the Southern states; most of them are best suited for bedding purposes,

2d. **HARDY ANNUAL BULBS** are those that from a dormant condition, grow, bloom, and mature their bulbs in one year, and are not injured by our cold winters, such as Hyacinths, Crocus, Tulips, etc.

3d. **TENDER PERENNIAL BULBS** are those that do not need a season of rest, hence are grown all the time.

4th. **GREENHOUSE BULBS.** For description see culture of greenhouse bulbs.

CULTURE OF TENDER ANNUAL BULBS. All of these are natives of countries where there is little, if any frost. They should never be planted in the garden until the earth has been warmed by the increasing rays of the sun; we cannot give any specified time that would be advantageous.

We, in this latitude, plant them about June 1st; no doubt our Southern friends have them in bloom by that time if not earlier; however, do not plant until danger from frost is past. They are all easily grown, luxuriating in a sandy soil, well enriched with good stable manure, which should be dug into the soil the previous autumn. Plant the bulbs about four inches deep, and from nine to twelve inches apart in the rows; all the care they will require during the summer will be to keep them clear of weeds, and if the ground should bake or become hard, loosen it with the hoe or fork. Such as the *Gladiolus* should be tied to neat stakes to keep them from breaking, as well as to show the flowers to better advantage. In the autumn, after the first frost has killed the foliage, the bulbs should be dug up, dried in the sun and put in a dry, warm place, there to remain until time for planting in the spring. The degree of dryness can only be learned by experience, all we can say is if the bulbs become soft they are too dry, if they begin to grow they are too warm and perhaps too moist; in either case remove to a cooler place and put them in dry sand or charcoal. Remember that *Tuberoses* that have bloomed once will not bloom again.

HARDY ANNUAL BULBS. Many of the varieties of this class are now popularly called Holland Bulbs because they are grown more largely there than in any other country, hundreds of acres being devoted to their culture. They usually arrive in this country about the first of September. They should be planted early enough in the season so that they will begin to grow and make a strong start *at the roots* before cold weather sets in. If this advantage is given them the flowers will be much handsomer. If the soil is not sandy we generally put in a handful of sand in the hole and embed the bulb in the sand; this will act in the capacity of drainage and save the bulb from rot. Manures for hardy bulbs must be well rotted; cow dung is preferred; it

should be well mixed with the soil. Plant Hyacinth and Lily bulbs four inches deep, Tulips and Crocus three inches. After we are satisfied that cold weather has set in for the season, the bulb bed should be covered with three inches of leaves, straw, or litter, which must be removed in early Spring.

POT CULTURE OF TENDER BULBS. Because we have no room in the garden, or perhaps no garden in which to grow these bulbs, still we need not be deprived of them. They are admirable pot plants. Three or four Gladiolus, Tigridias, or Zephranthes may be planted in an eight inch pot, and if carefully attended to will bloom beautifully and bountifully. The Tuberose, Caladiums, and larger growing Amaryllis should be potted single, that is, one bulb in the pot. They may be put in four inch pots at first, and afterward shifted into larger pots. The treatment is simple; rich, sandy soil, good drainage plenty of moisture, syringe frequently. This treatment can be pursued when desired to start or force the bulbs early in the season, before it would be safe to plant in the garden. By this mode they will bloom much earlier in the season. This is desirable, especially with the Tuberose, as it sometimes is killed by frost before the flowers are developed. We should say if you wish to *force* these bulbs, plenty of heat is necessary.

POT CULTURE OF HARDY ANNUAL BULBS. This class require a widely different treatment. If we would be successful with them we must encourage a strong growth at the roots *before* the tops push forth. We will give the culture of the Hyacinth, as it is so well known, and the same treatment is equally applicable for Tulips, Crocus, Narcissus, and all other such bulbs. Prepare a soil composed of about one-fourth well rotted manure, three-fourths of rotted sandy sod or turf; for a medium sized Hyacinth bulb use a pot five inches in height and the same in diameter.

Fill this loosely with the prepared soil, press the bulb down in the soil until the top of the bulb is about a half inch below the level of the top of the pot, press down the soil and fill in with more, leaving space at the surface for watering. A large pot may be used, say an eight inch pot, in this three bulbs can be put, and will produce a pretty effect when in bloom. This pot would be large enough in which to grow seven Tulips or ten Crocus. (Fig 19.) These

FIG. 19.

bulbs may be grown in glasses or in boxes, (Fig. 20), on tables in damp moss. A great many pretty designs will suggest themselves to the enthusiast. No matter in what

FIG. 20.

they are to be grown the following is the proper treatment. After the bulbs have been potted give them one good watering and put them in some *cool, dark* place, this to encourage growth at the roots. In from three to four weeks the pots will be pretty well filled with roots, then they are in condition to make and support a strong, healthy growth at the tops, and should be placed where they will have

plenty of light and moderately warm. In a few more weeks we will see them in all their glory. If at this time the Temperature can be somewhat reduced the period of blooming will be proportionately lengthened. These bulbs will rarely bloom well the second year, but if they are planted out in spring they may produce very fine flowers the second season after. If they are grown in water, a few drops of ammonia added to the water every time it is changed, will be beneficial to them.

CULTURE OF TENDER PERENNIAL BULBS. These are usually grown in pots. They luxuriate in a rich, sandy soil, like plenty of moisture during the growing season, a part of which should be withheld after their season of flowering, when they become semi-dormant, though retaining their foliage.

GREENHOUSE BULBS. This is a class that are very handsome; in it we include the Gloxinia and Cyclamen. We give them this name because they are not suitable for bedding purposes. They are all admirable and highly esteemed for pot culture in the house, window garden or conservatory. They require, while growing, the general treatment given for tender annual bulbs in pots.

CHAPTER XI.

HANGING BASKETS.

ROWING plants in suspended baskets is one of the most popular modes. We are pleased to note the rapidly growing sentiment in favor of this; although all plants are not suitable for this, yet it requires something of this kind to fully present the beautiful habits of quite a large number of our familiar friends. The style or shape of a basket will be to a great extent in unison with the ideas of the owner; so also

FIG. 21.—HANGING BASKET.

will be the material of which it is made, provided the person makes or has them made; however at most of the floral stores can be bought baskets made of wood, wire or earthenware, (FIG 21). The Wood or Rustic Basket is made of an oval bowl covered with knotted laurel roots, etc., and suspended usually with grape vine or cane handles; they will last for three or perhaps four years. The wire basket is preferable to the rustic, because it is cheaper, and, as when the plants are growing luxuriantly they almost completely hide the basket, it will look fully as well; and again, it is almost impossible to give too much water, as the drainage is so complete. The earthenware baskets have at least one advantage; they will not wear out; consequently, if not broken by accident or carelessness, they will last for ages. There is such a great demand for this kind of baskets, that the manufacturers rival each other in the production of new designs, and in the decoration of them. One of the favorite designs, is a simile of a log painted to imitate

FIG. 22.—LOG HANGING BASKET.

nature; it is beautiful and attractive, yet for rare and valuable plants we do not recommend it, as the paint fills up the pores, thereby depriving the plants of the air necessary to their health; however, it is better that the paint is on the outside only, and the plants will do comparatively well for a season, and as the baskets should be over hauled and remodeled twice a year, viz: spring and fall, they can be used, new plants being used for filling; the old plants being re-potted and allowed to recuperate. As we have said, the

above styles can be bought. Many of our culturists reside in rural districts; they have ample opportunities for displaying taste and ingenuity in arranging other styles; for instance, one like a log cabin, an octagonal one; in fact, a great many beautiful designs will be presented to the mind, all of which can be readily made; one of our lady friends made a neat one of corn-cobs, though it was not very durable. If the wire or log cabin style is used, the interstices must be filled to prevent the soil from falling out. For this purpose use sheet moss; it will be found in the woods on trees that have fallen and are decaying. These styles will drain very rapidly, and the culturist must take care that the plants in them do not suffer from lack of moisture. If, on the other hand, the bowl of the basket is not porous, a liberal supply of drainage must be used. It is not an uncommon thing to see some plants in a basket growing luxuriantly and others in the same basket in a dying condition, and the appearance of the whole not very creditable to the owner. We are not surprised at this. We have always contended that it requires knowledge, taste and judgment to fill a basket so that it will look well and do well, but very frequently none of these are used. We see all in one basket; plants that require a great amount of moisture and those that want very little; plants that require a hot house temperature with those that frost will hardly kill; some that require sun with those that need shade; those whose seasons of growth is nearly passed, with those that are just springing into a sturdy growth; etc. We enumerate these differences so that you may be on your guard when about to fill your basket. You want the basket to look well, that you may enjoy it, and with your friends admire it. If it must be so, it devolves upon you to start right; study well the nature of the plants; associate together those whose requirements are similar; use taste in their arrangement and judgment in their location and in

their attention. None of the strong and rapidly growing plants are suitable for a basket; as the quantity of soil is limited, their roots would soon "crowd out" the roots of the weaker plants; hence we use the more delicate and comparatively slow growing plants for this purpose. We have usually found it necessary to use one plant of upright habit for the centre of the basket; this is surrounded with plants of a drooping and half drooping habit; they can be arranged to suit the taste of the owner. A number of baskets may be filled with different plants, all the plants in each basket to require the same treatment, and placed in appropriate situations, so that all the available places may be made attractive by their presence. Do not overlook the fact that some of our most beautiful and best adapted plants for this purpose are those with ornamental foliage, the flowers of which are in many instances small, or perhaps we might say, they are not attractive. Nothing is more graceful or more attractive for the centre of a basket than a seedling plant of *Centaurea Gymnocarpa*, yet the flowers greatly resemble those of the Scotch Thistle.

