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THE ROCK GARDEN

AGRICULTURAL EXPERIMENT STATION
MICHIGAN STATE COLLEGE
Of Agriculture and Applied Science
SECTIONS OF LANDSCAPE ARCHITECTURE
AND HORTICULTURE
East Lansing, Michigan

Flower in the
crannied wall,
I pluck you out of
the crannies,
I hold you here, root & all,
in my hand,
Little flower—but if
I could understand
What you are, root & all,
and all in all,
I should know what God
and man is.

- Tennyson



THE ROCK GARDEN

By C. P. HALLIGAN

*Gray rocks are kindred of the mold
That brings my seed to flower,
Companions of the bitter cold
And of the sun-bright hour.
Their gaunt shapes shoulder earth away
As on some distant glacial day.*

*And though I coax the soil to bloom,
Bordering them with grace,
Still in my garden's little room
The gray rocks keep their place,
Eternal as the hills that rise,
And motionless, and old, and wise.**

There is a world of interest and pleasure in a rock garden. Whether it be an area so limited as to accommodate but a few irregular, weather-beaten rocks, clothed with diminutive rock-loving plants, or a larger grouping of rocks developing a beautiful expression of nature, a wealth of fascination and enjoyment is associated with it.

Rocks add a new theme, a new interest to the enjoyment of a garden. They further appeal to all plant lovers because they provide the pleasing setting and cultural conditions favorable for the establishment and growth of many kinds of delightful plants that otherwise could not be grown. Since there are no standardized rules of procedure, the making of a rock garden offers a special appeal to amateurs to try their own hands at this form of artistic expression. A few general principles that should be followed are here presented.

VISUALIZING THE EFFECT

To visualize the most pleasing and fitting effect is the first and most fundamental consideration in constructing a beautiful rock garden. Without a conception in mind of the scene one hopes to produce, he is working without aim or reason. The attainment of a beautiful rock garden effect is not the accidental result of a happy coincidence. Rather, it is the result of a well

*Hilda Morris.



Fig. 1. Rocks add a new theme, a new interest to the enjoyment of the garden.

conceived effect achieved by a reasonable, fitting, and well considered plan of development.

The particular effect to be developed in any rock garden depends largely upon the conditions of the site to be used; its size, exposure, and topography; the type of rock available; the general relations of the garden to the house and neighboring landscape; and, finally, of one's own choice in style of beauty and expression.

Novelty of effect is not a worthy basis of good rock garden design. It commonly results in the development of grotesqueness and reflects unfavorably upon the good taste of the designer.

STYLES OF DESIGN

There are two general styles of assembling rocks to form beautiful rock garden effects, the formal and informal styles. These are so different in their conditions of being and in their ideals of expression that they are inherently inharmonious. Therefore, one should clearly understand the fundamental aims of each before endeavoring to determine the most appropriate effect to produce in building a rock garden.

THE FORMAL STYLE: The fundamental aim in the formal style of organizing rockwork is to select and arrange the rocks so they frankly appear as a man-made composition, to serve man's own uses and to express his control over the materials and forces of nature. Such work assumes the forms of such elements as walls, pavement, gate-posts, steps, and other structures.

Some of the most beautiful gardens in America have thus been developed in this style of rockwork. Nevertheless, the artificiality and expense of a formal rock garden and its inharmonious effect in a simple, informal setting, make it more particularly appropriate, fitting, and pleasing within the confined area of a city or suburban yard or within an enclosed area upon a pretentious estate.

On almost every home grounds, however, there are places where such elements of a formal type as walls, steps, and walks seem required in an informal setting. The practice of using such elements under these conditions requires the adapting of their formal qualities to the informal conditions about them in such manner as to make them appear fitting and reasonable. Usually, this may be accomplished by subduing the particular qualities of formal elements that are most strongly in conflict with the qualities of an informal scene.

Sharpness of line, definiteness of form, and high color value are properties of formal elements that commonly make them most inharmonious in such a setting. These qualities also tend to render them more dominant than their relative importance and purpose warrants. This obtrusiveness of formal elements may therefore be greatly subdued by modifying their sharply defined lines, surfaces, and forms into softer, less apparent contours and by neutralizing or blending their color with that of the environment.

It should not be the aim, however, to gain this harmony of effect by making the design of these elements so informal as to obscure their identity. Thus, a bridge built of rock, even in an informal setting, should frankly express by

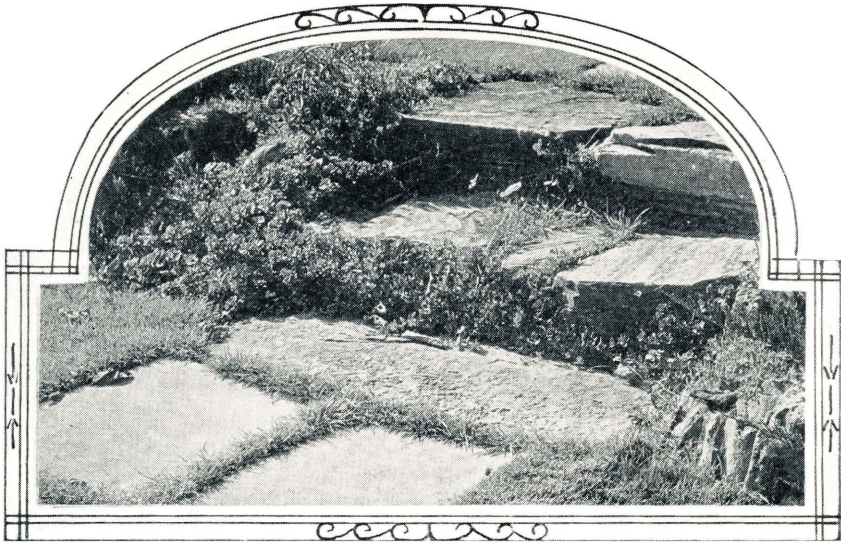


Fig. 2. Stone steps subdued by plantings, make a most pleasing interlude in a flagstone walk.



Fig. 3. Rock garden steps, when subdued in line, form and color, become a harmonious part of the informal rock garden.

its design the fact that it is a bridge and not an informal, unorganized mass of rock dropped there by a prank of nature. A rock wall should not be so uneven and irregular in its design as to lose the effect of a wall or to appear as a piece of very inefficient workmanship. These formal developments can be made acceptable in an informal scene by more reasonable means. For example, a retaining wall may be required where a cut for a drive or public highway has been made. A brick or concrete type of wall construction might prove very serviceable for the purpose but, in an informal rural setting, these types of construction would appear so artificial and dominant as to be quite inharmonious. A wall of large, irregular, weather-worn rocks, laid with deep joints to form a soft, less sharply defined face and top is much more fitting. Its rough, coarse texture, less sharply defined form and sombre color, would tend to subordinate its formality and thus blend it more harmoniously into the scene. In the construction of such a wall, pockets of soil could be provided in which adaptable plants could be grown. These would further tend to subdue and beautify the wall to a degree such as to make it a more fitting and pleasing part of an informal scene.

Steps are often required in an informal rock garden or landscape setting. They are commonly required to give access to the garden but in such informal settings they should not be so sharply defined and attractively constructed as to draw the attention from the observation and enjoyment of the plants and of the scene as a whole. Though they should frankly appear as well constructed steps for the service intended, they should be harmonized into the general garden scene by proper subordination. This may sometimes be effected by constructing them of the same kind of rock as that used in the garden, and otherwise by choosing rocks of a neutral or subdued color,

arranging them into steps not too sharply defined in form and by selecting large stones and laying them with open joints to produce the effect of coarseness in texture. Open joints left between the rocks, if filled with suitable soil and provided with drainage, may be planted to further subdue and blend the steps into the garden scene. Thus, though they will frankly appear as man-made developments, their fitness in the scene from the standpoint of utility and their subdued effect will make them a more harmonious part of the scene. Other formal structures of rockwork may likewise be subdued in an informal setting to such a degree as to appear fitting and reasonable.

THE INFORMAL STYLE: One's aim in constructing the informal style of rock garden is to select and arrange the rocks in such manner that each appears as a natural deposit which was there originally and had not been disturbed by the hand of man; and collectively, the arrangement should produce a pleasing expression of nature. An informal rock garden, therefore, is not a meaningless jumble of rocks. It is not a rock pile. It is neither an assemblage of blasted or broken rocks showing glaring, newly exposed surfaces nor of rocks set upon end or in some other unnatural, unstable, and meaningless position. Such effects are crude and grotesque. A rock garden



Fig. 4. Such beautiful gems of nature should be the inspiration for the conception and development of beautiful, naturalistic effects in the rock garden.

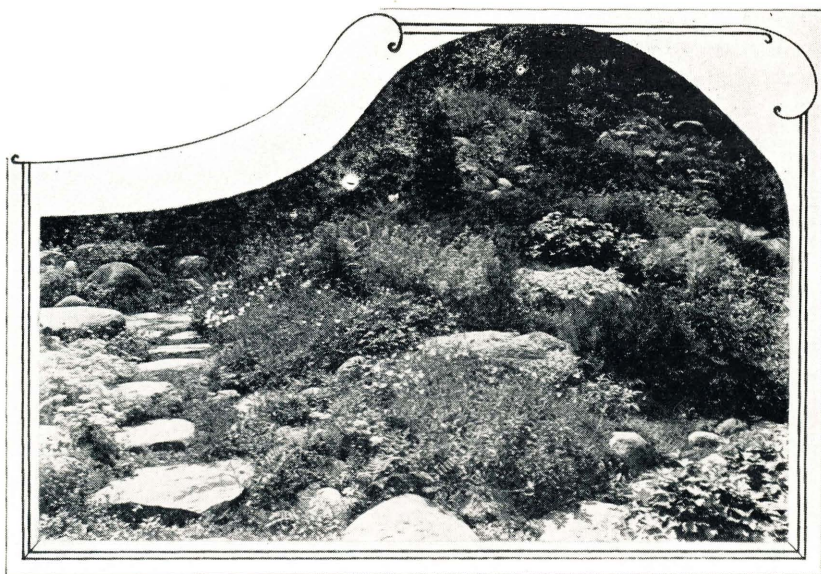


Fig. 5. The informality and apparent waywardness of effect is often the basis of the charm of the rock garden.

is rather a flower garden containing natural weather-beaten rocks so arranged that they not only appear to have been placed there by the forces of nature but develop an admirable landscape expression. The effect should be as one of the gems of nature selected from the landscape panorama. (Fig. 4.)

Hence, the first principle in the informal arrangement of rocks is that they should be made to look as natural as possible. (Fig. 11.) It is very desirable to study rocks of similar character under natural conditions in nature in order to learn their qualities, the conditions of their environment, and some of the choice expressions of nature of which they form a fitting part so that one can arrange them naturalistically and satisfactorily upon his own place. The rules of the informal rock garden are thus the rules of Nature.

The apparent relation of rocks, one to the other, is also an important condition that measures the effect produced. As the forces of nature over long periods of time have molded ground into such forms as hill, valley, and plain, so rocks are not usually found aimlessly detached but occur in such organized collections as ledges, strata, and trains. No matter where they may be seen there is always a positive logic in their arrangement that should not be disregarded.

USE OF STRATIFIED ROCK: Stratified rock, particularly of a limestone formation, is the most fitting type for most informal garden effects, especially if the rock is of such a kind as to be somewhat porous, irregular

in form, and will weather to become of a rather neutral color. This kind of rock may be found especially suitable for laying up a steep slope to simulate an outcropping ledge without sacrificing its natural appearance. In some parts of such a development, the rocks should be so closely massed as to develop an abrupt slope but in other less sloping parts they may be more loosely grouped and scattered. The related form, color, and texture of this rock, combined with the laying of it to develop a general harmonious direction of the fissures and strata, will tend greatly to unify the rock and make it appear naturalistic. Such rockwork also offers favorable conditions for rock plants, since the fissures among them may be made deep and moist for root growth. Although a large proportion of strictly alpine species of rock plants cherished so sincerely by the advanced rock gardener are of the lime-loving sort, it appears incongruous to use imported, smoothly stratified Indiana limestone or stratified rock from other distant points in a Michigan garden possibly already supplied with glacial stone. It would be difficult to mold any such distinctively defined imported rock into an informal rock garden to appear as an indigenous native element. This rock does not typify our Michigan landscapes, and therefore is more particularly suitable in this section for the formal rock garden.

SELECTION AND ARRANGEMENT OF GLACIAL ROCK: Because all of Michigan is of glacial formation with but a few spots (mostly in the Upper Peninsula), where the original rock formation is found at the surface, the present character, location, and arrangement of the rocks have resulted from glacial action. The rocks are usually hard, of various kinds

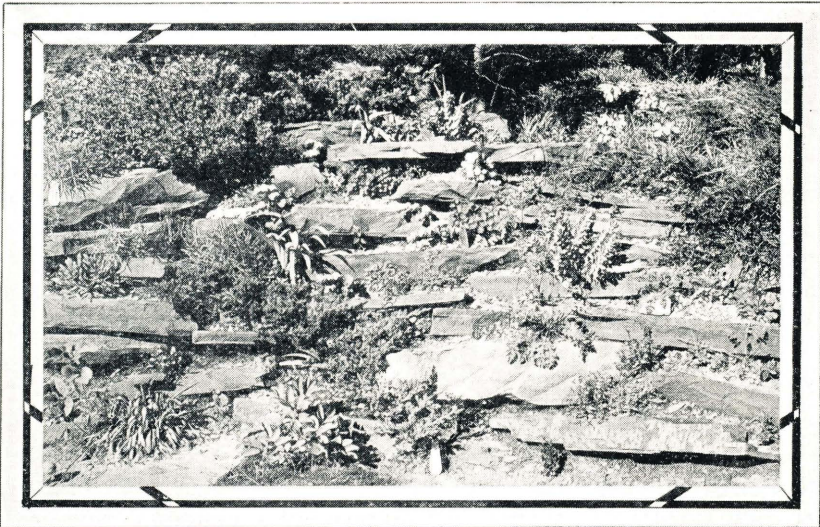


Fig. 6. Stratified rock, laid with the strata generally horizontal, may express the effect of an outcropping ledge.