FIG: 23.

CHAPTER XII.
AQUARIUMS AND FERNERIES.

THE Aquarium is one of the most elegant and instructive of parlor ornaments. In this we can have specimens of the animal, vegetable and the mineral kingdoms as interesting as Barnum's Happy Family. The form of the tank or vases is immaterial, so no great expense need necessarily be incurred in that direction. The familiar fish globe is frequently used. To the party to whom expense is no object, the most attractive and useful vessels are those of rectangular form, as a plainer view of the contents can be obtained through a plain than

No. 6 AQUARIUM.

FIG. 24.

through a curved glass. The frame work of the tank may be cast iron or of wood if *well* seasoned; the sides and ends filled with glass. Most of our floral stores keep on hand a variety of Aquariums, ranging in price from two dollars to fifty dollars. No doubt the florist with whom you deal can supply you or refer you to some dealer in Aquaria and Ornaments for the same.

FIG. 25.—AQUARIUM AND STAND.

FURNISHING THE AQUARIUM. Having selected your vessel the next thing in order is to prepare it for the reception of its intended occupants. In this matter we can only give the reader some "hints," in a general way leaving it to the fancy of the individual to decide what is the most suitable and ornamental for the tank that is to be furnished. It will require considerable artistic ability to furnish an Aquarium in such a way as to be pleasing and satisfactory. Let us remember that the highest degree of art is but an imitation of nature, and the more natural an object is, the more pleasing; so with our artistic skill, let us see how nearly we can imitate nature in furnishing our Aquarium. **ROCKWORK** will be found indispensable; in small Aquariums

FIG. 26.—HOLD THE FORT CASTLE.

a few rugged stones of different sizes, shapes, etc., of sufficient variety to form a contrast, yet all to harmonize, is perhaps all that can be used to advantage. In larger tanks a very pretty effect may be produced by building the rockwork above the surface of the water leaving plenty of cavities in which to grow Aquatic plants. Coarse sand or sifted pebbles may be used to cover the bottom of the Aquarium, they should be thoroughly cleansed in order to free them from any minerals or other substances that might prove injurious. If there is no rockwork above the surface, a floating island may be introduced, a piece of cork may be

carved to suit the fancy, after which it should be burned all over the surface to give it a unique appearance. If the size of the "island" will admit of it, holes may be made through it, and some of the plants can be trained up through these holes; the plants will, to the casual observer, appear to be growing *on* the island; this will keep the island in its proper position and not allow it to come ashore; or the surface of the island may be hollowed out in places and filled with soil. Ferns and other small plants will grow admirably thereon; the soil may be raised to represent small hillocks. After what we have said about

FIG. 27.—VENUS IN A SHELL.

imitating nature, we hardly think it necessary to say that *coral* and *marine* shells should not be introduced into a *fresh water* aquarium; and here permit us to say that salt water fish or plants will not flourish in fresh water, nor will the inhabitants of fresh water live in salt water. The water for use in an aquarium should be clear as crystal, and

great care must be exercised that it be free from saline matter, or the result may be very serious. It should be obtained from a river or brook; if, however, there is no such stream in the neighborhood, spring or rain water must be used. The latter is decidedly preferable, but before it is used it should be filtered to render it perfectly clear. If spring water must be used, it should be allowed to stand in the open air in a tub or some other such vessel for a few days in order to be softened by the action of the elements.

FIG. 28.—TABLE AQUARIUM.

When an aquarium is provided with plants and animals, in proper proportion, changing the water will be unnecessary. If there be no plants, or not enough to supply sufficient oxygen, the water must be changed frequently, perhaps as often as once every day. The plants will con-

sume the carbonic acid gas given off by the animals, and for this will return to the water in which they live, the oxygen necessary for the maintenance of animal life. It is frequently necessary to aerate the water; this should be done whenever the fishes come to the surface for the purpose of gulping air. It can be done by supplying a portion of fresh water, or by introducing oxygen (air) by an artificial process. The simplest way to do this is to take out portions of water and then pouring them in again from a small height, say from two to three feet. When a fountain can be introduced, no other mode of aeration will be needed. The temperature of the water should not be more than seventy nor less than fifty degrees; the mean temperature, sixty degrees, will prove the most suitable.

PLANTS AND PLANTING. By reference to the latter part of this book you will discover those plants which require the most water. From these select those which, when grouped in the limited space of an aquarium will present the most picturesque appearance, for upon them in a great measure will the beauty and attractiveness of the whole depend. The larger plants may be grown in pots, the smaller ones will look handsome springing from the crevices of the rockwork. Around the large pots may be placed mounds of stones to hide the pots from view. A sufficient variety of plants may be obtained to make the aquarium fascinating with the additional charm of animal life.

THE ANIMALS. The great mistake of the amateur, and one which is sure to prove fatal to a certain extent, is *crowding*. Two fish, three snails and two plants are sufficient for each gallon of water, this is the proper proportion as far as we are able to determine. And now we must leave the selection to you, only saying that you must not overlook the Mollusca or snails, (*Planorbis Corneas* is preferred) for it is they who consume the refuse matter, hence

keep the water pure. For the balance, gold and silver fish, minnows, newts, tadpoles and frogs. The variety and number will depend on the capacity of the tank.

"The fish must be fed about twice a week, except in very cold weather, when they seldom touch any food. The best food for gold fish, or any other, is "Prepared Fish Food," because it will not sour the water. Turtles, eels, lizards, codfish, etc., must be fed either flies, worms or raw meat cut very fine or beaten tender, and hung to a string so the fish can reach it. Gold and silver fish may be fed in like manner, but care must be taken to remove food not eaten, likewise decaying plants.

Never allow the full glare of the sun during a hot day to rest for hours on the aquarium; protect it with something that will admit light without heat.

The water should not be allowed to become lukewarm; *an even temperature must be maintained.*

Dust is another evil to be guarded against. A plate of glass as a lid to the aquarium, raised about one inch above the upper edge, so as to allow a passage of air, is the best protection. If no glass is used, an occasional stirring of the water will prevent the accumulation of dust on the surface.

MANAGEMENT. Sediment can be taken out by means of a glass tube. Place the finger on the upper end, and then dip the tube in the water over the object to be taken out; remove the finger for a moment, and the water will rush up the tube, sucking with it the object sought; place the finger again on the upper end of the tube, and it can be taken out and emptied.

For filling and emptying the aquarium, a syphon (a small rubber pipe) may be used. It is done by placing the end of the pipe in your mouth and drawing your breath strongly; the water under this suction forces the air out, and causes it to flow out freely—always supposing

that, in emptying, the end of the pipe in the pail is lower than the aquarium, and in filling *vice versa*.

If the green slime (*confervas*), a low form of vegetation, appears, do not get alarmed, for it will benefit the fishes and prove a good substitute for Aquaria plants. The glass can be kept free from this substance by occasionally scrubbing it with a tooth-brush or a sponge tied to a stick. This operation will make the water cloudy for a little while, but it will do no harm.

The rules for successful management can be expressed in a few words: even temperature, cleanliness, regular feeding, plant life and no overcrowding."

FERNERIES. Although ferns do not produce flowers, yet it seems that in the heart of every lover of nature there is a spot occupied by love of Ferns. We cannot but admire them, the delicate maiden hair varieties as well as those of more robust growth that produce their grand fronds from eight to twenty feet in length. Perhaps none, or, at most, but very few of our readers will have a suitable place in which to grow these large-growing species, hence we will pass these, simply saying that all ferns require about the same treatment. They will vary some in regard to the heat required, but they all require moisture and shade. The chief trouble in growing them in the house is the dry atmosphere. This can be overcome by growing them in a glass case. This idea was first advanced by W. B. Ward, who invented what is now known as the Wardian Case. It is made pretty much in the same manner as an aquarium; in fact, if a glass roof be added to a rectangular aquarium it makes a model fernery. The roof should be made in two pieces so that it may be slightly opened to admit fresh air as well as allow the vitiated air to pass away. This circulation of air is necessary if after watering we discover that there is too much moisture in the case. This will be indicated by the presence of mould

or decay on the plants. Another style is to have the base

FIG. 29.—WARDIAN CASE.

made of terra cotta, planting the ferns in this and covering with a glass globe. An improvement has been made in this style; the globes used are chiefly from France, and cost from two to five dollars each. They have been liable to break at any time, from the fact that the heat inside expanded the glass; the colder atmosphere outside would not allow this expansion; the result was the globe broke. This difficulty has been obviated by having a ventilator (Fig 30.) put in the top of the globe; this prevents breakage of the glass from atmospheric variations, and

FIG 30.

also allows a current of air to pass through the fernery at all times.

It must not be supposed that Ferns are the only plants that will grow in a wardian case or fernery. All plants that flourish in a moist, shady place will feel perfectly at home in a fernery. This class of plants is so extensive and so varied that we can have no difficulty to fill several cases at any time, and not have two plants alike. Plants in these cases do not require as much attention as those that are grown in the open air. If the circulation of air is very limited, they may not need watering more than three or four times in a year. They will not be ruined by dust, and but few insects will get at them—so you see this mode of plant culture should be extremely popular.

FIG. 31.—ARCH.

CHAPTER XIII.

PLANTS BY MAIL AND EXPRESS.

ENDING plants by express was, in days gone by, considered a great advance, and it certainly was as it opened an avenue to those who, by reason of their location, could not obtain plants in the neighborhood of their residences. The mode of packing plants was soon mastered by the florists, and annually tons of plants were safely delivered by the various express companies. The greatest difficulty in the past has been the "charges." Very often on long distances they have amounted to more than the first cost of the plants. We are pleased to say, however, that now (Dec., 1879,) the charges are very materially reduced, and that a great deal of the red tape which hitherto has been in vogue is entirely abolished, and instead of each company making its charge, that all goods passing over the routes of the principal express companies are now carried to their destination under one charge. This is so advantageous that now if the distance be not more than 600 to 800 miles, and the package weighs more than five pounds, it is fully as cheap to have them sent by express. All this was well enough for those who lived near where the express companies have their offices, but there are a great many people who do not live within a day's journey of such an office; they love flowers just as dearly as those who have a florist's establishment in their immediate vicinity. Happily for them, Uncle Sam said he would carry their plants in the mail bags. We do not know who was the first to send plants by

mail; if we knew, we would advocate the erection of a monument to his memory, for by this mode of transportation every one can have their flowers delivered in their village or hamlet at the rate of one cent per ounce. This mode of mailing plants is very popular, and if only a few plants are wanted, and the distance is long, it is decidedly preferable to expressing them. During the last six years all over our country business has been, to say the least, dull, and in many of the homes in our land luxuries have been below par. No one doubts but that flowers are to a certain extent luxuries, and as they could neither be eaten or worn, they, among the first, were discarded; hence the flower trade was dull. Florists who had all their capital invested could not afford to sit down and wait for good times; they must effect sales in some way, and the only way to do this was to lower their prices, and the lowest priced man got the order. The result has been that plants are now delivered at your door at less than one-third the price they were in the spring of 1873. Even now at these prices some florists are making money. But while we remember that the prices are so low, we must also remember that in the mailing trade the plants are smaller. It is unreasonable to expect a large plant for a small price, or in other words, you need not expect to receive a plant weighing a half pound by mail for ten cents; the cost of packing and postage would cost all you gave for it. Florists who make a business of sending plants by mail prepare their stock for this purpose. If the florist understands his business he will have small, stocky, well-rooted, healthy plants grown in as cool a temperature as the nature of the plants will admit of. At the prices quoted in their respective catalogues, they can only afford to send small plants, hence when a plant becomes too large to send by mail, that is, when it weighs too much for the price, it is grown on either for stock or for retailing at home. The florist with whom

you deal doubtless has some of these plants. If you want larger plants than are usually sent by mail you can get them by adding one-half or doubling the catalogue price, which has been placed low in order to secure your patronage. We don't want a false impression to go forth from these remarks, that the higher the price the larger the plant. We know that some florists charge two or three times as much for the same sized plants as others do, the plants being very similar.

Sending plants by mail is always attended with some risk. No matter how well they may be packed, the box may be accidentally broken or the package bursted, and the plants will be damaged if not wholly destroyed. Sometimes the packages are allowed to remain in the Post-office for several days and nights before they are called for by the party to whom they are addressed; if the weather is very cold the plants may get frozen while awaiting delivery at the Post-office, hence you see the necessity of getting the plants as soon as they are delivered at your Post-office. The loss occurring in these ways is comparatively small, and most florists bear this loss by guaranteeing the safe arrival of plants in good condition; however, this guarantee does not prohibit these losses from occurring, so you are liable to receive plants in a damaged condition at any time, though they be fine plants, well packed. If you should get plants in a damaged state, don't get angry and call the unsuspecting florist a swindler, and other pet names, but consider the matter calmly; tell him of your misfortune. Give him the names of the plants that are injured beyond recovery and ask him to replace them; if he don't answer your letter, write again, and if he does not replace the plants, don't deal with him any more.

CHAPTER XIV.

IN THE GARDEN.

IF we were looking for a site on which to locate an extensive Flower Garden, we would be very particular about the aspect and soil; but as this work is intended only for the amateur who loves Flora's Children and is anxious to raise only a few, we do not think it necessary to dilate on that part of the subject, because if the soil is not just suitable, we can make it so, and if the aspect is not the most desirable for some kinds of plants, it will do first rate for others; in fact there is no part of the globe that is inhabited by man or beast, in which the vegetable kingdom is not fully represented. In the matter of soils, approximate the following: A subsoil of gravel or sand is the most desirable, as this will allow all surplus water to pass away rapidly. If the subsoil is of a clayey nature, it should be drained; however, for a few plants, not many persons would be willing to go to the trouble and expense of thoroughly draining a small patch of ground according to the established laws on the subject. Sometimes when we have been making flower beds, where there was a clay subsoil, we have excavated it to a depth of three feet from the surface, and filled the hole two-thirds full with gravel, then completed the filling with a soil which contained sufficient sand and fibrous matter to allow the surplus water to pass through to the gravel underneath. This soil had been enriched with half rotted stable manure, and should be so enriched each succeeding fall or spring. Draining on a more extensive scale has been and is still

occasionally discussed in all the leading agricultural papers; we do not think a repetition is necessary, hence we omit it.

The soil we have described as being used for the surface of the flower beds is suitable for growing nearly all kinds of plants, and is what we would prefer as a basis to begin with. If for some particular variety we needed a little more sand, clay or manure, this soil could be prepared to suit them by giving the soil a top dressing of clay or manure, as necessity demanded, and thoroughly incorporating it into the soil by spading or plowing; or if there should be only a few plants, this ingredient may be mixed in the soil in the immediate vicinity of the plants, when they are being planted out, except when manure is wanted. If it is to be used in this way it must be thoroughly rotted, or it may prove more injurious than beneficial. In regard to the aspect, this, of course, we cannot change; but we can select plants to suit it, no matter whether it be Northern or Southern, Eastern or Western. For a Northern or Eastern aspect, select plants that cannot bear the fierce afternoon rays of our midsummer sun. For instance, our Fuchsias and Begonias are admirable bedding plants, if they are planted in such a position that sun does not shine on them later than from ten to eleven o'clock in the morning. In our latitude, in such a position the Golden Tricolor Geraniums would have sufficient sunlight to bring out their delicate tints and not sufficient to cause the tints to become dull looking or faded. Many other plants, in fact all that require partial shade, should be kept in summer in such a position. Many of these would flourish under the shade of our forest and fruit trees, if not too densely shaded. For a Southern or Western exposure, we can use our Roses, Geraniums, Coleus and all other plants upon which the sun's most intense rays fall with impunity, indeed these plants seem to require all the sun-light and sun-heat they can get to fully develop the beauty of their flowers or foliage.

DESIGNS. Since we believe that all parts of the garden can be utilized, it becomes necessary to adopt a plan or design by which we can divide it into flower beds or grassy plots in such a manner that when done the whole will harmonize and look pretty before the flower beds are planted, because if they don't harmonize before the beds are planted, they rarely will after. Now we might give a dozen or more full page engravings to give you an idea of what we think pretty, but there are such a variety of shapes and sizes of gardens, and such a great difference in our ideas of taste, that we think as perhaps these engravings would only be pretty to look at, and would not suit more than one in a thousand, they had better be omitted, more so because we have another idea that is suited to the wants of all. Take a piece of paper and sketch the outlines of the plot you propose to use as a flower garden. It is not absolutely necessary that this be accurate; certainly it would be better, we suggest, that this be sketched correctly and proportionately. Next mark off the walks in use and new ones you propose to make. The remainder will be what you will have for grass and flowers. The next operation will be to lay out the flower beds. The prevailing shapes for these are the Circle, Oval, Star, Heart, Crescent, Triangle, Shield, etc., while on either side of the walks the whole distance may be a long bed from three to four feet wide. From these or other shapes select such as your taste may prefer, and mark or sketch them on the paper, being careful that the sizes of the beds are proportionate, and that the *designs harmonize*. If when one design for the whole plot is completed, examine it carefully and critically, to see that you are perfectly satisfied with it; if not, then try again; and just at this time we recommend a great deal of patience, because this will be more easily remedied while it is on paper than it would be after the design is executed in the garden. After trying until you have succeeded in producing a design that you

fully approve of, the next move will be to lay out the garden in reality. This can now be more readily and more easily done, as we now have to guide us, a design that just suits your taste and your garden to a T.

LAYING OUT THE GARDEN. With the design, spade and shovel, rake, stakes, tape line, and a rope or clothes line, we enter the garden. If it has not been graded or leveled to suit the taste of the owner, this will be the first operation; we all know how to do this, so we only desire to whisper in your ear that the surface should be a gentle slope *from* the house; this will carry away the water, and the scene will look prettier both from the house and from the avenue. The supposition now is that it is graded and that there is about twelve inches of what we might call a fair garden soil covering the whole. We now, according to the designs we have adopted, proceed to lay out the walks or roads. If these are to be straight, all that will be necessary will be to get our distances from the designs and put in stakes at either end; we can now stretch our line from these stakes and drive in a stake at every eight or ten feet during the whole length of the walk; but if these walks are to be bending or serpentine in shape, it will be more difficult to lay them out correctly. It requires considerable skill and some practice to mark out irregularly shaped walks or flower beds without the aid of something to clearly show just where the outline should be. We have found nothing more advisable to recommend to our friends than a heavy rope or clothes-line; this is always on hand, and answers the purpose; lay this on the ground and bend or coil in any direction until the desired shape is obtained. By this rope the eye is enabled to perceive the whole form of the walk or flower bed at once, and readily detect any fault and rectify it at once. When other than straight lines are desired, we consider the use of the rope superior to the old mode of using stakes; its use is also advantageous

in connection with stakes in laying out beds in the shape of stars, and all others that are more or less pointed, a stake being used at each point to keep the rope in position. When the rope shows the walk to be the right shape, it should be marked off by making with the spade a row or gutter two inches deep close beside the rope. All the proposed walks having been mapped out in this way, the soil should be removed from the space to be used for walks, to the depth of eight to ten inches. This soil may be used for filling up the low places in other parts of the garden. The remainder of the garden should all be dug over; if the soil is poor it should be enriched with manure prior to digging; now mark off by the aid of ropes and stakes one of the accepted designs for flower beds. When correct the outlines should be made permanent by sodding; obtain sufficient sods or green turf about two and one-half inches thick and six to ten wide, to make a border all around the bed close to the line or rope, being careful to keep the outline perfect and distinct. These sods should be beaten severely with the back of the spade, to unite the sod with the soil, so that the roots of the grass will not dry out, but will root into the soil underneath. All the beds will be laid out and arranged in the same way. The border on either side of the walks should also be sodded, and if the sods can be had in abundance, all the remainder of the garden not used for walks or flower beds may be covered with them, care being taken that the sods are of uniform thickness, so that the surface will be comparatively smooth and level. If, however, the sods are not easily obtainable, the flower beds may be edged or bordered with bricks or fancy tiles; they look quite novel, but to our taste are not nearly so pretty as the beautiful green hue of the grass. If only sufficient sods can be procured for bordering purposes, lawn grass seed may be sown on the remainder at the rate of four bushels to the acre. Most all seedsmen have the different grass seeds that are

suitable for lawn making in mixture, under the general name of lawn grass. This should be sown early in the spring, so that it may have the benefit of the spring showers, and make a good growth before the hot dry July days come; indeed by that time the grass should need mowing.