Fig. 7. Rocks should be embedded to the depth of their weathered lines if they are to appear as having been there from time immemorial.

and colors, gathered from distant and diverse places, worn smooth by water and ice, and deposited here with the glacial soil debris, particularly of the sandy and gravelly type, and forms what is known as glacial drift. Gravitation and erosion since the glacial age have reduced the slopes on the knolls, hills, water-washed banks and shores to their present angle of repose, except where these forces have been resisted by the presence of the boulders. This history of its soil and rock formations explains the present character of the topography of the state and is the basis of its distinctive landscape effect. Therefore, in modeling informal rock gardens, the slopes of the garden, the selection, disposition, and arrangement of these boulders must all appear as if arranged by natural formative forces. Thus glacial boulders could hardly be used as stratified rock to develop the effect of an out-cropping ledge or rippling cascade any more successfully than stratified rock could be used by placing it at random on the surface of a gravel slope to develop the effect of a stream-cut earth and boulder bank. If these precepts and examples found in Nature are disregarded the effect will be artificial, unnatural and even grotesque.

Where the site for the informal rock garden is upon a bank or rather steep slope, the land lends itself readily to the development of the effect of a stream-cut bank where the water has worn away the softer material and laid bare the outcropping boulders. Otherwise, the stream valley or pond basin are desirable forms to develop, since such shapes make a composition enframed and apart from the surrounding landscape.

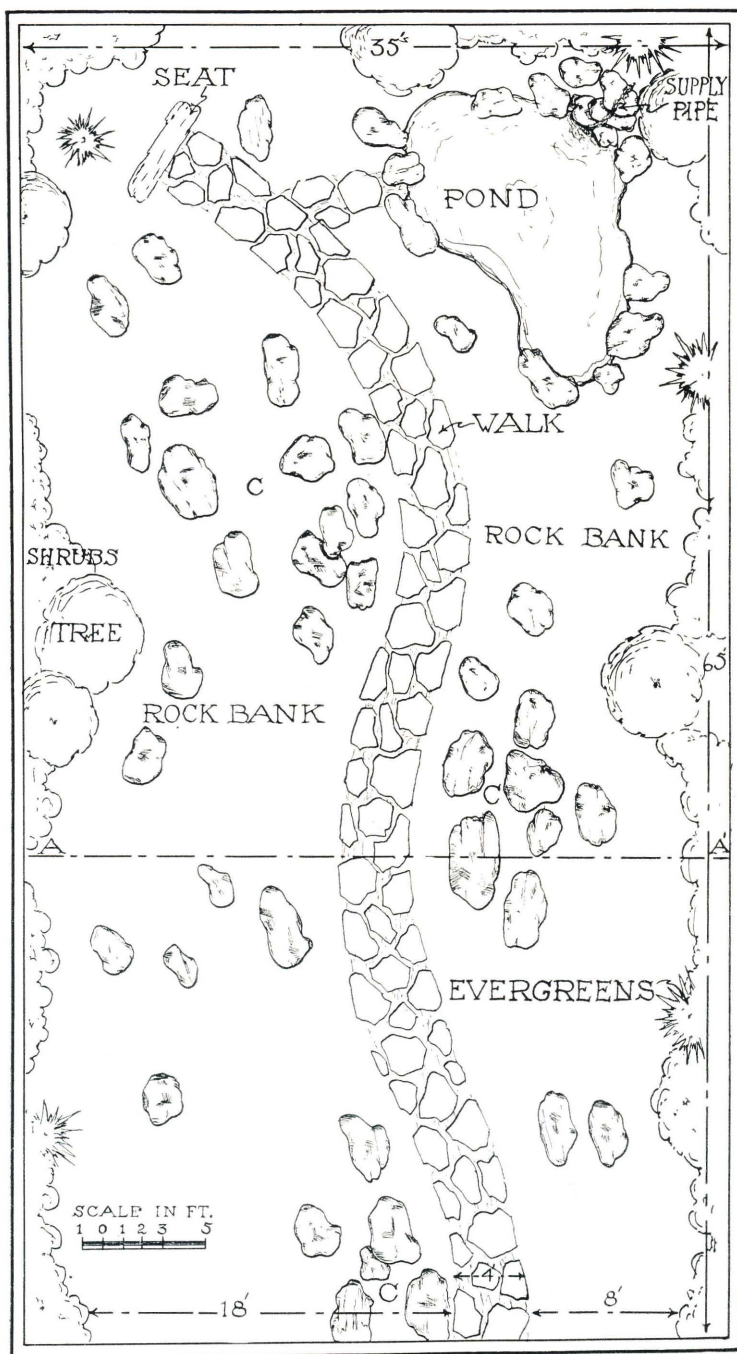


Fig. 8. Plan of a rock garden.

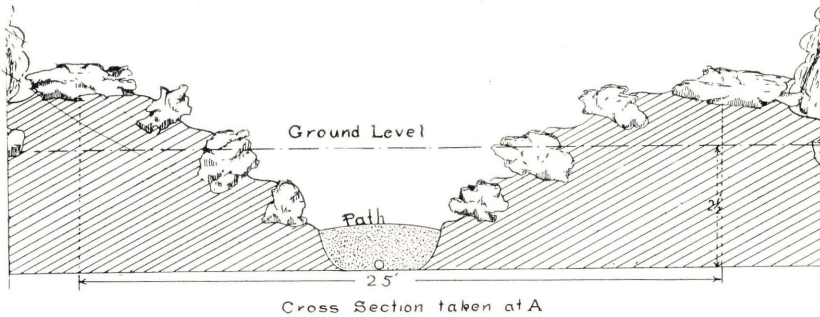


Fig. 9. Profile of the rock garden (Fig. 8) showing grades developed upon a level site with soil made available by lowering the elevation of the walk.

In such developments, the rocks will normally form the steeper and dominant parts of the slopes or banks. The slopes, therefore, should recede at intervening areas, with a more scattering arrangement of the rocks accentuating the dominance of rocks in the steeper area, and thus introducing the variety in grade so essential to the effect of naturalness.

This relationship which should exist between the arrangement of the rocks, as well as of the walk, to the slopes is illustrated in Fig. 8, and its profile is shown in Fig. 9. Thus, it may be seen that too many rocks equally accentuating a multiplicity of points is a more common and objectionable condition than the presence of a too limited number. In the plan of the rock garden, Fig. 8, the rocks are less crowded than in most gardens, leaving more area for plant effects and are given dominance only at areas designated by the letter "C". The size of the rocks used should be determined by the scale of the garden. Some standard-sized rocks should be selected for general use, sup-

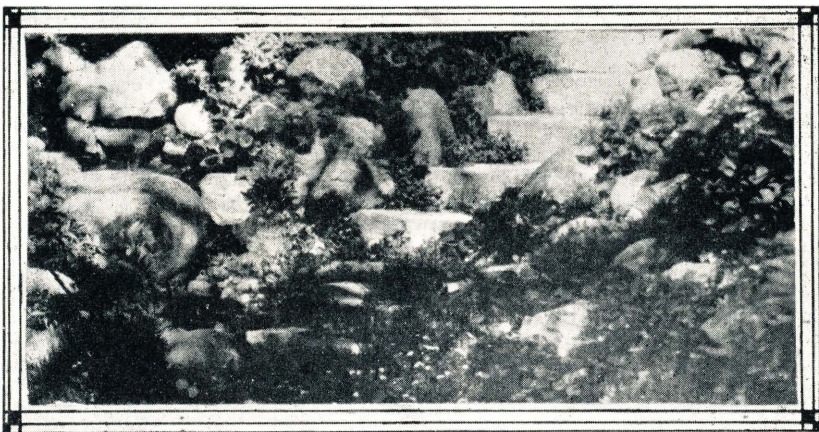


Fig. 10. Glacial rock of irregular forms and of subdued weather-worn colors blend best in the informal rock garden.

plemented by a few larger and smaller ones for special locations. Large rocks develop the effect of strength and stability while small stones used too extensively tend to develop a weak, temporary, and artificial effect. Large rocks seem an inherent part of the area, though small stones are desirable to supplement the larger stones.

To gain the effect of naturalness with boulders, it also is necessary to be very discriminating in the form and color of the rocks selected. It is well to search the fields for the boulders of irregular, rather than rounded forms that by weathering have become of a rather dark, neutral color. Freshly dug, rounded, or light-colored boulders cannot give the effect of having been there from time immemorial. Such types of boulders, instead of forming a subdued setting for the plants—the beauty of which should constitute the leading feature of a garden—are themselves so “striking” to the eye as to dominate the scene. Glacial boulders are generally so hard and impervious that they weather very slowly. Therefore, boulders already weathered should be selected and embedded into the soil at least to the depth of their weathered line. Thus, in the selection of rocks, it should not be the aim to select distinctly beautiful specimens of gaudy colors or unique formation, as for a museum, but rather those of less conspicuous characteristics that harmonize with each other. Such similarity or repetition in form, color, and texture of the rocks tends to develop the effect of unity which is an essential condition for the presence of beauty.

Thus, the goal in building a rock garden is to develop beautiful landscape by introducing rock-formed slopes and areas and forming them into one natural, harmonious unit. In the attainment of this aim, the selection and placement of suitable rocks is of prime importance.

THE GARDEN EXPOSURE

In considering the site to be selected for the rock garden, it is well to be informed as to the advantages and limitations of the garden as determined by the exposure. A southern exposure insures the maximum amount of sunlight to sun-loving flowers but likewise exposes them to prolonged summer heat and to the injurious effect of the alternate freezing and thawing action of late winter and early spring. A northern exposure provides less sunlight but more coolness and moisture which some plants require. An eastern exposure, being more moist, cooler, and better protected from wind than a western exposure, is generally preferable for plant growth. A western exposure is



Fig. 11. A "bit" of a slope in the rock garden composed in apparent effortless harmony.

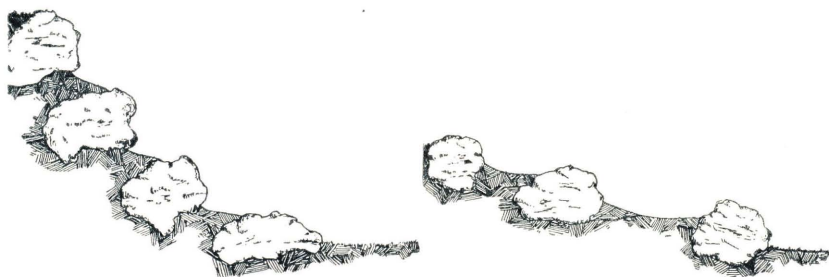


Fig. 12.

*A close assemblage of rocks to form
an abrupt slope.*

*A more scattering assemblage to form
a mild slope.*

very trying during hot, dry periods of the summer and for the wintering of many perennials. Therefore, a site that is protected from the south and west sides is generally desired for the welfare of flowering plants. Many rock garden plants, however, are able to thrive under any of the climatic conditions likely to be encountered, providing the site is at least moderately sun-exposed and well drained. Few flowering rock plants thrive, however, in full shade or endure poor drainage conditions.

Most rock gardens provide within their boundaries such a variety of exposures that sun-exposed, wind-protected, shaded, and other types of sites may be found within the same garden area. A consideration of these conditions in selecting the particular kind of flower for each exposure will help to insure most satisfactory results with the plantings.



Fig. 13. *A hillside makes a desirable site for a rock garden but an aimless, rock-strewn slope does not constitute a rock garden.*

THE GRADING PLAN

The grading plan of the rock garden is the very basis upon which the arrangement and effect of the rocks and plants are determined. One is endeavoring in the grading to produce such a setting as will make the presence of the rocks and plants most reasonable and fitting.

Since rocks, as found in nature, usually constitute a part of a rugged, broken or picturesque landscape, it is this type of landscape beauty that should generally predominate in a rock garden. Therefore, the grades in a rock garden should be abrupt and broken, being especially steep where rocks are most predominant. Where the rocks are more scattering, the slopes should be gentler, more receding, and graceful.

Rocks upon slopes tend to retain the soil above them. (Fig. 12.) Therefore, the elevation of the soil above a rock upon a slope is commonly higher than at other points where the forces of erosion have washed it down the slope. Thus a rock-strewn slope instead of forming a flat face assumes the form of ridges that are high above the outcropping rock and lower between them. Each of these weather-exposed rocks has its weather-exposed face on the downward side of the slope with the soil sloping more gently away at



Fig. 14. A steep, rugged bank may prove an admirable site for a rock garden.

the base than the general grade of the bank. (Fig. 12.) Most of the upper surface of each rock will also be soil-covered almost to the front face. Embedding weathered rocks in the rock garden with the grades about them simulating those seen in nature tends to produce a natural and fitting effect. Each rock will seem to be a natural feature of the spot instead of appearing as being rock carried from a distant place and aimlessly strewn about the surface of the slope. This practice of embedding the rock in the soil also tends to make them appear firm, stable, and permanent. With glacial rock, it will be desirable to bury them at least to the depth of their weathered line, if they are not to appear as recently moved rock.

Thus, rock gardens appear most fitting when composing a part of a sloping bank, a picturesque vale or sites too abrupt and broken for general garden effects. When such terrain is not available, one must determine the particular type of rock effect that can be most readily developed and that will prove most reasonable and fitting. Sometimes, where the site is level and the area small, it is more reasonable to frankly accept these limitations and build a formal rock garden. Where the area is somewhat larger and the environment more informal, the terrain may be reconstructed to simulate a small rocky vale with less labor and expense than might at first be supposed. This could be accomplished by digging out a walk area a foot or more below the present grade, and using this soil for raising the areas on each side, as shown in Fig. 9. If this walk is laid in a meandering line, it forms an apparent excuse for the construction of a bold, abrupt, protruding ridge around which the walk circles as at "C" in Fig. 8, and for mild receding slopes at other points.