THE WALKS. These have already been laid out and bordered, and the good soil removed from them. The surface of the walks should be about two inches below the surface of the border; to fill them up to this distance will be next in order. The surface may be paved, cemented, or fine gravel may be used. The walk should be filled with sufficient coarse gravel to raise it with whatever is used for the surface, to the required height.

FIG. 32.—FLORAL CROSS.

ORNAMENTS. We illustrate several beautiful designs of Vases and Statuary which will be very attractive in the garden or on the lawn. Those made of Terra Cotta, ware a sample of which we show by Fig. No. 33 are in our opinion decidedly preferable to those made of iron.

FIG. 33.—TERRA COTTA VASE.

CHAPTER XV.

PLANTING OF FLOWER BEDS.

E are now almost ready to plant our flowers, but one small operation is yet necessary to make the beds ready for their intended occupants. The beds should be somewhat higher than the general level of the surroundings. In digging the beds the soil should be *slightly* raised in the centre and gradually fall to the border, at which point it should be about two inches *below* the level of the top of the bed. The object in raising the centre is to show the plants more prominently. Be careful that this be not carried to such an extreme that all the water will drain off. The objects in recommending that the soil at the border of the bed be *lower* than the surrounding, are: It keeps the outlines plain and distinct, and to a great extent prevents the grass from encroaching upon the space occupied by the flower bed. This having been done, the beds are ready for planting. This is a very important operation; not that it requires a great amount of skill to remove a plant from a pot and put it in a hole in the ground, but because in order to produce a beautiful effect we must use judgment in the arrangement of our plants. To be enabled to use this judgment we must be acquainted with the habits and colors of the flowers of the plants we intend using. We have frequently seen handsome plants bedded out by novices who had no idea what the plants would grow to be; all they knew about them was that they looked pretty in the greenhouse, and they should look

pretty in the garden. The plants were all about the same size, and from this (if at all) the inference was drawn that they all grew with the same rapidity. The result of this promiscuous planting was that some of the tender plants died, and the rapid growing varieties smothered the weaker, thus making the bed, instead of a thing of beauty and pride, an irregular mass of confusion and a constant reminder that our ideal flower bed is a miserable failure. Without stopping to inquire into or investigate the why and the wherefore of this failure, the disappointed novice declares that he or she "*cannot* grow plants to make them look as pretty as Mr. A's or Mrs. B's, and if I can't have them as pretty as any other person, I won't have them at all." This is why many persons do not grow plants because "*the plants don't do right.*" My dear reader, the plants will grow themselves, if you give them half a chance. The fault lies with the cultivator; through his ignorance the plants are cruelly treated, and because they do not show their gratitude they "*don't do right; and I won't bother with them any more.*" If the above has been your experience, our advice is to study well the requirements and habits of plants in every sense of the word. Know your plants, treat them well, and they will prove a source of unceasing and unalloyed pleasure, but we have only been speaking of wrong doing and the results of it; let us see how we can do these things right in regard to bedding out our plants.

There are a number of styles of arranging different habited plants in the garden. These are popularly known as the "Ribbon Lines," "Massing," "Sub-Tropical," "Carpeting," and the old way of "Mixing." Each of these modes has its advantages, and perhaps none of them can be dispensed with. The reader, in order to properly decide which will be most appropriate, must take into consideration the surroundings and the extent of the garden. We can make good use of the design employed in laying out the garden,

With this design and a box of water color paints, procured at a nominal cost from any stationer, we can paint the flower beds any color or colors desired. By this we can see what our garden will be. If the arrangement does not suit, or the colors do not harmonize, it will be an easy matter to make any change that seems to be necessary. We can also by this process learn just what kinds of plants we need and how many of each, to make our garden complete. In coloring our design and in making the selection, if the space and circumstances will permit, it might be advisable to have a specimen bed of each style of arrangement, as the whole will have rather an informal though none the less fascinating appearance.

FIG. 34—SECTION OF FLOWER BED, RIBBON LINE STYLE.

RIBBON LINES. This name is given to that style of bedding wherein the plants of each are arranged in a line by using plants whose flowers or foliage form a strong contrast with those in the line in front and those in the line behind, the most charming effect may be produced. There is a great variety of plants suitable for forming Ribbon Line beds, principal among which may be mentioned Cannas, Achyranthes, Coleus, Centaureas, Ornamental Grasses, Geraniums, Salvias, Golden Feverfew, Alternanthera, etc. In a bed of this description the plants must be properly arranged at the time of planting this in reference to the habit and growth of the plants. If only one side of the bed is ex-

posed, the tall growing plants must be planted at the back, the next tallest in the next row, and so on down to the outside or border line, which should not be more than six inches in height. During the summer the tops or some of these plants will require to be pinched out; this will cause the plants to branch out and make the plants in the bed more compact; but this is only a secondary consideration; the principal object in pinching out the tops is to keep the plants at their proper height in comparison with the row in front and behind, so that the whole bed will present a uniform appearance, gently sloping from the back down to the front. If both sides of the bed are exposed, the same plants should be used on either sides. This style is not confined to long beds where only straight lines can be used. It can be employed in beds shaped like stars, shields, circles, hearts, etc., in fact, beds of almost any shape, though in most of these it will require more skill and precision in planting.

MASSING. For this purpose such plants are used as are continuous bloomers, such as Geraniums, Verbenas, and many others we might name. Any one color is selected for a bed; for instance, we might have one bed filled with Scarlet Geraniums, another with White or Purple Verbenas, another filled with Phlox Drummondii, mixed colors or any one color. It is usual, however, to only have one color in each bed, as the "mass" is more attractive than if the colors are varied.

CARPET BEDDING. This mode of planting is comparatively but little known in this country, although it is extremely popular in some parts of Europe, and no doubt will be in this country when it becomes more generally known. This style of bedding takes its name from the class of plants that are used, they all being of dwarf habit, and are planted so closely as to form a complete covering or carpet over the bed. None of the plants used for this pur-

pose should be allowed to grow more than six inches in height. Those generally used are *Alternanthera*, *Artemesia*, *Lobelia*, *Pansies*, *Moneywort*, *Ivies*, *Echeverias*, *Mesembryanthemums*, etc., etc. As we have already intimated, the plants being of dwarf habit, it is requisite that they be planted quite thickly in order to produce a complete carpet; hence a goodly number of plants must be used. This number we cannot give, as it will depend on the variety and growth of plants, as a "carpet" with holes in it is not at all pleasing anywhere. This mode is especially desirable if the flower beds are small and of fancy designs, or if the design is composed of a number of flower beds the outlines of which it is necessary to keep clear and distinct so that the desired effect of the whole may not be marred by any irregularity. Some of the plants may require trimming during the summer; this should not be neglected, but should rather be done just as soon as necessary.

SUB-TROPICAL GARDEN. This is composed of very rapid growing plants, natives of tropical countries, which in our short seasons produce such majestic specimens of tropical luxuriance that they in imagery carry us to climes where it is always summer and the air is laden with the aroma of some of our most delicious fruits and flowers. These plants, of which the *Cannas*, *Ricinus* and *Caladium Esculentum* are types, may be planted in groups or singly in *rich* earth, or they may be arranged somewhat in Ribbon Line shape, as the taste may dictate.

MIXED. The modes of planting heretofore described are only suitable for those who have room for quite a large number of plants and who can afford to spend a part of their wealth in this way. There is another class of people whose love for flowers is unlimited, and if their purses would permit they would have an excellent collection, but their means will only admit of the possession of a few. And the question now before us is, How can these be arranged

to show to the best advantage? Arrange them, the tallest growers at the back or in the centre of the bed, as recommended in "Ribbon" gardening, the smallest in front, keeping in mind how the plants will look when in bloom, to see if the colors of flowers and foliage will form a proper contrast. This is all we can do, but if this is well done we shall receive as much pleasure from our few plants as those who are favored with broad acres teeming with beauty and fragrance.

CHAPTER XVI.

SOWING THE SEED AND MANAGEMENT OF SEEDLINGS.

PERHAPS in no department of floriculture have we heard of so many failures and so many complaints as in the seed business, and we are not surprised at this. There are two great causes for these failures: Ignorance on the part of the cultivator, and (we don't like to use the word, but suppose we must,) *dishonesty* on the part of the seedsmen. Now to explain: Seeds are in many respects peculiar; there is as great a difference in them as there is in members of the human family. So in order that we may grow them successfully we must understand at least the most prominent traits in their character. The catalogue of almost every seedsman in the country will give you this information: It will tell you the nature, habit, growth, etc.; with this information, together with what general remarks we may make, may give some light on the subject that we hope may prove beneficial. Looking at the subject in this way it is not surprising to us to hear that a person who sowed Begonia, Calceolaria or Gloxinia seeds in the open border in May, had utterly failed; indeed it would be more surprising to hear that he had succeeded. Yet the seed may have been as good as ever had been sown, and would have undoubtedly germinated under favorable circumstances, but through *ignorance* on the part of the cultivator, the good seeds did not give satisfaction.

During the past few years, owing to an endeavor to increase their business and to make more money, many old

seeds that have lost their vitality have been sold, and to defeat the ends of justice, some seedsmen have placed a disclaimer on their seed bags or packets to the effect that it was mutually agreed that the seller was not to be held responsible for any damage that might occur by the failure of the seeds to grow. This is a declaration that the seller was in doubt about the article, and for this reason dare not warrant them, and if you buy them, you buy them at your own risk. What would you think of your clothier or shoe dealer who made you such an answer? Many seeds are now sent to every village and hamlet in the land to be sold on commission; this rate of commission ranges from forty to seventy per cent. on all sales, the unsold seeds to be returned at the end of the season, to be sent out the next season in the same manner. This mode is a fraud on the American people, and it should be abolished. To every reader of this we desire to say emphatically: Don't buy seeds from any firm who send seeds out to be sold on commission; if you do you will regret it. The catalogues usually divide seeds into four principal classes: Annuals, Biennials, Perennials and Greenhouse.

SOWING THE SEEDS. When it is desired to have the plants in bloom real early in the season, the seeds should be sown in pots or shallow boxes in March or April; fill the pot or box two-thirds full of broken pots, moss, charcoal, or any other substance that water will readily drain through; cover this with one or two inches of soil composed of one part loam, two parts leaf soil and one part sand thoroughly mixed and pulverized; on this sow the seeds and cover with the same compost to the depth of about twice the diameter of the seed, not more. They should now be watered with a fine sprinkler, and from this time the soil should never be allowed to become dry; the surface may be lightly covered with *Sphagnum* or moss; this will prevent the rays of the sun from drying and baking the soil; this must

be removed as soon as the seedlings appear. The box may be covered with glass; this will keep off the cold air and greatly assist vegetation; however, as soon as the seedlings appear, air should be admitted freely. The box, as soon as the seed is sown, should be kept as nearly as possible in a temperature of from sixty to seventy degrees. As soon as the seedlings have developed the second pair of leaves, they should be pricked out into boxes or small pots; if put in boxes they should be planted from two to four inches apart or planted singly in pots; shade from the sunlight until they have fully recovered, then place them close to the glass to incite a strong, sturdy growth. As soon as all danger from frost is past, plant them out in the prepared border, where they are to bloom. In sowing, remember that soaking for several hours in warm water will greatly hasten the germination of all *hard-shelled* seeds, such as Cypress Vine, Cannas, etc. By removing the cottony husk from Abronia, Globe Amaranth and other like seeds, the germination will be greatly facilitated. When we do not desire to have the plants in bloom early, we may defer sowing the seeds until the increasing heat of the sun warms the earth, when they may be sown in a prepared bed in the garden, in the same way as described for sowing in boxes; the after treatment will be the same, except that in pricking them out, they may be planted where they will ultimately bloom. However the seeds of what are known as Greenhouse plants should not be sown in the garden; they are too delicate to bear this, and must be carefully attended.

CHAPTER XVII.

HYGIENIC AND THERAPEUTIC RELATIONS OF
HOUSE-PLANTS.

BY J. M. ANDERS, M. D., PH. D.

Read before the Alumni of the Auxiliary Department of Medicine, University of Pennsylvania, February 6, 1880.

An article in relation to any important matter, especially one whereby from the information derived from it we may be benefitted or injured to any considerable extent, should demand close investigation; and if advice is given, we should, before acting upon that advice, ascertain if the writer is an authority upon that subject. The author of the subjoined article, (which we extract from the *Philadelphia Medical Times*, May 8th, 1880,) Mr. J. M. Anders, M. D., Ph. D., of Philadelphia, Pa., is perhaps the highest authority on the subject in the United States, probably the highest in the world. We regret that we cannot devote sufficient space to copy the whole article; we only give that which will be of most interest to our readers, at the same apologizing to Dr. A. for mutilating his article, and thanking him for in this particular giving us such an excellent remedy:

“The old question of the effects of living plants on the air of houses is one of considerable interest. The family doctor is oftentimes confronted with the query, ‘How do plants in rooms affect the health of the inmates?’ Formerly it was the universal opinion that they were injurious to health, particularly in the sleeping room and sick-chamber. Unfortunately, this still continues to be a popular impression. To review the various views on this subject down to

the present would be foreign to the scope of this article and quite out of place. The discussion will necessarily be confined to the present state of our knowledge concerning the subject, and especially such of its bearings as are interesting from a medical point of view.

Three of the chief functions in plant life are the absorption of carbonic acid, the exhalation of oxygen and the generation of ozone. Now, it has been conclusively shown that variations in the amount of these gases from the presence of any number of plants have no appreciable effect on the air of an apartment, the absorption and exhalation of these substances being carried on too slowly either to improve or to vitiate the air.

There is, however, yet another process in plants, which in this connection is of far greater importance, viz., that of *transpiration*. By this term is meant the exhalation of moisture by the leaves. About this function very little was known until recently. Careful investigations of the subject have been made by the writer, to which brief reference only can be made here. It may suffice to say that the average rate of transpiration for plants having soft, thin leaves, as the geranium, lantana, etc., is one and a half ounces (by weight) of watery vapor per square foot of leaf surface for twelve diurnal hours of clear weather. In order to convey some notion of the great activity of this function, it might be stated that at the above rate the Washington elm, at Cambridge, Massachusetts, with its two hundred thousand square feet of leaf-surface, would give off seven and three-quarter tons of water in twelve hours. In the twenty-four hours an indoor plant will transpire more than half as much as one in the open air. It would appear to follow naturally from these facts that growing plants would be capable of raising the proportion of aqueous vapor of the air of closed apartments. And this suggestion prompted the writer to make observations with the view of establish-

ing this fact experimentally. By means of the hydrometer, the atmosphere of two rooms at the Episcopal Hospital, in which the conditions and dimensions were in every respect similar, were tested simultaneously, in order to note the variations produced by growing plants. In the window of one of the rooms were situated five thrifty plants, the other contained none.

For eighteen consecutive days the dew-point of the room containing plants gave an average complement one and a half degrees lower than the room in which there were no plants. Thinking that possibly this difference of humidity might not be owing solely to the presence of plants, the conditions were varied, and further observations made with similar results.

It is true that in special states of the system — *e. g.*, in chronic rheumatism — dry heat is beneficial; but this is no argument against the benefit ordinarily derived from a proper amount of moisture in the atmosphere. On the other hand, if the presence of a certain number of thrifty plants in an occupied room warmed by dry air would have the effect of raising the relative humidity to the extent indicated, it is clear that we possess in them the readiest means of obviating these evil consequences. In all instances, then, in which artificial heat is used, but particularly in the case of dry air, as that furnished by furnaces, plants become, under proper regulations, hygienic agents of special value.

Were this article intended for popular reading, much might also be said in favor of keeping house-plants for the benefit they confer in delighting our senses and ministering to our æsthetic tastes; but we are discussing the question from a strictly medical point of view, and such matter would seem somewhat irrelevant.

Of course it is chiefly in diseases of a chronic nature, and particularly those affecting the lungs and air-passages, that we should expect to derive good results from such a meas-

ure as stocking the sick-room with growing plants, for it is in such cases that dry heat does the most harm. Still, they would prove beneficial also, in a less degree, in acute diseases, especially the continued fevers, and, perhaps, membranous croup, where moisture in the air is so desirable. House-plants have, however a sphere of usefulness which is independent of atmospheric humidity. In nervous disorders of the functional class, such as melancholia and chlorosis, in diseases of the mind proper, and in other allied conditions (excessive grief, ennui, etc.,) where it is necessary to divert the mind or relieve tension, nothing is more efficient than the pleasing occupation of studying and caring for plants.

But it is in that sweeping disease phthisis that plants offer the best hope of success as therapeutic agents. The importance of the point demands that it should receive careful attention.

Deeming it necessary that the experimental data should receive supporting evidence of an unequivocal character before the efficacy of plants in the treatment of this disease would be firmly established, the writer opened a correspondence with some prominent practitioners, besides making inquiries of those with whom he came in contact, soliciting a brief statement of their observations in regard to the effects of plants on the sick.* The almost unvarying response has been in the following terms: 'I cannot help you, for my attention has never been directed to the points in question.' A notable exception is the letter of my friend Dr. Hiram Corson, of Conshohocken, Pennsylvania, who, after stating that a number of his relatives had died of consumption, continues as follows: 'I mention these cases to show that the germs of the disease were with the family. Thirty years ago my eldest sister, then above fifty years of age, was

*The writer would still be grateful for any interesting information upon this subject, for without aid it would be almost impossible to establish the position taken or to correct temporary conclusions, and he wishes to make a further study upon the subject. Address 1638 North Eighth Street, Philadelphia.

reported by her physician, Dr. J. P., a victim of tubercular consumption, to which disease she would succumb before the coming summer. She was a lover of plants and flowers and cultivated them in-doors and out. The spring saw her again moving among her plants, and the winter found her confined to the house, and sometimes for weeks to her bed-chamber, which, like the sitting room, was literally a green-house. Visitors and friends often spoke to her of the impropriety of having so many growing plants in her room, reminding her of the tradition that they were injurious. Still, every spring found her again on her feet, in the yard and garden, nursing her plants, and every winter confined to her room. And thus she lived, year after year, until two years ago, when, at the age of eighty-five, she passed away. I have seen a few others have plants growing and blooming in their chamber, but never one who so lived among them as did my sister. Winter after winter we looked for her death, the cough, expectoration and weakness justifying our apprehensions, and yet her eighty-fifth year found her cheerful and happy, living among her plants and enjoying the society of her friends. May we not believe that the vast exhalation from these plants — water purified and medicated by their vital chemistry—prolonged her life?"