It will prove helpful in working out such a garden scheme to have a plan drawn to scale on paper, indicating at least the main features, such as the higher and bolder portions of the garden, the path, pool, steps, seats, and boundaries.

THE PLANTING PLAN

Though rocks should constitute a basic feature of a rock garden, the beautiful effects as developed by plants, should dominate the scene. A garden,



Fig. 15.

after all, is primarily a place for the growth and enjoyment of beautiful effects of plants. There are landscape scenes that may be developed about the home grounds where rocks themselves may constitute the leading feature, but the informal rock garden is primarily a flower garden, where the beauty and prevalence of flowers in such a setting constitutes the most attractive and dominating feature of the effect.



Fig. 16. Rocks should be used to produce the distinctive setting desirable for rock plants but should not be so numerous and dominant as to monopolize the effect.

In addition, a rock garden should be a very distinctive type of flower garden. It should be characterized not alone by rocks and plants, but more particularly by such kinds of plants as are generally associated with these conditions. Many plants are therefore thought of as being distinctly rock garden plants. They are plants that seem to require the setting of a rock garden to appear most appropriate and pleasing. Culturally, many of them require the conditions that may be produced by the use of rocks for their best development. Some of the general flower garden plants also can be used advantageously in the rock garden.

There are a host of flowering plants, however, that are distinctly out-of-place in such an environment. Geraniums, coleus, scarlet-sage, cannas and most of the other foliage and flowering plants used for bedding purposes are exceedingly inappropriate in the informal rock garden. China asters, zinnias, nasturtiums, cosmos, and many of the most popular flowering annuals also appear out of place here. Most of the coarser and higher growing perennials of the cultivated garden are likewise neither in spirit with the effect of a rock garden nor culturally suited to the conditions. Therefore, one should discriminate in the selection of plants, that their effect may prove harmonious in expression with that of the rocks and other conditions of the garden.



Fig. 17. The low spreading forms of hardy perennials and evergreens are especially fitting in the rock garden.

COLOR HARMONY: It is preferable usually to make the selection of the plants such as compose harmonious color effects at certain specific seasons rather than to choose them with the aim of having a succession of flowers throughout the entire growing season. A delightful spring effect may be produced in the rock garden by a proper selection of about three kinds of plants that are simultaneously in flower at this time, such as *Arabis albida* for white,



Fig. 18. The deeply penetrating roots of many rock plants are favored by the uniformly moist, cool soil conditions that rocks provide.

Alyssum saxatile for yellow and *Phlox subulata rosea* for pink. Such combinations should be of harmonious colors with each kind arranged in groups and masses, irregularly disposed throughout the garden at sufficiently repeated intervals to brighten the entire garden scene. Intervening areas may likewise be planted to other harmonious selections for succeeding seasonal effects. Hence most of the kinds of plants to be grown should be used in such quantities that their inherent beauty of flower or foliage may be cast over the entire garden scene rather than given to one apparently isolated spot.

Since most of the rock garden perennials are such diminutive plants as to produce individually but a small amount of foliage or flower color, they should be used in close masses occupying areas of sufficient extent to be in scale with the garden design, and to be effective at the distance from which the garden is to be seen and enjoyed. In large gardens where woody vines, sprawling shrubs, and low-spreading junipers are used, the areas of the masses would be proportionally greater.

The practice, however, should be not to choose a great variety of plants in trying to make pleasing garden effects, but rather to select only a few kinds that are the ones best suited to the cultural conditions at hand and to the garden effects one aims to develop. Repetition in the use of the kinds selected tends to give character and unity to the plantings. Having a major portion



Fig. 19. An informal rock garden.
Before planting.



*Fig. 20. An informal rock garden.
After planting.*

of the garden planted to these basic kinds of plants for specific seasonal effects, one may then indulge sparingly in the selection of a few of a variety of other kinds of plants for special locations or effects that will not conflict or compete in any way with the prevailing effect.

HARMONY OF FORMS AND TEXTURES: If one is to produce most delightful effects in the rock garden, it is necessary to give some consideration to the planting composition from the viewpoint of the harmonies in textures and forms as well as of the colors in the plants selected. Thoughtless combinations of fine-leaved plants with large coarse-leaved ones, or of upright forms with spreading or sprawling ones are common faults that detract from the delightfulness of many flower gardens. There should be a standard of texture typifying the garden scene with such moderate variations as may be reasonable for special portions. Usually, fine textured effects are most desirable for nearby areas and small scaled effects, while coarse textured plants are for large scale plantings and for more distant effects. Since rock gardens are usually rather limited in extent and are most commonly enjoyed by intimate association, it is more reasonable to use plants of finer textured foliage and flowers than characterize most other types of gardens. Even here, however, it is well to remember that the finer leaved and flowering plants should

generally be near the front of the planting and the larger, coarser growing ones toward the back.

Since most of the planting areas of a rock garden are raised one above another, the need of upright growing plants is not as great as in general gardening. Therefore, a predominant proportion of the rock plants may well be of the low, spreading, or mat-forming type. Where protruding ridges occur in the terrain of the garden, they may be accentuated by planting upon their summits the more aspiring forms. Under other conditions, the upright bushy plants may prove the most fitting. There is no one form that should always be used to the exclusion of the others, but it is important to appreciate that beautiful garden effects are measured to a degree by the unity in the forms of its compositional elements. Thus beautiful planting effects are developed by such selection and arrangement of the plants as to produce harmonies of colors, textures, and forms. These are the three stepping stones to beauty in the compositional arrangement of plants.



Fig. 21. A heavily planted rock bank showing contrast in foliage texture.



Fig. 22. A dense planting of shrubs and small trees makes a pleasing background for the rock garden.

THE INCLOSING PLANTING: The landscape effect of a rock garden is generally in such strong contrast with the beauty that characterizes the environment of a home grounds as to require an inclosing, informal planting about it to prevent the displeasing contrast of these conflicting types of landscape beauty. The planting of such an inclosing enframement with hardy shrubs or small trees, that will not unduly shade the garden, gives the effect of completeness to the garden scene and may also serve to protect the plants from unfavorable winds. The rock garden upon a bank or sloping site, likewise requires an inclosing planting which further serves as a pleasing background for the garden.

Usually the topography immediately about the home is subdued to such a degree that the presence of any great number of rocks about the front lawn area or other lawns appears incongruous, unreasonable, and inharmonious. In a rugged, broken topography where rocks are a conspicuous feature of the native landscape, they may well form a basic feature, but such conditions about the home are not generally prevalent in this part of the country. Therefore, rocks should not generally be used as a part of the general landscape development of the home grounds, nor can the rock garden itself constitute the main feature in the general development of the grounds and be in harmony with the surrounding landscape. Usually, the rock garden should be an inclosed development constituting simply a non-dominant part in the general development of the grounds.

THE WALL GARDEN

Where the site for the rock garden is too abrupt for an informal arrangement of the rock, it may be composed to form a retaining wall so constructed as to provide for the development of certain kinds of plants in the soil filled crevices between the rocks. (Fig. 24.) In cases where a concrete-bound rock wall is necessary, it may be so built as to provide soil-filled spaces at irregular intervals extending through the wall for the growth of plants as seen in Fig. 26. The presence of appropriate plants spreading their verdure and beauty over the otherwise unclothed rock transforms the bareness and bleakness of such a construction into a pleasing and more harmonious landscape effect. (Fig. 27.)



Fig. 23.

The stability and permanence of this sort of construction depends to a large degree upon the efficiency of the foundation. It is important to construct the foundation to a depth of two and a half to three feet to be below the frost line and to provide effective drainage at this depth by a tile drain line laid beyond the back or supporting side of the wall. In order that drainage may readily reach the tile the filling directly above this tile line and immediately behind the wall should be of gravel, cinders, or other pervious material to a height of within a foot of the surface. (Fig. 26.)

The foundation of the wall should be somewhat wider than the upper section, especially, where the subsoil is sandy or otherwise does not constitute a firm base for the weight of the wall. It should be composed of concrete or of rock bound with concrete and constructed to within a few inches of the surface. (Fig. 26.)

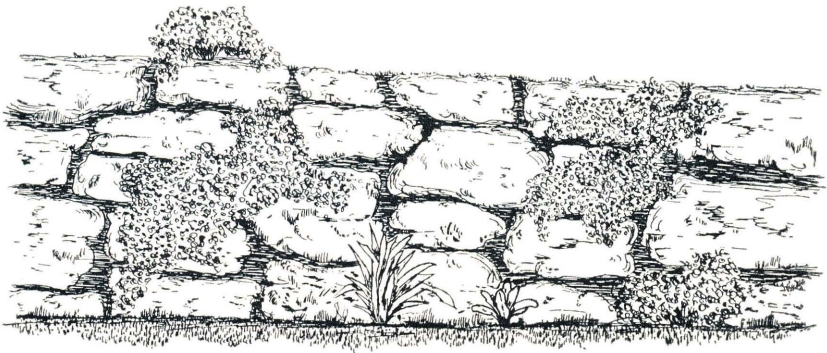


Fig. 24. A rock wall should be so constructed as to provide favorable conditions for the growth of plants in the soil filled crevices.

Walls are generally constructed with a perpendicular face. However, where plants are to be grown in a wall, the face should be built at a receding angle and the soil-filled crevices and fissures constructed with a moderate slope downward from front to rear. Built in this way, a greater amount of moisture will strike the face of the wall during each rainfall and more of it will be carried into the soil-filled spaces. To facilitate the absorption of this water, the soil in these crevices should usually be modified by the addition of sand, stone-chips, or other material. (Fig. 25.)

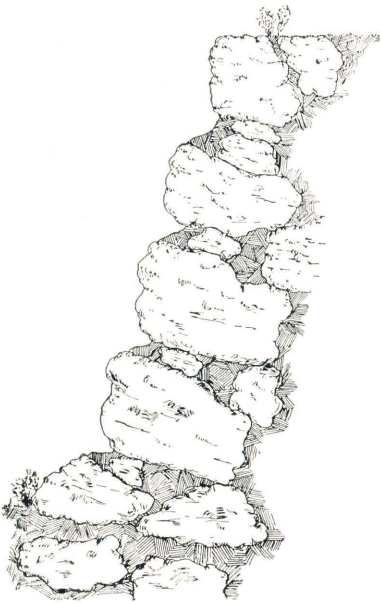
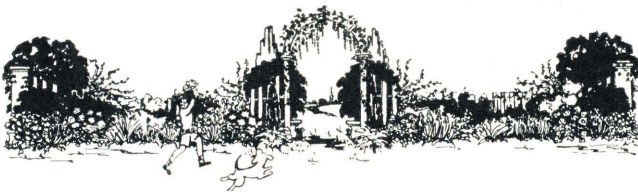


Fig. 25. Profile of a soil-bound rock wall showing receding face and large stones held apart by stone chips in the soil-filled crevices.

Large rocks are more desirable for soil-filled retaining walls than small ones. As these are placed into position, they should be firmly blocked with large stone chips to hold them permanently apart and thus prevent their settling. (Fig. 25.) The soil should be packed firmly into these spaces as each rock is placed in position rather than after the placing of all the rock is completed.

All "random" walling is ugly. It is always best to lay the stones level and on the side upon which they laid naturally. They may be sorted into sizes for courses of approximately the same thickness, or the thinner stones may be laid to come level with the thicker ones in the same course.



Where concrete is used to bind a retaining wall, it should be so made as to blend in color or be as subdued in color as the rock itself and laid with deep joints to preserve the rough texture effect of the rock and to be as little apparent as possible. At irregular intervals, moderately spacious sloping openings should be left extending the entire distance through the wall and through the drainage layer of gravel or cinders behind the wall and filled with prepared planting soil. (Fig. 26.) The roots of the rock plants in these spaces will then be directed through the wall and through this drainage layer to the soil area of the bank. Thus, a large root feeding area is provided for the plants.

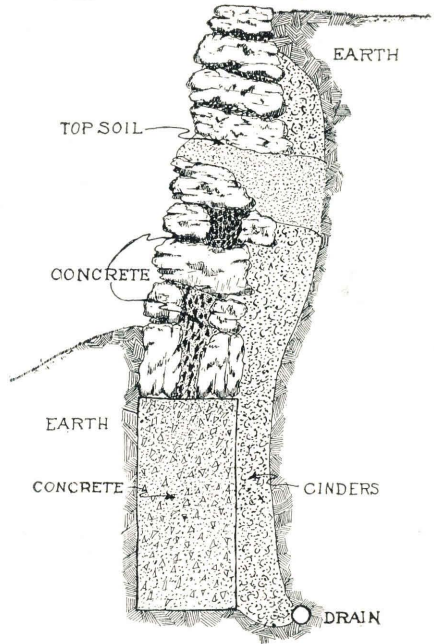


Fig. 26. Profile of a concrete bound retaining wall, showing proper details of construction and a soil-filled fissure through the wall for planting.





Fig. 27. Retaining walls may be made the leading feature of the rock garden when they are well planted.

WATER EFFECTS

Water effects in the form of restful, cool, informal pools and of gay, restless, cascading streams seem so appropriate and acceptable in the rock garden as to prove an almost essential feature. Their presence forms an additional

element of interest and variety in such a scene. Hence, when planning a rock garden, it is well to consider the possibility of having a naturalistic pool in an appropriate part of the garden. If this can be supplied by a moderate sized stream meandering and cascading down an adjacent rocky slope, it may prove one of the most fascinating features of the garden. The absence of such a constant water supply does not preclude the feasibility of developing a simple informal pool to be refreshed with a limited amount of water as occasion requires. A pipe line connected with the water system of the

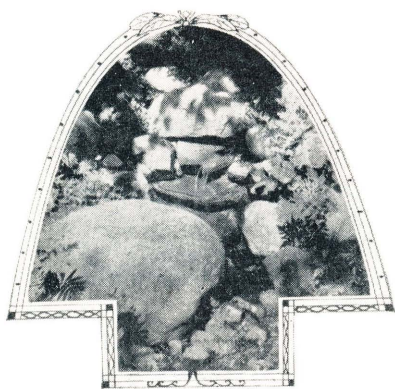


Fig. 28. A graceful, naturalistic cascade may constitute a fascinating feature of the informal rock garden.