After citing a number of other interesting cases, Dr. Anders says:

"From the above cases it will be seen that what we had deduced from experimental results concerning the health-giving effects of plants (which is owing to transpiration increasing the humidity of the air,—the plants acting as natural and perfect 'atomizers') is entirely in harmony with what is observed concerning the effect of sufficiently moist warm air in many cases of phthisis; and if it is true, as we have attempted to demonstrate, that house-plant hygiene constitutes a valuable preventive measure where there is hereditary tendency to certain diseases, then it ought to be

definitely and thoroughly understood, and it is of vital importance that it should be adopted in cases where there is a known pre-disposition to phthisis, for half the cases are supposed to be preventable, whereas if the disease be allowed to develop complete recovery is not to be expected. Furthermore, though the keeping of plants does not 'cure' confirmed cases of phthisis, it is nevertheless very useful to prolong life, and by ameliorating the distressing symptoms renders existence at least endurable, — an office not to be despised in such a wide-spread and lingering disease.

Observation teaches that advanced cases of phthisis, (as, for instance, where cavities exist,) are benefited by a decidedly more moist atmosphere than is required in health, and hence they will require a much greater profusion of plants in the room than those who have the disease in a more incipient stage.

The plants should be well selected and kept in a thriving condition. The chief point to be borne in mind in the selection of the plants are, first, that they have soft, thin leaves; secondly, foliage plants, or those having extensive leaf-surface, are to be preferred; thirdly, those which are highly-scented (as the tuberose, etc.) should be avoided, as they often give rise to headache and other unpleasant symptoms.

In order to facilitate a practical application of the data gained by experiment, the following formula has been carefully prepared: Given a room twenty feet long, twelve feet wide, and ceiling twelve feet high, warmed by dry air a dozen thrifty plants with soft, thin leaves and a leaf-surface of six square feet each would, if well watered and so situated as to receive the direct rays of the sun (preferably the morning sun) for at least several hours, raise the proportion of aqueous vapor to about the health standard.

This formula may serve as a guide in the use of plants for hygienic purposes; but under conditions of actual dis-

ease it will be necessary to increase the proportion of plants according to the degree of humidity sought, or as the indication of individual cases demand.

It should be stated that, to obtain the best results, both the rooms occupied during the day and the sleeping-apartment should contain plants. It was for a long time the opinion of scientific interpreters generally that plants in sleeping-apartments were unwholesome because of their giving off carbonic acid gas at night; but it has been shown by experiment that it would require twenty thrifty plants to produce an amount of the gas equivalent to that exhaled by one baby sleeper: so this is no valid objection to their admission, and not to be compared with the benefit arising from their presence.

We have no desire to underrate other means of treatment while upholding the importance of our subject. Exercise in the open air is of immense advantage in phthisis, and during the warm season the consumptive should be moving among his garden plants, and, if he be a lover of flowers, should assume personal charge of them. Again, no one will dispute the value of certain tropical climates for judiciously selected cases of phthisis; but the practice of indiscriminately sending patients to them is certainly to be deprecated.

New health-resorts (many of them comparable only to the patent nostrums) are constantly being pressed upon the public, but too often a trial of them brings only disappointment, and the consumptive is rendered more miserable by the annoyance of travel and the anxiety of being separated from all the endearing relations of home.

To have always at hand and readily available so complete and withal so agreeable a health resort at home as that of a room well-stocked with plants must prove an inestimable boon to the despairing invalid."

We can only say that our own experience corroborates the testimony of a number of florists interviewed by Dr.

Anders, who all believe that the working with and among plants is beneficial; and among all our acquaintances in the profession we know of none who think otherwise.

Specific Directions for the Cultivation of Plants and Bulbs.

In the following pages we give a great amount of information relative to each of almost all plants and bulbs in commerce. The soils indicated are to be used when the plants are grown in pots. Always use a little sand in the soil, sufficient to make the soil porous. The moisture indicated is to be applied to the roots of the plants. For moisture in the air, see chapter on moisture.

The heat indicated is for the winter season, or when the weather is colder than the amount of heat noted. When no heat is indicated it is understood that the plant or bulb is perfectly hardy here.

In some instances different varieties of the same species require quite different conditions to grow them to perfection. We divide these as best we can without quoting the varieties in detail.

In this list we have not quoted many of our popular plants that are grown from seed. We do not think it necessary, as we have in another chapter written how to grow them.

Those marked * are tender bulbs which should be kept *warm and dry* during the winter. The treatment herewith given is for the growing season.

We have found it impossible to give all the information that may be needed in the space occupied, the plants in many instances requiring a different course of treatment at other seasons of the year. Yet we believe we can glean sufficient knowledge of the needs of the plants to be successful in cultivating them.

EXPLANATION.

Light—1 full sunlight; 2 morning sun only; 3 shade.

Moisture—1 abundant; 2 moderate; 3 sparingly.

H is for those suited for house or pot culture only.

B is for those suited chiefly for bedding purposes.

HB is for those suitable for both house and bedding culture.

Name of PLANT OR BULB.

	SOIL.			LIGHT.....	HEAT.....	MOISTURE	CULTURE..
	Loam...	Peat...	Loam Soft Soil....				
Abella.....	1			1	35	2	HB
Abutilon, (Flowering Maple).....	3		1	1	70	2	HB
Acacia.....	2	1		1	59	2	H
Acalypha.....	3	1		1	50	2	HB
Acanthus.....	1	2		1	60	2	H
Achillea.....	1			1			B
*Achimenes.....	2		"	2	60	3	H
Achyranthus.....	1			1	65	2	HB
Acorus.....	1			2	50		H
Adiantum, (Fern).....	1	1	2	3	55	2	H
Adonis.....	1			1	40		B
Æchmæa.....	1	1	3	1	50	2	H
Ærides, (Orchid) see special note.....							H
Æschynanthus.....	1	1	2	2	60	3	H
Agapanthus, (African Lily).....	1			2	45	2	HB
Agave, (Century Plant).....	1			1	45	3	HB
Ageratum.....	1			1	50	2	HB
Akebia.....	1			1		2	B
Allamanda.....	2	1	1	1	60	2	H
Alocasia.....	2	2	1	2	59	1	HB
Aloe.....	1			1	50	3	HB
Aloysia, (Lemon Verbena).....	1			1	40	3	HB
Alsophylla.....	1	1	2	3	50	2	H
Alternanthera.....	1			1	70	2	B
Alyssum.....	1			2	55	2	HB
*Amaryllis.....	2		1	1	60	2	HB
*Amorphophallis.....	1			1	60	1	HB
Ampelopsis.....	1			1		2	B
Anemones.....	3		1	1		2	HB
Anthericum.....	1			1	50	2	HB
Anthurium.....	2	2	1	2	60	2	H
Aphelandra.....	2	1		1	70	2	H
Aphelexes.....	1	2	1	1	45	2	H
Aralia.....	1			1	65	2	H
Araucaria.....	1			1	40	3	HB
Ardisia.....	2		1	1	60	2	H
Areca.....	2	1	1	2	60	2	H
Argyrea.....	1	1	1	1	60	2	H
Aristolochia.....	1			1	50	2	HB
Artocarpus.....	1		2	1	60	2	H
Arundo.....	1			1	49	1	B
Asphodelus.....	1			1		2	B
Aspidistra.....	1			2	60	2	H
Astrocaryum.....	1	2	1	2	60	2	H
Attalea.....	1	2	1	2	60	2	H
Aueuba.....	1			1	50	2	HB
Azalea.....	1	2	1	2	45	2	H
Balm.....	1			1		2	B
Bambusa.....	1	1	2	1	65	2	HB
Banksia.....	1	2		1	45	2	HB
*Batatas.....	1		2	1	50	2	H
Beaucarnea.....	1		2	1	45	2	H
Begonia Rex.....	2	1	2	2	60	2	H
Begonia Flowering.....	2		2	2	70	2	HB
*Begonia Tuberous.....	2		2	2	60	2	HB
Bignonia, (Trumpet Creeper).....	2			1		3	B
Billbergia.....	1		1	1	60	3	H
*Blandfordia.....	1			1	45	2	HB
Bletia.....	1	1	1	1	60	2	H
Bocconia.....	2		1	1	55	2	HB
Bonapartea.....	1			1	50	3	HB
Boronia.....	1	1		1	45	3	HB

Name of PLANT OR BULB.	SOIL.			LIGHT.....	HEAT.....	MOISTURE	CULTURE..
	Loam...	Peat...	Leaf Soil.....				
Bougainvillea.....	2		1	1	55	2	H
Bouvardia.....	1		1	1	60	2	HB
Bowenia.....	1	1	1	2	60	2	
Brassia, (Orchid).....			1	1	55	2	H
Brexia.....	1	2	1	1	50	2	H
*Brodia.....	1		1	2	35	2	
Bromelia.....	1		1	1	60	2	H
Bertolonia.....	2	1	1	2	60	2	
Brugmansia.....	1		1	1	50	1	B
Cactus.....	1		1	1	50	3	
*Caladium Esculentum.....	1		1	1	60	1	B
*Caladium Fancy.....	1		1	2	65	1	HB
Calanthe.....	1	1	1	1	60	2	H
Calceolaria.....	1		1	1	50	2	HB
Calla, Lily of the Nile.....	1		1	2	60	1	HB
Callixene.....	1	1		1	45	2	H
Camellia.....	1	3		2	45	2	H
Campsidium.....	2		1	1	60	3	H
*Canna, (Indian Shot).....	1		1	1	60	1	H
Cantua.....	2		1	1	50	2	H
Carludovica.....	1	2	1	2	55	2	H
Carnation.....	1		1	1	50	2	HB
Carolinea.....	1		1	1	60	2	H
Caryota, (Fish Tail Palm).....	2		1	2	55	2	H
Cassia.....	1	1	1	1	65	2	H
Cattleya (Orchid) see special note.....							
Centaurea.....	1		1	1	50	2	HB
Centradenia.....	1		1	2	60	2	H
Cereus.....	1		1	1	50	3	H
Chamaedorea.....	2	1	1	2	55	2	H
Chamærops.....	2	1	1	2	50	2	H
Chorozenia.....	2		1	1	55	2	HB
Choisya.....	2		1	1	40	2	HB
Chrysanthemum.....	1		1	1	45	2	HB
Cissus.....	2	1	1	2	70	2	H
Citrus, (Orange and Lemon).....	1		1	1	40	2	HB
Clematis, (Virgin's Bower).....	1		1	1	50	2	HB
Clematis (some varieties are entirely hardy)	1		1	1		2	HB
Clerodendron.....	2		1	1	55	2	H
Clitoria.....	2	1		1	50	2	HB
Cobea.....	1		1	1	60	2	HB
Cocoloba.....	2		1	2	50	1	HB
Cocos.....	1	2		2	60	2	H
Coffea.....	2	1	1	1	55	2	HB
Coleus.....	1		1	1	60	2	HB
*Colocasia.....	1		2	1	50	3	HB
Convallaria.....	1			2		2	B
Coprosma.....	1			1	45	2	HB
Correa.....	1		1	1	50	2	H
Cordyline.....	3	1	2	1	60	2	HB
Corypha, (Palm).....	2		1	2	60	2	H
*Crinum.....	3	1	1	1	60	2	HB
Croton.....	3		1	1	60	2	H
Cuphea.....	1		1	1	50	2	HB
Cureuligo.....	2	1		2	60	2	H
Curcuma.....	2		1	1	60	2	H
Cyanophyllum.....		2	1	2	65	3	H
Cyathea, (Fern).....	1	2	2	3	60	2	H
Cycas, (Palm).....	2	1	1	1	50	2	H
Cyclamen.....	2		1	1	45	2	H
Cyperus.....	1		1	1	50	1	HB
Cypripedium, (Ladies' Slipper).....	1	2	2	2	55	2	H

Name of PLANT OR BULB.	SOIL.			LIGHT.....	HEAT.....	MOISTURE	CULTURE..
	Loam....	Peat....	Leaf Soil.....				
Cytissis.....	1			1	40	2	H
*Dahlia.....	1			1	60	1	B
Daisy.....	1			2	40	2	HB
Daphne.....	2	1		2	45	2	H
Davallia, (Fern).....	2		2	2	55	2	H
Dendrobium, (Orchid).....				2	70	2	H
Deutzia.....	1			1		2	HB
Dianthus, (Pink).....	1			1		2	HB
Dicentra, (Bleeding Heart).....	2	1		1		2	HB
Dichorisandra.....	2		2	1	50	2	H
Dicksonia, Fern.....	2		2	2	55	2	H
Dieffenbachia.....	1		2	1	60	2	H
Dillenia.....	3	1		1	65	2	H
Dion, Palm.....	2	1	1	1	60	1	H
Dionca, Venus Fly Trap.....	1	1	2	2	75	3	H
*Dioscorea, Chinese Yam.....	1			1	50	2	HB
Dipladenia.....		2	1	1	65	3	H
Disandra.....	2		1	1	55	2	H
Doodia, Fern.....	1	1	3	2	50	2	H
Doryanthus, Queen's Land Lily.....	1	1	3	2	50	2	H
Dracæna, Dragon Tree.....	3	1	2	1	60	2	HB
Echeveria.....	1			1	45	3	HB
Echites.....	1		2	1	60	2	H
Epacris.....	1	3		2	45	2	H
Epidendrum, Orchid.....			1	2	55	3	H
Epiphyllum, Cactus.....	2	1		1	45	2	H
Eranthemum.....	2	1		1	55	2	HB
Erianthus.....	1			1	35	3	B
Erica.....		2	2	1	40	3	HB
Erythrina, preserve in winter like Dahlias,	1			1	50	2	HB
Eucodonia.....	1	2	2	1	60	2	H
Eucharis.....	2	1		2	70	2	H
Euonymus.....	1			1	40	2	HB
Eupatorium.....	1			1	45	1	HB
Euphorbia.....	2	1	1	1	60	2	HB
Fabiana.....	1			1	55	2	HB
Farfugium.....	2		1	2	40	2	HB
Ferns.....	1	1	2	2	55	2	H
Ficus, India Rubber Plant.....	1			1	50	2	H
Fittonia.....	2		1	2	60	2	H
Fragaria, Indian Strawberry.....	1			1	45	2	HB
Francisca.....	2	1		1	60	2	H
Fuchsia.....	2		1	2	50	2	HB
Funkia.....	1		1	1		2	B
Garden'a, Cape Jasmine.....	2	1		1	45	2	HB
Gazania.....	1			1	50	2	HB
Genista.....	2	1		1	45	2	H
Geranium Zonale.....	1			1	45	2	HB
Geranium Variegated.....	1			2	45	2	HB
Geranium Ivy.....	1			2	45	2	HB
Gesneria.....	2	1		1	60	2	H
*Gladiolus.....	1			1	50	2	HB
Glaucium.....	1			1	45	2	HB
*Gloxinia.....	1	1	1	2	60	2	H
Gnaphalium.....	1			1	55	2	HB
Graptophyllum.....	1	1	1	1	60	2	H
Gymnogramma, Fern.....	1	1		2	55	2	H
Gynierum, Pampas Grass.....	1			1	35	2	B
Habrothamnus.....	1	2	1	2	50	2	H
Hartwegia, Orchid.....				2	55	2	H
Heaths.....		2	1	1	40	3	HB
Hedera, Ivy.....	1			1	35	2	HB

Name of PLANT OR BULB.

	SOIL.			LIGHT.....	HEAT.....	MOISTURE.....	CULTURE ..
	Loam...	Peat.....	Leaf Soil.....				
Heliconia.....	2	1	1	1	60	2	H
Heliotropes.....	1	1	1	1	60	2	HB
Hemerocallis.....	1	1	1	1	40	2	B
Hepatica.....	2	1	1	1	50	2	HB
Hibiscus.....	2	1	1	1	50	2	HB
Hollyhocks.....	1	1	1	1	50	2	B
Houlettia, Orchid.....	1	1	1	1	60	2	H
Hoya, Wax Plant.....	2	1	1	1	60	2	H
Humea.....	1	1	1	1	50	2	HB
Hydrangea.....	1	1	1	1	50	2	HB
Imantophyllum.....	1	1	1	1	50	2	HB
Iresene.....	2	1	1	1	45	2	HB
Isolepis.....	1	1	1	2	50	1	H
Ixora.....	2	1	1	2	50	2	H
Jasminum.....	1	1	1	1	45	2	HB
Justicia.....	2	1	1	1	50	2	HB
Kleinia.....	1	1	1	1	50	2	HB
Koeniga.....	1	1	1	2	55	2	HB
Lælia, Orchid.....	1	1	1	2	60	2	H
Lagerstræmia, Grape Myrtle.....	1	1	1	1	35	3	HB
Lantana.....	1	1	1	1	50	2	HB
Laurestinus.....	1	1	1	1	45	2	HB
Lapageria.....	1	2	2	2	55	2	H
Lasiandra.....	2	1	1	1	60	2	H
Latania, Palm.....	3	1	1	2	60	2	H
Ledenbergia.....	2	1	1	1	50	2	H
Leptospermum.....	2	1	1	1	45	2	H
Libonia.....	3	1	1	1	55	2	HB
Lilium, Lilies.....	1	1	1	1	50	2	HB
Lily of the Valley.....	1	1	1	2	35	2	HB
Linaria, Kenilworth Ivy.....	1	1	1	2	45	2	HB
Linum.....	2	1	1	1	50	2	HB
Livingstonia, Palm.....	2	1	1	2	60	2	H
Lobelia.....	1	1	1	2	50	2	HB
Lomaria, Fern.....	2	1	1	2	55	2	H
Lonicera, Honeysuckle.....	1	1	1	1	45	2	B
Lophospermum.....	1	1	1	1	45	2	HB
Lycaste, Orchid.....	1	1	1	2	60	2	H
Lychnis.....	1	1	1	1	40	2	B
Lycopodium, Moss.....	2	1	1	2	50	2	H
Lygodium, Fern.....	1	1	1	2	55	2	H
Lysimachia, Moneywort.....	1	1	1	3	60	2	HB
Macaya.....	2	1	1	2	70	2	H
*Maderia Vine.....	1	1	1	1	50	2	HB
Mahernia, Honey Bell.....	2	1	1	2	50	2	HB
Mandevillea.....	1	1	1	2	55	2	H
Manettia.....	2	1	1	1	70	2	H
Maranta.....	1	1	2	2	60	2	H
Maurandia.....	1	1	1	1	45	2	HB
Mesembryanthemum.....	2	1	1	1	50	3	HB
Mikania.....	2	1	1	2	55	2	H
Mimulus.....	1	1	1	1	50	2	HB
Musa, Banana.....	2	1	1	1	60	2	HB
Myosolis, Forget-Me-Not.....	1	1	1	2	50	2	B
Myrtus, Myrtle.....	2	1	1	1	50	2	HB
Myrsiphyllum, Smilax.....	2	1	1	2	60	2	H
Nepenthes, Pitcher Plant.....	1	1	3	2	70	2	H
Nicotiana, Tobacco.....	1	1	1	1	60	1	HB
Nierembergia.....	1	1	1	1	45	2	HB
Niphibilus, Fern.....	1	1	1	2	55	2	H
Nerium, Oleander.....	1	1	1	1	45	2	HB
Odontoglossum, Orchid.....	1	3	2	2	55	2	H