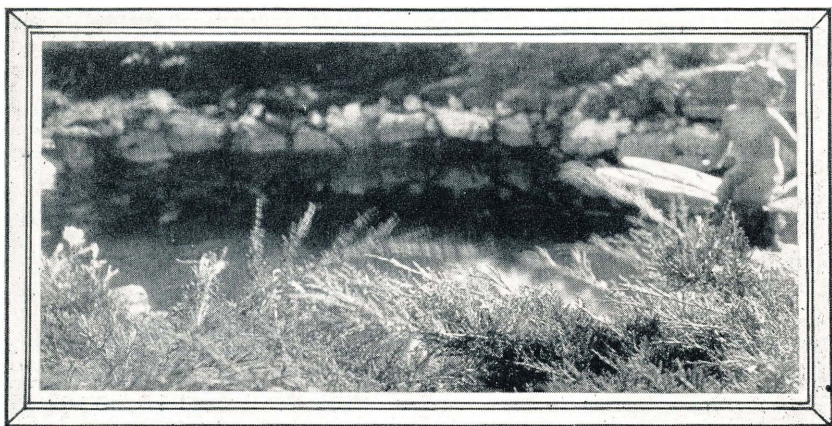


Fig. 29. An informal rock garden pool makes an appropriate development in the lowest apparent portion of the garden.

house makes a most convenient means of supply. When this is not available, one may furnish the water as needed with a garden hose. A small informal pool does not require a lavish supply at frequent intervals. In fact when water plants are to be grown, a constant supply, unless of small capacity, is not desirable because fresh water is commonly too cold for plant growth; but, where fish are to be present, it is desirable to keep the water refreshed by a constant, uniform supply.

Development of a pleasing garden pool involves first the selection of a site that will apparently be the lowest in the garden where one might reasonably expect a pool to exist. The general shape should be informal, graceful, and fitting in relationship to the grades about it and to the general position it occupies in the garden. (Fig. 8.) If the pool happens to be placed near the boundaries, enough room should be left between them and the border of the pool for plantings to form a pleasing background, setting, and screen. After the proposed shape of the pool has been staked out, the soil should be excavated to a depth of about two and one-half feet. In making this excavation, all portions of the sides and bottom should be brought to an even, firm surface, leaving no soft spots. It is usually preferable to build an informal pool with curved sides simulating the form of an egg, instead of with perpendicular sides as for a formal pool. This would require the construction of forms, and would be more difficult to construct sufficiently well to prevent cracks and leaks, especially, at the union of the side walls with the base. After the excavation is made, a layer of six to ten inches of cinders or gravel should be firmly packed as a sub-base.

All drains and pipe lines should be installed before the concrete is laid. To facilitate draining the pool at any time, an outlet drain with a shut-off valve accessible from a nearby valve box, as shown in Fig. 30, should be installed at the lowest point in the pool. An overflow drain pipe also should

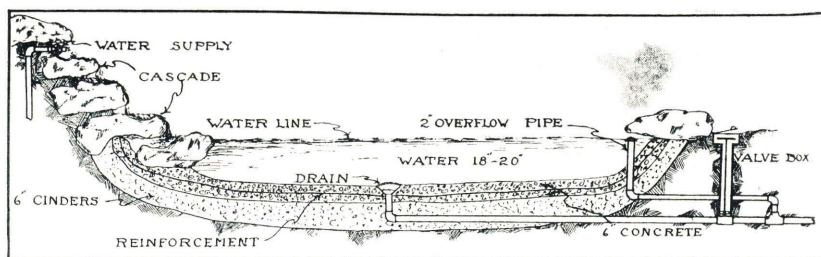


Fig. 30. Cross-section of a garden pool showing details of construction.

be provided and may be connected with the same outlet drain at a point beyond the shut-off valve. The intake to the overflow line and the drain should be capped with brass screens to prevent debris from entering and clogging the pipe. Usually, such as overflow pipe is not a beautifying thing and, therefore, its presence may well be hidden by an overhanging rock or by other appropriate means. If the water is supplied through a pipe leading directly to the pool, it should enter near the bottom at a point most distant from the overflow intake, to insure the greatest circulation through the pool. After all drain and supply pipes have been constructed, the concrete base and sides may be laid. It is important that reinforcement in the form of three-eighths inch iron rods placed about 16 inches apart each way be laid to within three inches of the base of the concrete and wired together. If such rods are not available, medium-mesh wire fencing may be used to serve as reinforcement. The side walls should be constructed to an elevation of within a few inches of the surface of the ground, and the overflow drain should be adjusted to within an inch or so of the top of the concrete. The nearer the water surface approaches that of the ground about it, the more apparent and extensive is the water effect.

The artistic effect of the pool will be measured to a large degree by the finishing of the walls at the waters edge in such a way as to hide the artificial looking concrete and develop a semblance of naturalness. A special shaping

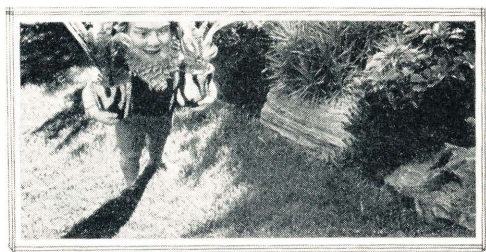


Fig. 31. Cheerful gnomes, brimming with willingness and mirth, are by night the unseen workers in our gardens that drive away the slugs, spiders and cutworms—so at least runs the legend.

ing of the top of the wall, by which the concrete is concealed by being over-laid with turf, is made by receding the top of the wall at an elevation about 2 inches below the waterline for a distance of 6 to 10 inches almost horizontally and then curving it upwards to a point a slight distance above the waterline.

At certain accent portions about the border of the pool,



Fig. 32. An informal stepping-stone walk to the pool, making a flowing, graceful line through the informal rock garden.

naturalistic-appearing groups or masses of rock may be placed, some of which may extend over the top of the wall or be partly submerged in the water to harmonize the pool into rock garden scene. An artificial or stilted effect in their arrangement, such as the placing of a continuous row of rocks about the edge as a coping is not appropriate or naturalistic. When rocks are used about the borders of the pool, they should not be laid to pierce the wall. It is usually preferable to set them upon a protruding shelf or ledge built along the inner side of the wall; otherwise, the wall construction should be carried unbroken behind them. It is usually difficult to obtain a perfect union of concrete about rocks to prevent leaking, and often the rocks themselves are porous. Where concrete is used to bind them in place, any that is visible between the rocks should be removed before it hardens.

The concrete may be mixed in the proportion of one part, by measure, of cement to 2 parts of sand to 3 of gravel. About seven sacks of cement would then be used to half a cubic yard of sand and three-fourths of a cubic yard of gravel. This should be thoroughly mixed and then watered to such consistency as to compose a dense concrete that when laid and firmly tamped will hold its position along the sloping sides. The use of too much water dilutes the cement paste. After the concrete begins to set, it should be well worked to an even surface with a wood float. Then it should be protected from sun and drying wind by covering it with soil, straw, or burlap and kept moderately moist by occasional sprinkling. This curing period should continue for three or four weeks. The pool should not be filled during this time as the great weight of the water will crack it. When the pool is finally filled after curing, the water will absorb the free alkali from the concrete. This would be harmful to plants or fish. Therefore, it should be filled for a period of two or three weeks to absorb this free alkali and afterwards drained and refilled with fresh water before planting or stocking with fish.

CULTURAL REQUIREMENTS OF ROCK PLANTS

By C. E. WILDON
Section of Horticulture

Just as diversity in locations permits or necessitates the development of many kinds of rock gardens, it permits or compels the use of many kinds of plants in these gardens. These various kinds have one trait in common, they must be more or less dwarfish in habit of growth. This trait, along with adaptation to other requirements of the rock garden, is found predominantly in plants growing naturally on high mountains between the timber line and the region of perpetual snow. These are all called alpine plants but they vary greatly in type. All have become adapted to the short growing seasons (90-120 days) prevalent in such regions and to withstand extreme cold and wind. They are mostly evergreen, many of them passing the depths of winter under heavy snows, ready to produce a profuse and amazingly brilliant display of flowers at the first appearance of the short summer. The flowers are produced quickly and lavishly and seed is produced abundantly and ripened before the winter sets in again.

In the struggle for existence, the relative sizes of the root systems and the tops of the plants become disproportionate as compared with plants of the lowlands. The root system of the tiniest alpine may extend many feet through the scanty soil in rock fissures or on rock ledges in search of the necessary moisture and minerals, while the intensity of the sunlight neces-

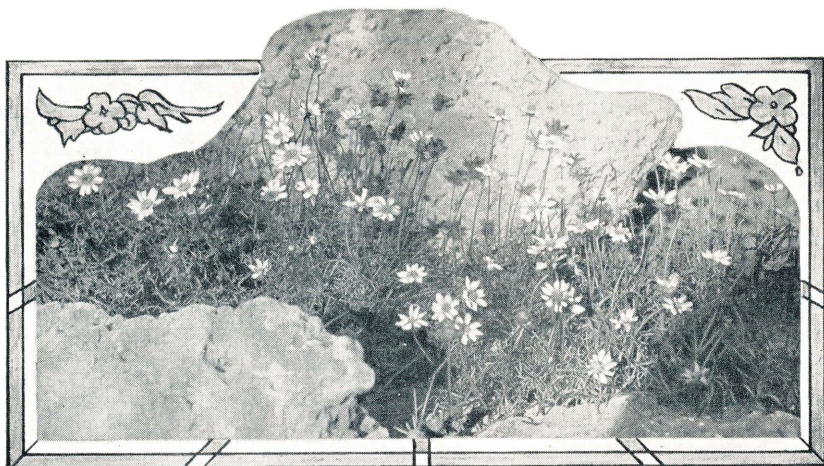


Fig. 33. *Leptosyme Stillmanii*, a splendid quick growing annual with bright yellow daisy-like flower heads, is valuable for quick effects in the rock garden and for its brightness of color at times when the rock garden is likely to be lacking in color.



Fig. 34. *Campanula rotundifolia* varies in habit, foliage and other characteristics with changes in environment. Here it is shown at home on moist cliffs in central Michigan. The foliage is long and narrow and the stems wiry.

sitates only small amounts of foliage in proportion to roots and to the flowers produced.

Fierce winds and heavy snows have also helped to cause dwarfness in these plants. These elements tend to rip the plants away or to flatten them to the surface; consequently those that develop a tenacious hold on the rocks, offering the smallest possible surface to the force of the wind, have survived. They developed dense, compact tufts, dense mats, or closely clinging, prostrate, or climbing habits of growth most adapted to survive.

These plants have also developed in other ways to fit their environment. Some, such as *Anemone alpina*, *Alyssum serpyllifolium*, *Campanula elati-*

noides, and *Artemesia atrata*, grow only in regions where limestone is the rock form. Others, such as *Erigeron Coulteri*, *Eriogonum ovalifolium*, and *Dianthus glacialis*, appear only on mountains of granite rock or rock of an igneous nature. Some, as *Pentstemon rupicola*, *Androsace helvetica*, and *Pentstemon diffusus* grow on the exposed sides of rocks in full sunshine; others, as *Campanula Piperi* and *Saxifraga aretioides*, grow on natural ledges or wedged in rock crevices, and still others, as *Primula farinosu* and *Erythronium*, are found in shaded or partially shaded nooks. Some grow on a northern slope and not on the southern slope of the same mountain or vice versa, clearly indicating different requirements for growth. There are small basins on exposed slopes and in valleys which through the ages have filled up with organic matter and rock debris. Some of these are bog-like, others well drained, and each has its distinctive flora.

This diversity of natural environments and of plants growing in them serves as a guide to the culture of these plants in the rock garden. The natural habitats must be examined closely. This may be done rather easily with native plants (Fig. 34) but not in the case of exotics or plants whose native homes are at a distance.

There are three methods by which one may determine the conditions necessary for best growth. First and best of all, one may visit the natural homes of these plants. Vacation periods of rock plant lovers and owners of rock



Fig. 35. *Opuntia humifusa*, a hardy native cactus with yellow flowers in July, thrives in sandy soil in very dry situations.



Fig. 36. Gilia tricolor is an early flowering hardy annual useful for filling in bare spaces in the rock garden.

gardens might very well include trips to the mountains of the West and of Canada or to New England and other eastern mountains in the early summer. In this way, one can learn at first hand the natural requirements of these plants.

The second method, necessary with many who have no time or means to visit the natural habitats, is to learn about their requirements from someone who knows. An increasing number of persons are devoting time and study to these plants and are willing to give the results of their experience to the uninitiated. There are also many excellent books on the subject. Of these, three are especially to be recommended, "Rock Garden and Alpine Plants" by Henry Correvan; "American Alpines in the Garden" by Anderson McCully; and "Mountain Wild Flowers of Canada" by Julia W. Henshaw.

The third method is that of the hard school of experience. When one finds a plant failing in one situation, he can try it in another place or in a different soil until the proper condition is found. This method is often discouraging, but as one gains in experience one becomes better able to predict the proper treatment for a plant by examining it. For example, plants with deep penetrating roots usually prefer a dry porous soil; large leaved plants need much moisture; and thick fleshy-leaved succulents require a dry gravelly sterile soil.

As one descends a mountain, he finds the different alpine floras gradually changing. At certain altitudes some plants thrive, though they often do not appear higher up or below a certain altitude. The higher mountain ledges,

alpine meadows, and bogs, may have very considerably different floras from those found in similar locations at lower altitudes.

On the moraines are plants such as *Mimulus*, certain *Gentians*, and *Saxifrages*, which seldom appear in other situations. These moraines were originally formed by the deposition of gravel and rock debris on greater or lesser slopes by melting glacial ice. Similar moraines are sometimes formed by flood waters rushing down slopes and depositing sand, gravel, and boulders on the level lands. These moraines are very porous and well drained. As time went on, organic matter tended to drain through the gravel mass so that extremely varying types of moraines are found. One may be almost pure gravel, another may contain a large amount of organic matter, some are comparatively dry, and others may be almost bog-like in nature. Such varying types will naturally display equally variable types of plants.

Below the timber-line of mountains are these same geologic and topographical features but with varying conditions for plant growth. There is more soil and more humus. Plants are larger and have less of the alpine characteristics. Under shrubs and trees are shade-loving plants; and, in the lowlands, an entirely different flora grows.

To many people, rock plants are alpines. This is not entirely true, for, though most alpines are rock plants and practically all of them are usable in a rock garden, there are many non-alpine plants which naturally grow in rocks and often are more easily grown in the rock garden than are the exotic alpines.



Fig. 37. *Euphorbia myrsinites* is an excellent plant for a warm dry situation. The blue green color of the foliage adds to the attractiveness.

CULTURE

SOIL: The soil is a very important factor in the growing of plants in the rock garden. The best general soil is one made of sand or gravel, peat, leaf-mold, and rock chips. If the plant is a native of a limestone region, lime must be added in sufficient quantities to give an alkaline reaction to the mixture and limestone chips in the mixture are very desirable. Plants native in non-calcareous soils are often injured by lime and their soil should be acid; the stone chips in such soils should be granite, sandstone, gneisses, or similar rock with little or no lime, magnesium, or sodium content (Fig. 54). When plants do not appear to be thriving, it is well to test the soil for its reaction. Should it be insufficiently acid, occasional watering of the soil with a weak solution (1-100) of acetic acid or vinegar often gives good results. Where acidity should be still greater, the addition of a small amount (one to five pounds per 100 sq. ft.) of aluminum sulfate (alum) or of lime-free sulfur or of tannic acid in quantities varying with the soil and the nature of the plant, mixed into the soil around the plants will usually suffice. For lime-loving plants, use lime or limestone chips. Addition of commercial fertilizers is seldom advisable as they tend to encourage vegetative growth at the expense of flower production, in case of alpine plants.

The soil for moraine plants should be gravel with varying amounts of peat and leaf-mold. Some plants require almost pure gravel, others a large amount of organic material mixed into the gravel. Alpine meadow plants require much the same general type of soil as the alpiners do, but it should be spongier, containing peat and large amounts of fibrous organic matter. Rock plants from the wooded lowlands require a soil made of loam, leaf-mold, and sand or clay, as the case may be. The soil proper for the different plants is indicated in the discussion of the important plants and in the plant lists (see supplement). The addition of commercial fertilizer may be advisable for this class of plants.

In preparing places for the various rock plants, it is well to remember that drainage is extremely important. Long before the rocks were put in place the site should have been provided with free drainage. The alpiners, though thriving in moisture, cannot endure stagnant moisture. In their natural habitat, moisture trickles over the rocks, flowing ever downward through fissures and pockets. Reaching for this moisture, the roots penetrate deep. In providing positions for such plants in your rock garden have plenty of rocks down through the soil and those rocks showing on the surface should extend deeply into the soil. In preparing for the actual planting of the plants, fill the pockets or fissures to a depth of two or three feet with the proper soil mixture.

Alpine bogs and meadows can be imitated by using one of the larger pockets in the lower parts of the rockery. Dig out the pocket to a depth of several feet. Then carefully line the pocket with flat pieces of rock making

it as water-tight as possible with the crude rock. It may be advisable to

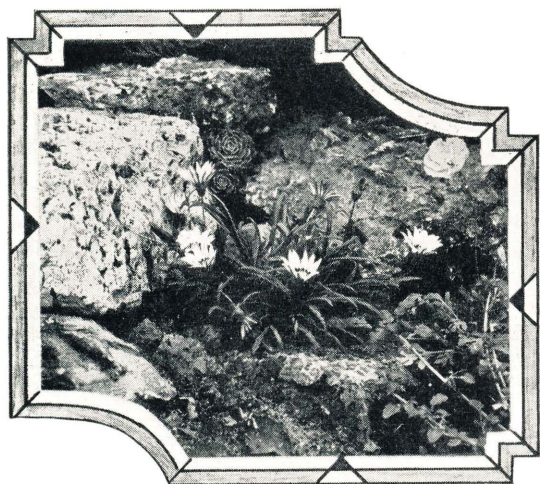


Fig. 38. *Gazania longiscapa*, a half-hardy perennial with bright yellow flower heads, growing in a pocket between rocks. It should be taken up in the fall and wintered in a frame.

face the bottom of the pocket with a coating of cement to form a basin-like depression six or eight inches deep which will hold moisture. When the cement is dry put in a ten-inch layer of gravel and then fill with a mixture of two to three parts peat, one part leaf-mold, and a little gravel. The top layer may have a larger proportion of leaf-mold and sand. An artificial meadow or bog of this kind will grow many moisture-loving plants such as *Mimulus*, *Caltha*, *Lobelia*, *Myosotis*, *Parnassia*, certain species of *Primula*,

a few *Saxifraga*, *Trollius*, and others. Where it is possible to have moisture trickling over the rocks, an imitation rock shelf will hold a layer of gravel and humus through which the moisture will pass and allow a number of alpine plants that will not thrive under any other conditions to be grown very easily.

The moraine can be arranged at the base of the rockery by supplying a proper depth of sand and gravel mixed with a little peat and leaf-mold. Stones carefully placed over the surface to imitate the natural moraine give opportunity to grow any of the moraine plants.

PLANTING: Planting of pot-grown plants in the rock garden is no more difficult than planting any other plants in the ordinary garden. Carefully firm the soil around the ball of earth using a pointed stick to ram the soil into place. If the plants have not been grown in pots the planting must be done much more carefully. The roots should be spread out and extended to their full length in the fissure or rock pocket. The soil should be carefully filled in a little at a time around the roots and rammed into place with a stick. Very small fragile plants should not be placed where they will be overshadowed by rampant kinds. Plants should be grouped so that a mass effect of the color of the flowers or foliage may be obtained. The rampant, fast-growing, and climbing plants may be set where they will overlap rocks without danger of encroaching on the domain of other plants or they may be planted at the base where they may run off into the moraine or the surrounding terrain. It is wise to devote a single pocket or fissure to but one kind of plant, unless the

area is large and the plants are very small forms that are naturally associated in their native haunts. There are many alpine bulbous plants such as *Crocus*, *Tulip*, and *Chionodoxa*, which may well be planted in the rockery. These may be planted among rampant or closely carpeting alpines such as *Phlox subulata*, *Thymus*, Mossy *Saxifraga* and *Arenaria*. Neither will be harmed by the presence of the other and the bulbous plants will add much of interest to the garden. Do not, however, select kinds that grow too large. Select kinds that naturally grow in high rocky mountains, such as *Tulipa Clusiana*, *Narcissus cyclamineus*, *Chionodoxa*, *Leucojum*, *Muscari*, and *Scilla*.

In the very small rock garden, there is, of course, no place for trees and shrubs except such dwarf forms as *Phyllodoce empetriformis*, *Polygala chamaebuxus*, *Rhododendron chamaecistus*, *Daphne Cneorum* and similar plants. In the larger rock garden, many dwarf shrubs and trees are useful. (See supplement.) These should be set in places where the roots will not interfere with the alpine plants.

After the planting is completed, the soil around and between the alpine plants should be covered with stone chips, using limestone chips for the lime-requiring plants, and sandstone or granite chips for the lime-intolerant plants (Fig. 54).

Some plants, such as *Eritrichium nanum*, *Androsace glacialis*, and *A. alpina*, are often difficult to grow unless they are given the airiest position in the rock garden. For these, mix a liberal quantity of sphagnum moss throughout the soil, using almost pure sphagnum with a little leaf-mold and peat for the top three or four inches. If such a plant requires lime, mix limestone chips with the sphagnum.

CULTIVATION: The rock garden should not require much labor in its maintenance. Weeds should be destroyed as soon as they appear. Keep after them continually and do not allow them to get established, as they are



Fig. 39. *Lavendula vera*, "Sweet Lavender," is excellent for rocky slopes and for the large rock garden. The delightful fragrance of the dried flowers lasts indefinitely.

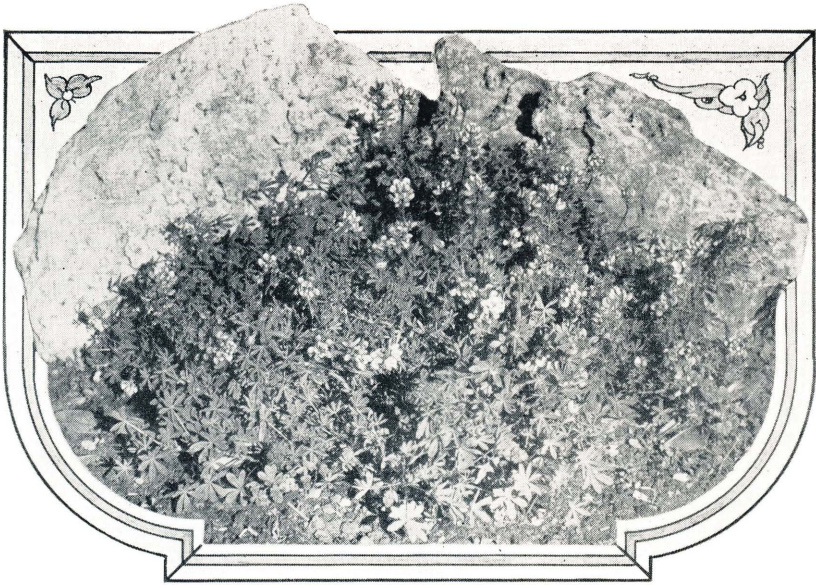


Fig. 40. Lupinus nana, an annual with rich green foliage completely carpeting the ground and an abundance of beautiful blue flowers, is excellent for planting with the hardy spring bulbs.

then more difficult to remove and are likely to injure delicate plants seriously. When the rockery is first established, some watering is required until the plants have become established. After that, there should generally be little need for artificial watering, if the rockery has been properly constructed. Plants newly introduced into the rock garden may be watered individually, as required, until they are established. Winter protection to the rock garden is not necessary for the alpine plants except where it is necessary to protect them from water. Some of them are extremely intolerant of water on the foliage and about the crown during the winter, but alpine plants are not injured by snow. In case of mild rainy winter weather, they should be protected from excessive moisture. A mulch of stone chips close around the plants helps materially. (Fig. 54.)

In the spring, the established rock garden will require some attention. Many times plants will have been heaved out of the soil by the frost. Melting snows and spring rains will have washed much soil away. The lost soil should be promptly replaced and plants that have heaved out should be firmed in and mulched with soil and stone chips. Some alpine and moraine plants naturally appear to grow out of the soil; these require mulching every year with fresh soil. In the native homes of these plants nature accomplishes this by washing stone debris, humus, and sand down around them. After mulching, always cover the soil again with stone chips.

PROPAGATION

SEEDS: Although the kinds of plants used for rock gardens, may be propagated very easily, the amateur gardener generally finds it much cheaper to purchase the plants for his rock garden than to attempt to propagate them for himself.

The majority of these plants can be propagated from seed. The best soil for the seed is a well-drained soil made up of one-third peat or leaf-mold, one-third woods loam or garden loam, and one-third sand. To this mixture may be added a little lime for plants requiring lime. Some plants may require special mixtures of different ingredients. Often, finely chopped sphagnum moss mixed with the soil is desirable. Rotted sawdust, cocoanut fibre, powdered charcoal, and similar materials are sometimes used. For nearly all of the alpine, a well-drained soil is necessary and, for this reason, the soil may well contain more, rather than less, than the amount of sand indicated. In selecting a container for sowing the seed, it should be remembered that many of these plants send out long roots entirely out of proportion to the size of the plant. Often, the tops remain extremely small for a long time while extensive root systems are developed, as for example *Adonis vernalis*, *Silene alpestris*, and *Phlox adsurgens*. When such plants are finally ready to be transplanted, recovery is rather difficult because of the severe injury necessarily done to the roots.



Fig. 41. The dainty thread-like *Tunica saxifraga* thrives in the soil-filled crevices of the rock in walls, steps, walks and other places.

For this reason, many specialists in the growing of these plants sow the seeds in tiny pots, a few to each pot. Small pots, called rose pots, not over

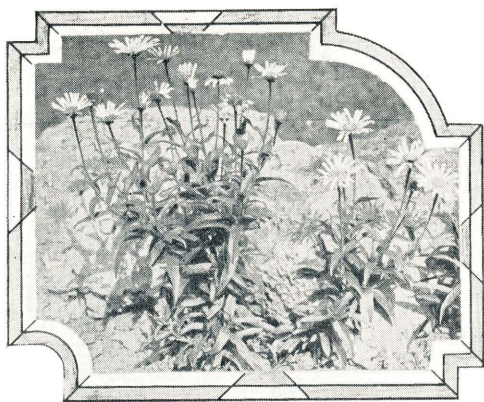


Fig. 42. *Bupthalmum salicifolium* adds interest to the rock garden in the summer months. The rich yellow flowers make a splendid contrast with the blue of *Campanula rotundifolia*.

two or two and one-half inches in diameter and three to four inches in depth are best. Other kinds may be sown in standard size pots or shallow boxes. Pots are preferable, for each kind can be given a separate pot properly labeled. Whatever container is used, perfect drainage should be insured from the start. This can be obtained by filling the container one-third to one-half full with small stone chips. Over this may be placed a thin layer of sphagnum moss or granulated peat and then the con-

tainer filled with the soil mixture. After the soil is carefully firmed, the seed is sown on the surface and covered by sifting over it a mixture of two-thirds sand and one-third finely screened peat. Barely cover the seed. The pots or boxes should then be set with the rims level with the soil in a well-drained coldframe.