Olea, Fragrant Olive.....	1			1	50	2	HB
Oncidium, Orchid.....	1	1		2	55	2	H
Opuntia, Cactus.....	1	1	3		50	2	HB
Othonna.....	2			1	45	2	H
Oxalis.....	1			1	40	2	HB
Palms.....	1	3	2	2	60	2	H
Pæonies.....	1	1			1	2	B
Panax.....	1	1			65	2	H
Pancratium.....	2	1			45	3	HB
Pandanus, Screw Pine.....	2	1			60	2	HB
Panicum, Grass.....	1			2	50	2	HB
Pansy, Heart's-ease.....	1			2	40	2	HB
Passiflora, Passion Flower.....	2		1	1	50	2	HB
Paullinia.....	2	1		1	60	2	H
Pedilanthus.....	2	1			60	2	HB
Pelargonium.....	1			1	45	2	HB
Peperomia.....	1		1	2	50	2	H
Pepinia.....	1	2			65	2	H
Peristeria, Orchid.....	1	3	2		60	3	HB
Peristrophe.....	1			1	50	2	HB
Petunia.....	1			1	50	2	HB
Phaius, Orchid.....	1	3	2	2	60	2	H
Phalaenopsis, Orchid.....				2	60	2	H
Philodendron.....	2	1		2	60	2	H
Phlebodium, Fern.....	1	1	2	2	55	2	B
Phlox.....	1			1		2	H
Phoenix, Palm.....	2	1		2	60	2	H
Phormium, New Zealand Flax.....	1			1	50	2	HB
Physianthus.....	2	1			55	2	HB
Pilea.....	1			2	50	2	H
Pittcairnia.....	1	2	1		60	2	H
Pittosporum.....	2	1		1	45	2	HB
Platynerium, Fern.....	1		2	2	55	2	H
Pleione, Orchid.....	1	3	2	2	60	2	H
Pleroma.....	2	1		1	55	2	H
Plumbago.....	1			1	50	2	HB
Poinsettia.....	3		1	1	60	2	H
*Polianthes, Tuberosa.....	1			1	60	2	HB
Polypodium, Fern.....	1	1	2	2	55	2	HB
Polystichum, Fern.....	1	1	2	2	65	2	H
Pomegranate.....	1			1	45	2	HB
Primula, Primrose.....	1		2	2	50	2	H
Prichardia, Palm.....	2	1		2	60	2	HB
Pteris, Fern.....	1	1	2	2	55	2	H
Pyrethrum.....	1			1	40	2	HB
Reineckia.....	1			1	50	2	HB
Rhapis, Palm.....	2	1		2	55	2	H
Rhododendron.....	1	2	1	1	45	2	HB
Rhynchospermum.....	2	1		1	60	2	H
*Richardia.....	1			1	50	2	HB
Rivina.....	2		1	1	60	2	H
Rondeletia.....	2	1			55	2	H
Roses, Monthly, for winter blooming.....	1			1	60	2	
“ “ “.....	1			1	35	3	HB
“ Hybrid Perpetual.....	1			1			B
“ Moss.....	1			1			B
“ Climbing.....	1			1			B
Ruellia.....	2	1		1	60	2	HB
Russelia.....	2	1	1	1	50	2	HB
Sabal, Palm.....	1	2	1	2	60	2	H
Salvia, Sage.....	1			1	60	2	HB
Sanchezia.....	1	2		1	60	2	HB

Name of PLANT OR BULB.	SOIL.			LIGHT.....	HEAT..... °	MOISTURE	CULTURE...
	Loam...	Peat...	Leaf Soil.....				
*Sandersonia.....	1			1	60	2	HB
Sarracenia, Side-saddle Flower.....	1	2	2	2	50	1	HB
Saxifraga, Aaron's Beardz.....	1			2	45	2	HB
Scutellaria.....	2		1	1	50	2	HB
Seaforthia, Palm.....	1	2	1	2	80	2	H
Sedum, Stone Crop.....	1			1	50	3	HB
Selaginella, Club Moss.....	2		2	3	55	2	H
Sempervivum, House Leeks.....	1			1	50	3	HB
Senecio, Parlor Ivy.....	1			2	50	2	HB
Solanum, Jerusalem Cherry.....	1			1	50	2	HB
Spirea.....	1			1		2	B
Stanhopea, Orchid.....				2	70	2	H
Stephanotis.....	1	2		1	70	2	H
Stevia.....	1			1	50	2	HB
Strellitzia, Queen Plant.....	1	2		1	60	2	H
Swainsonia.....	2	1		1	50	2	H
Tabernaemontana.....	2		1	1	60	2	HB
Tacsonia, see Passiflora.....	2		1	1	60	2	HB
Talinum.....	1			1	50	3	HB
Tecoma.....	1			1	55	2	HB
Thrinax, Palm.....	2	1		2	60	2	H
Thymus.....	1			1		2	HB
Thysacanthus.....	1			1	50	2	H
*Tigridia, Tiger Flower.....	1			1	60	2	HB
Tillandsia.....	2	1	1	2	60	2	H
Torrenia.....	1			1	60	2	HB
Tradescantia.....	1			2	50	2	HB
*Triejrtis.....	1			1	60	2	HB
Tritoma, Flame Flower.....	1			1	40	2	B
Vallisneria.....	1			1	50	1	H
Vallotta.....	2		1	1	45	3	HB
Vanda, Orchid.....				2	60	3	H
Vanilla, Orchid.....				2	65	2	H
Verbena.....	1			1	40	2	HB
Veronica.....	2		1	1	50	2	HB
Vinea.....	1			1	45	2	HB
Wigandia.....	1	2	1	1	55	2	H
Woodwardia.....	1		2	2	50	2	H
Yucca.....	1			1			B
Zygopetalum, Orchid.....				2	65	2	H

NOTE.—ORCHIDS.—Orchids for our purpose we will divide into two classes—those that are usually grown in a soil and those that are grown in the air. Of the first it will not be necessary to give extended cultural directions. Of this class the *Bletia* is a type. As a rule they do quite well in a moist atmosphere in a temperature of from 60 to 70 deg. The soil in which they are grown should be such as water will readily drain through. Under no circumstances should water be allowed to remain about the roots. Of the second class we shall also write briefly inasmuch as we cannot do justice to this tribe in a foot note at the close of this volume. Any of our readers who are especially interested in these plants should procure a work devoted to them alone. We have had very good success with orchids grown in pots as well as on logs. If they are to be grown in pots the mode of potting is as follows: A pot of suitable size having been selected, we place inside of this a small pot inverted; around this pot place small pieces of broken pots, peat and sphagnum; fill the pot with these so full that when the plant is placed in the pot the base of the pseudo bulbs will be level with the rim of the pot. The plant being in position build up around and between its roots with coarser pieces of

pots, peat and sphagnum, being careful not to injure the roots. If the plants are to be grown in the air, cover a small log of wood with sphagnum, on this fasten the orchid securely, and allow the roots to hang from the log and obtain their nourishment from the moist atmosphere. In regard to their culture, they need a period of rest prior to blooming; during the rest they require but very little moisture at the roots but should be syringed not less than once a week and be kept in a moist, cool atmosphere. Should the bulbs begin to shrivel, give a little more water. After the rest, when the plants are old enough they begin to bloom after which, should it appear necessary, they should be repotted and will then make a nice growth. During this time the atmosphere must never be allowed to become otherwise than quite moist, and they should also have considerable moisture at the roots. After the growth is completed withhold the water and keep them dry and cool, seeing that they have only moisture sufficient to prevent shriveling.

INDEX.

CHAPTER.	PAGE.
INTRODUCTION.....	3
I.—Soils for Plotting.....	7
II.—Pots and Potting.....	10
III.—Temperature and Moisture.....	18
IV.—Insects	23
V.—Winter-Blooming Plants	33
VI.—Winter Protection	37
VII.—Propagation	40
VIII.—Ventilation and Light.....	49
IX.—The Window Garden.....	52
X.—Training Plants.....	59
XI.—Bulbs	62
XI.—Hanging Baskets.....	68
XII.—Aquariums and Ferneries.....	72
XIII.—Plants by Mail or Express	82
XIV.—In the Garden.....	85
XV.—Planting of Flower Beds.....	92
XVI.—Sowing the Seed and Management of Seedlings.....	98
XVII.—Hygienic and Therapeutic Relation of House Plants...	101
Specific Directions for the Cultivation of Plants and Bulbs.....	109

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