The proper time for sowing the seeds of most of these plants, especially those flowering early and maturing their seed early in the season, is in the fall soon after the seeds have matured. With many kinds, such as *Primula*, if the seeds are sown in the spring, they germinate slowly and sometimes require two or three years. Such kinds usually germinate quite readily if sown soon after maturity. When planted in the fall, the seeds need no protection during the winter except from heavy rains. Snow fall will not harm them; some growers even claim that a covering of snow for a time over the seeds makes slow germinating kinds germinate well. Some kinds, such as *Alyssum* and *Papaver*, of course, will germinate quickly, but these will not be harmed at all by winter weather. After the seeds are planted, they should never dry out. Water carefully to avoid washing the seed. During rain storms cover the frames with sash. At all other times leave the sash off entirely. Shade-loving plants should be protected from direct sunlight with cloth shades.

The growing of these plants in pots is becoming more common and has decided advantages. Potted plants may be planted in the garden at any time of the year without danger of loss. In purchasing plants, one should insist on pot-grown plants, although they cost more, as there is less danger of loss.

DIVISION: Many of the alpine perennials can be propagated readily by division of the old plants. The best time for doing this varies considerably. In general, most of them are best divided shortly after flowering. Some kinds, such as the Polyantha Primroses, can be divided at almost any time. Bulbous kinds do best if divided in late summer and replanted immediately. Some kinds, such as *Achillea*, *Arenaria*, and *Sedum*, are divided by cutting up the tufts or crowns or by pulling the plant apart. Others are divided by cutting up the roots, or rhizomes, as in the case of *Iris*. Many kinds can be planted out immediately after dividing, if this has been done in the fall or spring or if the plant is in an inactive condition. Those kinds divided during hot dry summer weather are best potted and given the benefit of more careful attention in coldframes until they have become established.

LAYERS: Another method of propagating many of these plants is by means of layers. All trailing, creeping, climbing, and procumbent kinds as well as other sorts with branches close to the ground, may be propagated in this manner. Many trailing, and creeping sorts, such as *Potentilla*, *Thymus*, *Vinca*, *Phlox subulata* (Fig. 56) naturally send roots out from the stems and propagation of these consists merely in cutting off the rooted parts, planting them, and carefully caring for them until they become established. Tiny trailing forms are sometimes rather difficult to establish. Several growers propagate these by plunging small pots of soil into the ground close around the plants. In time, the stems grow over the pots, establish roots in them and may then be cut away from the parent plants. This is a very easy and satisfactory method. Other



Fig. 43. *Pentstemon glaber*, native of the west, is at home in the rock garden. The rich blue color of the flowers and the smooth blue-green foliage makes this plant specially valuable for summer effects.

kinds which do not produce roots naturally along the stems, such as some *Dianthus*, *Rhododendron*, other *Ericaceae*, and procumbent plants may be induced to send out roots by injuring the stems and then burying the in-

jured portion in the ground. These eventually root and may then be separated from the main plant.

CUTTINGS: Propagation of hardy plants by means of stem cuttings is not difficult. Two types of cuttings, depending upon the plant, may be used. Most of them are rooted readily by simply cutting off one to four inches of the end of a branch and inserting it in sandy soil in a coldframe. Some kinds, such as species of *Dianthus* and dwarf *Thuya*, root much better if the cutting is taken with a "heel." In this case, a side branch is selected and pulled out of the main branch, bringing with it a small portion (the "heel") of the main branch. Trim off fibrous material on the "heel" and surplus foliage and insert in sandy loam in a coldframe.

A few kinds, such as *Romneya*, *Gypsophila*, *Phlox*, *Yucca*, *Paeonia*, *Saponaria*, and *Dicentra*, are very easily propagated by root cuttings. A good method to use is to cut the roots into pieces so that each piece has an "eye." This may be done in the fall. The cuttings may then be planted in sandy loam in a coldframe.

In some cases, it may be desirable to insert the cuttings in pots rather than directly into the frame. If this method is used the pots should be plunged to the rim in the soil of the coldframe.

Care of the cuttings consists in attention to details of watering and shading. For the first week or two, they will require shading from the direct sun and protection from rapid drying. After the cuttings have become established, the shade should be removed entirely except in the case of plants which are somewhat tender, there should be no other covering than protection from heavy rain. In the early spring the young plants may be planted directly into the rock garden or may be potted up and planted out as needed. Some plants will root in a few weeks while others may take a year or more. Those kinds that do not root by spring should be partially shaded from strong sun throughout the summer.

COLLECTING: Many people prefer to collect plants from their natural haunts. Almost invariably this results in failure, as few people understand plants well enough to move them properly. Usually, they move them when they are in flower. This is the worst possible time and, even when done by the experienced collector with the greatest possible caution, is extremely wasteful. The sudden reduction of the root system at a time when the plant needs large amounts of moisture and removal to a different environment is generally too great a shock for the plant to survive. A much better method is to select cuttings from the desired plant and transport these wrapped in damp sphagnum moss. Better still, mark the plant and come back later in the season to collect some of the mature seed. Experience with many of these wild plants seems to indicate that those grown from seed adapt themselves more quickly to growing in the garden and generally give much greater satisfaction.



Fig. 44. Dwarf evergreens lend their warmth of color to the winter effect of the rock garden and relieve the cold, bare appearance of rocks.

If you must take up a plant, select one of the smallest specimens and dig it up carefully, retaining as much of the root system and attached soil as possible. Wrap the plant carefully in moist sphagnum moss, get it home as soon as possible, pot it carefully, and plunge in a coldframe. Protect from sun and wind until it is well established. After it has become thoroughly accustomed to its changed environment, it may be placed in the garden.

Many native flowers are in danger of extinction. Thoughtless persons carelessly rip out wild plants without the slightest regard to their possible rarity. Lovers of rock gardens and rock garden plants should have the greatest regard for, and interest in, maintaining the wild plants in their native habitats. It is far better to collect the seeds than the plants, but it is often most satisfactory to obtain nursery-grown stock.



ROCK GARDEN PLANTS

ACHILLEA

All the species of *Achillea* are strongly aromatic plants, easily grown in almost any soil. The kinds used in the rock garden grow best in a sandy soil or one that is well drained and not rich, and most of them are suited to dry sunny situations. All but one or two species require an alkaline soil. Some sorts are useful for the wall garden and all are readily propagated by seed, division, or cuttings. Most of them spread rapidly and must be kept strictly within bounds. Though *A. millefolium* and *A. Ptarmica* (Fig. 45) may be planted in the large rock garden, their spreading habit precludes use in the small rock garden where dwarf slow growing forms are preferable.

A. atrata and *A. nana*, both bearing white flowers in early spring, are the smallest species. Both of these species are under four inches in height. Though both may be used between stepping stones, *A. nana* is somewhat more dwarfed, makes a good carpet, and is preferable.

A. umbellata is a woolly-leaved species, 4 or 5 inches high, having white flowers in June. It is especially valuable for the wall garden or dry rock



Fig. 45. *Achillea Ptarmica* withstands drought and spreads rapidly. It may be planted in the large rock garden, but it is rather too vigorous for the small rock garden.

crevices. *A. tomentosa* and *A. Clavennae* reach a height of about ten inches. *A. tomentosa*, the woolly yarrow, is a woolly, carpet-like plant requiring a dry sunny place in the rockery and bearing yellow flowers from July to September. It spreads rapidly and may be used as a carpeting plant. *A. Clavennae* has silver gray foliage and white flowers appearing in spring. It requires a well-drained soil, thriving in sand or gravel. *A. ageratifolia* is a very dwarf tufted species, 3 to 10 inches high, with silver gray foliage; its large white flowers appear in June. It should have a dry sunny situation and does well in a pocket between rocks (as in picture of *Gazania longiscapa*, Fig. 38). *A. sericea*, with velvety green foliage, bears yellow flowers all summer. It grows 8 to 15 inches high.

A. holosericea bears yellow flowers in July, has silver-gray foliage and is 12 to 15 inches high. *A. siberica* has white flowers in June and July and grows about 18 inches high. Two native forms, *A. borealis* and *A. lanulosa*, are interesting and usable. *A. borealis* is the better of the two. It grows from 2 to about 10 inches in height, bearing white or occasionally pale pink flowers from June to August. It is found wild in Canada, Alaska, Labrador and the Rocky Mountains, usually in sterile soil or on wet rocks and mossy slopes. *A. lanulosa* is larger and is similar to *A. millefolium* except that it is a little more dwarfed and its stems densely woolly. It is found along the St. Lawrence River, the Great Lakes, Michigan and westward and south in the Rocky Mountains. It is not so showy as *A. borealis* in flower and requires a dry sunny situation in a porous, gravelly, sterile soil.

AETHIONEMA, LEBANON CANDYTUFT

Several species of *Aethionema* are particularly desirable for rock gardens and wall gardens and may be used in the dry limestone moraine. They require a light well-drained stony soil and a sunny, dry situation. In soil that is very fertile, they tend to die out.

A. persicum is an erect shrub, growing about nine inches high and bearing rose-colored flowers in June or July. *A. grandiflorum* grows about twelve inches or more high. It has pink flowers which appear in June and July. *A. pulchellum* grows about 7 inches high and is a splendid species.

A. stylosum is a very dwarf species, only 3 inches high. *A. diastrophis* is similar to *A. pulchellum*, but more dwarf. It grows about 5 inches high, is very compact and has deep pink flowers in May. *A. schistosum* is another compact form producing large bright rose-colored flowers in May. It grows about 6 inches high.

AJUGA, BUGLE

The Bugles or Bugle-weeds are easily grown, hardy, herbaceous perennials largely used for carpeting in sunny or shady places.

A. genevensis, growing 6 to 12 inches high, with blue flowers in May and June, is the best species. The variety *Brockbanki* has deeper blue flowers.

A. reptans, 4 to 6 inches high, grows rapidly and quickly makes a dense carpet. There are several varieties which are more commonly grown; *atro-purpurea* has purplish blue flowers; *rubra* has dark bronzy purple leaves; *multicoloris* is a new form with bronzy foliage spotted and veined with yellow, brown, and red in the fall; *alba* has white flowers.

A. metallica crispa, growing 4 inches high, has smooth, glossy, curled leaves. *A. hybrida Tottenhami* is a newly introduced form described as having bronze foliage, purplish-red flowers in June and July, and growing 6 inches high.

ALYSSUM

The Alyssums are easily grown and are readily propagated from seeds, cuttings, or by division of the roots. They require a well-drained soil and are generally rock-loving plants. Some of the species are annual.



Fig. 46. *Alyssum maritimum* is a fine white-flowered annual for planting in bare spots. It flowers continuously.

A. maritimum (Fig. 46), the best annual form, is low, spreading and is covered with white flowers all summer. It is especially valuable for covering bare spots in the rockery. *A. saxatile*, "Golden-Tuft," is a popular perennial form bearing rich golden yellow flowers in the early spring and has greyish foliage. It is useful in the rock garden as well as the wall garden. It has the peculiar trait of "growing away" from the soil. (See page 37.)

The variety *compactum* is more dwarfed and sometimes more desirable in the small rockery and wall garden; *flore pleno* is a double-flowered form. Nurserymen catalog forms with lighter colored flowers as "*luteum*" and "*citrinum*."

A. rostratum, *A. argenteum*, *A. montanum*, *A. serpyllifolium*, *A. spinosum*, *A. spinosum roscum*, *A. Moellendorffianum* and *A. Wulfenianum* are also popular in wall and rock gardens.

ANDROSACE, ROCK JASMINE

The Androsaces are extremely dwarf tufted alpine plants. They require a well-drained soil and will not thrive either in loose sand or heavy clay. Some species require a soil with an acid reaction, other species require a soil with an alkaline reaction. Most of them seem to do best with a north aspect or in partial shade, at least in mid-summer, and are good for rock

fissures and walls. In the winter, they should be covered loosely with evergreen boughs. Most of them suffer from spring rains and should be protected from them as much as possible. They are rock-loving and require a deep soil between rocks, with the surface of the soil covered with limestone chips or, in some cases, sandstone chips.

A. carnea requires an acid soil composed of sand and peat and an airy sunny situation. There are several varieties of this species; var. *Laggeri* has pink flowers. *A. Chamaejasme* requires a sandy loam with a little leaf-mold, small stones or gravel, and sandstone chips. A little chopped sphagnum moss mixed deep in the soil may be advisable where summers are dry and hot. It should have perfect drainage and is tolerant of lime. *A. brigantiaca* (*A. carnea brigantiaca*) requires a deep sandy loam with a little peat added and a situation on sloping ground with partial shade. It is one of the hardiest and easiest to grow, requiring no winter protection. *A. lactea* requires a well-drained deep sandy loam with limestone. It should have partial shade, free circulation of air, frequent watering, and a north, west, or east aspect in a steep rockery or wall garden. It is very hardy and easy to grow. Variety *eximia* is larger, hardier, and more vigorous. *A. sarmentosa* should have a well-drained deep gravelly soil with a little leaf-mold and limestone chips, a location similar to that of *A. lactea*, and should be protected from rain in winter and spring. It is very good for use in walls and rock fissures. *A. villosa* should have a sandy peaty loam with crushed limestone and limestone chips, a sunny exposed situation, and may be used in the rockery, rock fissures or on level spots. The foliage should be protected from wetness in the winter. *A. Wulfeniana* requires a deep sandy loam and may be used in the wall garden, in vertical fissures, or on level spots in the rockery.

Other worthwhile species are *A. Helvetica*, *A. lanuginosa* and *A. imbricata*.

ANEMONE, WIND FLOWER

The culture of Anemones does not offer any particular difficulties. All may be grown from seed which should be sown as soon as ripened and often takes 12 months to germinate. Some may be propagated by division and a few by root cuttings. Most of them do well in the open, but better in partly shaded situations or in open woods.

A. Pulsatilla is one of the finest of the anemones. It grows about 10 inches high with large beautiful blue, purple, lavender, pink, or white flowers appearing in April, followed by beautiful seeds. It requires a well-drained deep light soil, with leaf-mold and limestone added. *A. alpina* is taller growing and later flowering but requires the same treatment. The flowers are white and purple; there is also a yellow-flowered variety. *A. Halleri*, *A.*

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patens, *A. patens Nuttalliana*, and *A. vernalis* require the same treatment as *A. Pulsatilla* except that they do not require lime and should have peat mixed into the soil. *A. vernalis* requires a cool place and will do well in a moist peaty moraine or in the bog garden. *A. japonica* is very popular for a partly shaded perennial border and may be used in the large rock garden. Its dwarfed form, *A. huphensis*, may be used sparingly in the small rock garden. It grows to 18 inches in height and flowers in early autumn. It requires a well-drained situation and is best in partial shade.

A. ricularis and *A. sylvestris* grow from one to one and one-half feet high and require a cool, moist, partly shaded position and a soil made up of sand and leaf-mold. There is a double flowered form of *A. sylvestris* that is splendid. *A. canadensis*, one of our best native species, is found growing commonly in shaded woods and open meadows. It requires a cool moist light soil with plenty of leaf-mold. *A. parviflora* is another native, 6 to 12 inches high, bearing white flowers from May to September. Plant it in a sandy loam, with some leaf-mold, between limestone rocks or mix limestone chips into the soil. *A. Baldensis* is real dwarf, 4 to 6 inches tall. It requires real alpine treatment—well-drained stony soil with leaf-mold mixed deep. It can be used in the moraine or may be planted in a rock crevice filled with rock debris and peat.

AQUILEGIA, COLUMBINE

There are a large number of Columbines with flowers of divers colors and various lengths of spurs. All of them may be used in the rock garden, but for the small rock garden only the dwarf species are advisable. They require a fairly rich, moist, well-drained sandy loam. Where it is desirable to keep the plants dwarf, it may be advisable to furnish a more sterile soil. Some forms require lime in the soil while others do not thrive with it. They are not long-lived plants and often must be replaced by young plants after four or five years. The most advisable for the small rock garden are: *A. alpina*, *A. caerulea*, *A. canadensis nana*, *A. flabellata*, *A. glandulosa*, *A. Jonesii*, *A. oxysepala*, *A. pyrenaica*, *A. Reuteri*, *A. Stuartii*. (For details of culture and description see Supplementary Bulletin.)

ARABIS, ROCK-CRESS

The Rock-Cresses are very easy to grow and will thrive even in poor soil. They should have full exposure to the sun, but will do very well in a little shade. All are suited to planting in the wall garden as well as the rock garden.

The commonest species are *A. alpina* and *A. albida*. These two species resemble each other very much. *A. alpina* is somewhat more dwarfed, later flowering, has somewhat smaller flowers, and is not as fragrant. There is also a pink-flowered form of *A. alpina*.

A. aubrietioides, *A. blepharophylla* and *A. muralis* are pink-flowered species; *A. purpurascens* is a red or purplish-flowered species; *A. procurrens* and *A. Sturii* are very dwarf white-flowered forms growing 3 or 4 inches high.

ARENARIA, SANDWORT

The Sandworts are mostly caespitose, evergreen plants valuable for the rock garden. They thrive in full sun in almost any soil but a well-drained light sandy soil is best. They are propagated by division or seed.

A. verna, the Tufted Sandwort, is a moss-like plant, growing one to three inches high. It is excellent in the rock garden and between flagstones. Variety *caespitosa*, Moss Sandwort, is more dwarfed and denser. *A. grandiflora* resembles *A. verna*, but is taller and less dense. It bears large white flowers all summer. Variety *aurea* is a yellow-leaved form. *A. montana*, Mountain Sandwort, growing 10 inches high, is another white-flowered form.

A. juniperina, *A. laricifolia*, *A. Bauhinorum*, *A. pinifolia*, and *A. purpurascens*, are other recommended species. *A. groenlandica* is an annual.

ARMERIA, THRIFT

The Thrifts or Sea Pinks have long been grown in rock gardens. They require a deep well-drained sandy loam and a sunny location. They are used in the rock garden and wall garden. *A. vulgaris* and *A. caespitosa* are widely distributed and are found growing in North America. *A. vulgaris* is the Common Thrift, of which there are a number of varieties varying in color from white to rose-red. *A. caespitosa* is a dwarfed species.

A. latifolia, *A. formosa*, and *A. plantaginica leucantha* are other good species.



Fig. 47. *Aster Amellus* var. *amelloides*, with its graceful, daisy-like blue flower heads offers colorful interest in the late summer.

ASTER, STARWORT

Asters are easily grown in a well-drained garden loam. The flowers are daisy-like and abundant (Fig. 47).

A. alpinus grows to a height of 10 inches and produces an abundance of beautiful violet daisy-like flowers in spring. It is an excellent plant for the rock garden, but should not have a very dry situation. It grows best in a light rich soil. There are a large number of varieties, Goliath, bearing large showy flowers, being most popular. Mauve Cushion is a lighter colored variety and *alba* is white. The variety *himalaicus* is an exceptionally fine, dwarfed form. *Aster subcaerulea* is another fine pale blue-flowered species; it needs protection over winter.

Other good species are *A. Amellus* (Fig. 47), *A. Canbyi*, *A. Farreri*, *A. Porteri*, *A. pleiades*, *A. ptarmicoides*, *A. salviaefolius*, and *A. Yunannensis*. *A. Farreri* needs winter protection in Michigan.

AUBRIETIA, PURPLE ROCK-CRESS

The Purple Rock-Cress is a popular spring flowering rock plant. Its most important species is *A. deltoidea* (Fig. 48). This, with its varieties

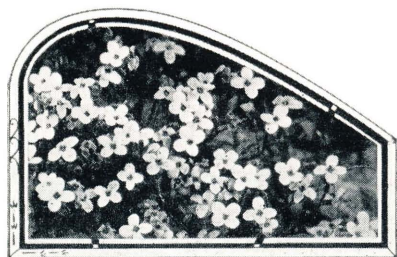


Fig. 48. *Aubrietia deltoidea* is one of the best rock garden or wall garden plants. The rich purplish flowers appear in almost continuous masses in the spring.

and hybrids, is one of the most brilliant and satisfactory of rock garden and wall garden plants and is often used in the perennial border. They are evergreen trailers growing from 2 to 12 inches high and when in flower give the effect of a solid mass of color. They are useful for trailing over rocks and ledges. They require open, dry situations and a light loamy soil. The varieties and hybrids are for the most part better than the species. They are easily grown from seed sown in the early spring and may also be propagated by cuttings rooted in sand or by division of the old plants.

CAMPANULA, BELLFLOWER

The Campanulas include the Bellflower, Canterbury Bells, Harebells, and Bluebells. Most of them grow in a moist, well-drained soil and thrive under very ordinary care. In the winter, they should be carefully mulched with leaves.

The most popular forms for the rock garden are the Bluebells of Scotland (*C. rotundifolia*) and the Carpathian Harebell (*C. carpatica*). *C. rotundifolia* (Fig. 34) grows in the cooler portions of Europe, Siberia, and North America, and is common in parts of Michigan. It is one of the lime-loving species and should be used with limestone rocks or with bits of limestone mixed with the soil. If the old flowers are picked off occasionally, it will flower all summer and may reach a height of 12 inches. *C. carpatica* (Fig. 49), the Carpathian Harebell, is a low-growing tufted plant with larger flowers. There are a number of varieties, varying in color from blue to white and in size of flower and plant. Some varieties reach a height of 18 inches and others only one-half this. It grows best in

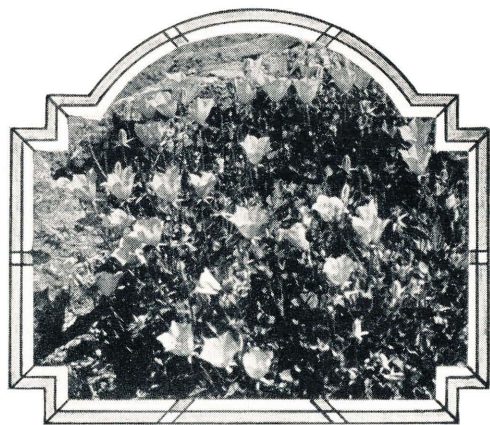


Fig. 49. *Campanula carpatica* is very hardy and flowers all summer. It is one of the most popular and best of rock garden or wall garden plants thriving in sun or shade.

deep rich loam in a sunny situation, although it endures some shade. It is very hardy and flowers all summer. *C. punctata*, the Spotted Bellflower, bears white flowers with violet spots. It grows to a height of 12 inches and thrives under the same conditions as the Carpathian Harebell. All three species thrive in the perennial border as well as in the rock garden and wall garden. *C. Portenschlagiana* (*C. muralis*), another blue-flowered sort, flowering in late summer or fall, is admirable for the rock garden or wall garden. It grows 6 to 9 inches high and requires protection during the winter with special provision to keep the foliage dry. It requires a soil of sandy loam and peat. *C. caespitosa* (*C. pusilla*) is easily grown. Its beautiful blue nodding flowers are borne all summer and fall. The plant is stoloniferous, forms a dense mat, grows 4 to 6 inches high and thrives in any good garden loam. It is perhaps one of the hardiest alpine plants and requires a cool, lightly shaded position in the wall garden or in a pocket all by itself in the rockery in which it can spread and form a dense mat and can be kept within bounds. Variety *alba* has white flowers. *C. glomerata*, the Clustered Bellflower, is too tall for general use in the small rock garden. The variety *acaulis*, however, is very dwarfed, growing 3 to 5 inches high, and has violet blue flowers in June and July. *C. garganica*, the Garganian Bellflower, is an exceptionally attractive species for use in a half shaded position in the wall garden or rock garden, or on a ledge where it may hang down over the edge. It is a trailing form, growing about four inches high and bearing dainty blue flowers all

summer. It should be protected from too much overhead moisture. *C. piperi* is a very dwarf form of exceptional merit coming from our western mountains. It may be used in crevices in the rock garden or in the wall garden or planted in the moraine.

Other less well known *Campanulas* good for using in the rock garden are *C. alliariaefolia*, *C. barbata*, *C. collina*, *C. mirabilis*, *C. pulla*, *C. tridentata*, and *C. Waldsteiniana*.

CERASTIUM, SNOW-IN-SUMMER

The *Cerastiums* are easily grown, creeping plants, thriving in ordinary soil. *C. tomentosum* (Fig. 27) makes a dense gray carpet above which appear masses of white flowers in May or June. *C. Biebersteinii* is similar, but has larger leaves. Both kinds should be kept well within bounds as they spread rapidly.

CERATOSTIGMA, LEADWORT

C. plumbaginoides (*Plumbago Larpentae*), Leadwort, is a low (6 to 12 inches high) stoloniferous plant with rich blue flowers in late summer. It requires a well-drained light soil in a protected position and thrives in sun or shade. The foliage becomes deep bronze in the fall. It should be given winter protection.

DICENTRA, BLEEDING-HEART

The *Dicentras* are easily grown plants, thriving in a light fertile soil in sun or partial shade. *D. spectabilis*, Bleeding-Heart, grows two feet high, and is too large for the small rock garden. *D. formosa*, Western Bleeding-Heart, is more dwarfed (12 inches) and has purplish pink flowers. *D. eximia*, Fringed Bleeding-Heart, grows 6 to 12 inches high and has pink flowers all summer.

D. cucullaria, Dutchman's-Breeches, is a dwarf form requiring a soil of sandy loam and leaf-mold and a shady position. Similar culture is required by *D. canadensis*, Squirrel Corn, a native form.

DRABA, WHITLOW-GRASS

Drabas are rock-loving plants, requiring an open well-drained soil and usually a sunny situation. Practically all of them may be used in the wall garden as well as the rockery. Some may be grown in the perennial border, others thrive in partial shade. They are specially effective in solid masses. Most of them are tufted or densely cespitose and a few (*D. glacialis*, *D. olympica*, and *D. repens*) are prostrate or trailing, forming a thick mat. They are all early spring-flowering plants.

Common species are *D. fladnizensis*, *D. alpina*, *D. aizoides*, *D. Aizoon*, *D. imbricata*, *D. borealis*, *D. olympica*, *D. repens*, and *D. glacialis*.

DRACOCEPHALUM, DRAGON'S HEAD

Dracocephalums are specially valuable for shaded or partly shaded, moist situations. They do not succeed in open sunny situations and require a moderately rich sandy loam with some leaf-mold. They are mostly erect hardy perennials flowering from early summer to mid-summer. The flowers are mostly blue or purple with occasional white forms and at least one species, *D. botryoides*, has pink or rose flowers and one, *D. heterophyllum*, has yellow flowers. *D. Ruyschiana* is the most common species.

DIANTHUS, PINK

Pinks are easily grown plants requiring a light sandy soil and a sunny situation. Some are lime-loving and some are intolerant of lime and a few require a sandy, peaty soil. Many of them are fragrant. Some kinds have the unfortunate peculiarity of dying suddenly without any apparent cause. In some cases, this is due to one or another of several diseases that may attack the plants; in other cases, it is due to exhaustion of the plant in seed production; and, in still other cases, it is because certain species and varieties are naturally short-lived or biennial or even annual in habit. Some kinds are killed, during winter or spring, by excessive moisture in the crowns of the plants and succeed better in the wall garden or in rock crevices. All are easily propagated from seeds. The smaller alpine sorts require a deep, light, moist soil with gravel mixed in and the soil surface covered with stone chips.

The species more commonly grown are *D. alpinus*, *D. arenarius*, *D. caesius*, *D. chinensis*, *D. cruentus*, *D. deltoides*, *D. glacialis*, *D. neglectus*, *D. latifolius*, *D. plumarius*, and *D. sylvestris*. All of these require a light well-drained sandy soil. *D. alpinus*, *D. caesius*, and *D. neglectus* should be planted with limestone rocks or should have limestone chips mixed into the soil. *D. glacialis* requires an acid soil. Other kinds thrive on a neutral, slightly acid, or slightly alkaline soil. *D. arenarius* and *D. sylvestris* require a very sandy or gravelly soil. *D. glacialis* needs a sandy, peaty soil with some leaf-mold and granite stone chips. The tallest of these are *D. cruentus*, growing to 2 feet and varieties of *D. chinensis* attaining perhaps 1½ feet. *D. plumarius*, *D. sylvestris* and *D. arenarius* may reach 1 foot. Other forms mentioned are lower growing, reaching not more than 6 inches in height with the exception of *D. deltoides* and *D. caesius*, which may grow to 10 inches. Nearly all are semi-trailing or caespitose in habit, some being distinctly prostrate and mat-forming, as *D. caesius* and *D. deltoides*. *D. alpinus*, *D. superbus*, and *D. glacialis* may be grown in partial shade. Species particularly suited to the wall garden are *D. alpinus*, *D. arenarius*, *D. caesius*, *D. deltoides*, *D. glacialis*, *D. plumarius*,

and *D. sylvestris*. Other fine species worthy of a place in the rock garden are *D. brevicaulis*, *D. fragrans*, *D. gallicus*, *D. graniticus* and *D. petraeus*.

Forms of *D. chinensis*, commonly grown in the hardy border, may also be used in the rock garden. It should be remembered, however, that many of these are annual or biennial. The popular variety *Hedderwigii*, Japanese Pink, is best treated as an annual. *D. plumarius* with improper soil or moisture conditions often proves biennial. If old flowers are picked off, largely preventing the maturing of seeds, the plants develop better in late summer and fall and have a better chance of surviving the winter.

D. caryophyllus and hardy forms of this species, all known as Clove Pinks, may be grown in the rock garden, but perhaps are better used in the perennial border. This is the species from which developed the American Carnation, a form which is generally not hardy in Michigan and is usually quite unsatisfactory when grown out of doors, requiring special cultural methods.

ERIGERON, FLEABANE

The Fleabanes are very easy to grow, requiring a well-drained garden loam and sunny situation. The flowers are daisy-like, mostly blue, purplish or white (Fig. 50).



Fig. 50. *Erigeron elatior* is a pale blue flowered perennial valuable for its color in the summer months. It thrives in poor and gravelly soils.

E. Coulteri requires a rather moist open situation and an acid soil.

E. flagellaris, a Rocky Mountain species, grows to a height of 2 inches and is especially recommended for the wall garden and for rock crevices. *E. lanatus* is a western American form useful for the cool sunny moraine. *E. hyssopifolius* is a native of Michigan, generally found on wet calcareous rocks. Other species recommended are *E. caucasicus*, *E. compositus*, *E. elatior* (Fig. 50), *E. linearis*, *E. mucronatus*, *E. multiradiatus*, *E. salsuginosus*.

E. speciosus, the Showy Fleabane, is the best known, but is better planted in the hardy border or in the large rock garden. *E. alpinus* is dwarfed and good for the small rock garden. *E. aurantiacus*, the Orange Fleabane, is an orange-flowered form 9 inches high. It does best in a situation shaded from the mid-day sun. *E. aureus* is a yellow-flowered, very dwarf form, requiring the same treatment as the Orange Fleabane. *E. Coul-*

ERYSIMUM, ROCK WALLFLOWER

The *Erysimum*s require a light well-drained loam soil and a sunny situation. The flowers are mostly yellow or orange, very fragrant and borne in the spring.

E. Helveticum is a yellow-flowered, tufted species growing eight inches high and flowering in May or June. It is useful for planting in walls and rock crevices. *E. pulchellum* is the best known species. The flowers are yellow, appearing from May to July. It may be grown in a variety of situations in the rock garden, border, wall, meadow, and on dry banks. In most favorable soil it attains a height of 12 inches. *E. purpureum* is a purple-flowered species, growing rarely to 6 or 8 inches high, that is recommended for planting in walls, rock crevices and well-drained pockets in the rockery. *E. pumilum*, an especially fine species growing only 3 inches high, is well adapted to rock crevices and the wall garden as well as the rock garden. *E. ochroleucum* is a pale yellow, early flowering sort which must not be planted in level spots, but rather in the wall garden or in rock crevices. *E. linifolium* (*Cheiranthus linifolia*) (Fig. 51) is a biennial with dark lavender flowers. *E. perofskianum* is an annual with orange flowers.

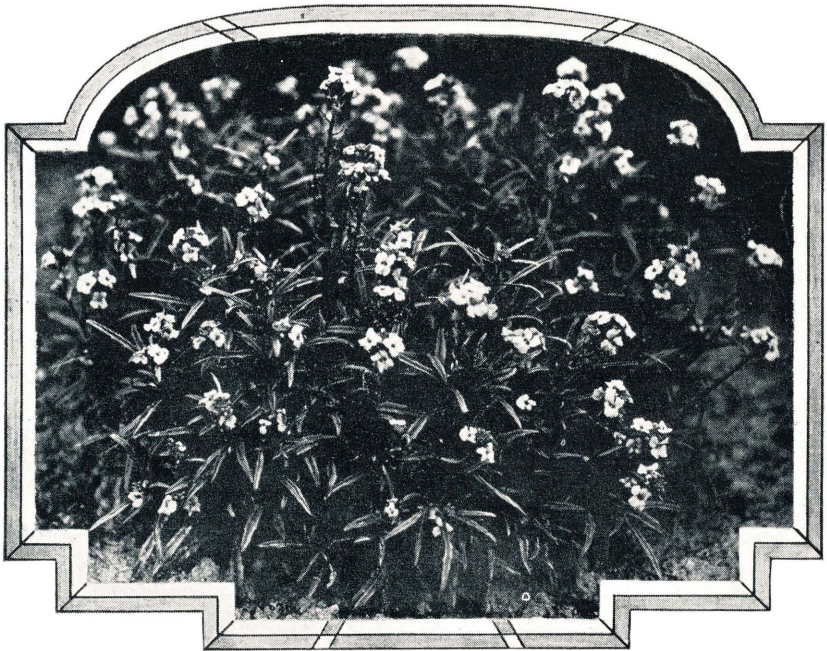


Fig. 51. *Erysimum linifolium* (*Cheiranthus linifolia*) is a rich deep lavender-flowered biennial of splendid habit. Its compact growth and wealth of flowers in the late fall more than make up for its biennial character.

ERYTHRONIUM, DOG'S TOOTH VIOLET

The Erythroniums, for the most part, require the partly shaded situation found in open woodland and a light soil with some leaf-mold. Some sorts require an acid soil while others are quite tolerant of lime. They are bulbous spring-flowering plants. Improper soil or situation prevents production of flowers in some varieties. Numerous hybrid forms in various colors are offered by specialists, many of which are worth trial in the proper situation. The bulbs should be planted with the tops two inches deep. Many of the species have typically mottled leaves that are interesting and beautiful even when there are no flowers.

The common *E. americanum*, found in the eastern states in open woods or in rich low ground near woodland, requires a somewhat acid soil of sandy loam and leaf-mold or peat. *E. grandiflorum* is a large flowered yellow sort attaining a height of possibly 2 feet in most favorable situations. It requires the same soil and light conditions. *E. Hendersoni*, a lavender and maroon-flowered sort, grows 6 to 10 inches high and requires acid soil and partial shade. *E. albidum* is the white-flowered sort found in Michigan and known as the White Dog's-tooth Violet. It requires a light rich soil.

E. montanum, the beautiful Avalanche Lily of the West, grows eighteen inches high and bears large white flowers in the spring. This is a rather difficult species to establish. It might be grown by planting on a moist well-drained peaty moraine or on a moist well-drained slope.

GENTIANA, GENTIAN

Most of the alpine Gentians grow best when planted with other low-growing plants, such as Violas, Primulas, or dwarf Campanulas. Most of the Gentians are highly exacting, some gardeners succeeding with them under one treatment, while others fail with apparently the same treatment. The genus is so large and the requirements for the various species and varieties so variable that it is quite impossible to state any general methods of culture. The gardener is advised in the event of failure in growing this plant in one soil or situation to try a change of either one or both. The Gentians are best propagated by seeds but the seed is likely to be difficult and slow of germination. Seed of the alpine sorts should be subjected to freezing immediately after maturing and should then be sown at once.

G. acaulis requires a well-drained situation with limestone rocks and moist air and has many forms which are often described as distinct species. The variety *angustifolius* thrives generally and may be recommended for the average rock garden. The variety *Clusii* is another fine form of *G. acaulis* which grows well in comparatively dry situations. *Dinarica* is an easily grown form. *Kochiana* is a variety that does not grow naturally in limestone regions, but seems to tolerate lime in the rock garden. *G. Andrewsii* is the

Closed Gentian of eastern North America. It dislikes lime and requires a cool rich fibrous spongy moist soil and partly shaded situations. *G. bavarica*, the Bavarian Gentian, thrives in a moist, porous, well-drained, peaty soil in a moist peaty moraine.

G. Bigelovii requires a rather light soil in a moist well-drained situation and some find it rather difficult to grow. *G. Parryi* requires an acid moraine. *G. septemfida* thrives in a well-drained loam with leaf-mold and peat and is one of the easiest to grow. *G. verna* is a popular form very variable in color and behavior. The variety *alata*, often cataloged as *G. angulosa*, is one of the easiest to grow from seed. Some varieties seem to require a limestone soil while others are said to require acid soil. *G. frigida* requires an acid soil and a location in the moraine. *G. Romanzovii*, the North American form of this, has slightly fragrant flowers. *G. sino-ornata* is a fall-flowering sort with blue flowers and grows about 8 inches high. It requires a moist peaty soil.

GERANIUM, CRANE'S-BILL

Geraniums thrive in an ordinary garden loam, either in partial shade or full sun. They are valuable for planting in masses and some are valuable for the rock garden. They are readily propagated from seed or by division.

G. argenteum, the Silver Leaved Crane's-bill, grows only 5 or 6 inches tall, bears pink flowers from June to August, and has silvery foliage. It is especially useful in hot dry places in the rock garden or wall garden and should have a sandy loam soil. *G. cinereum*, the Gray Crane's-bill, is similar, bearing lighter colored flowers.

G. Robertianum, Red Robin, bears bright crimson flowers all summer long. It requires a moist situation in partial shade and grows to a height of 9 inches. *G. Endressii* is a taller form, bearing throughout the summer light rose-colored flowers which are good for cutting. It is accused sometimes of not being hardy. This is because the plant rots in winter if it remains wet. It should have perfect drainage. *G. pratense* is a vigorous species thriving in the open.

GEUM, AVENS

In general, Geums require a rather light soil that does not become too dry. The double forms of *G. chilense*, Mrs. Bradshaw and Lady Stratheden, are very popular border plants and may be used also in the rock garden.

G. reptans and *G. montanum* grow about 6 inches high and bear yellow flowers in May or June. They require a rather light soil with limestone rocks. *G. reptans* spreads by runners, while *G. montanum* is erect. *G. Heldreichii* grows 1 foot high, bearing bright orange flowers in July and is very hardy. *G. Eckenii* is a light orange semi-double flowered form. For partly shaded places, *G. sibiricum*, *G. triflorum*, and *G. turbinatum* may be recommended for trial. *G. triflorum* requires a light moist tufty loam soil with some lime. *G. rivale* requires a wet or marshy situation.

GYPSOPHILA, BABY'S BREATH

All the members of this genus are easily grown from seeds. They thrive in a light, rather dry, calcareous soil.

G. repens, the Creeping Gypsophila, grows 4 inches high, creeping over the ground and bearing delicate white flowers from midsummer to fall. *G.*

cerastioides is also of creeping habit but more dwarfed and produces white or lilac flowers from May to July. *G. alpigena* is a dwarf form, growing four inches high, with rose and white flowers appearing in July. This species and *G. cerastioides*, are specially suited to planting in the wall garden.

HELIANTHEMUM, SUN ROSE

The Sun Rose thrives in a gravel limestone soil; the more sterile the soil is, the more profusely they flower. Though it has had the reputation of not being hardy, several growers in southern Michigan claim it to be perfectly hardy. Probably, they must be well established before the winter. They do not transplant successfully. The old flowers should be cut off, as this results in stronger plants better able to go through the winter. They should be given protection in winter.

The most popular is *H. Chamaecistus*, sometimes described as *H. vulgare*. There are numerous varieties of this species with flowers of white, yellow, rose, copper, crimson or lilac. The plant is a low sub-shrub, forming dense mats over the ground. It requires a sandy or gravelly soil with no humus, and a sunny position in the rock garden or in the wall garden. It is fairly hardy and is the best for trail in the rock garden.

H. lasianthum is the showiest species, but is probably not consistently hardy in all parts of Michigan. *H. canadense*, a native form growing in Michigan, is yellow-flowered, growing 1 to 2 feet high and requires the same soil treatment. It is very weedy and not often used. *H. umbellatum* is a shrubby sort, 1 to 2 feet high, with white flowers in June or July.

HEUCHERA, CORAL BELLS

Heucheras thrive in an ordinary garden loam and, though they prefer a sunny position, they grow well in partial shade. They are easily propagated by seeds or by division.

H. sanguinea is the best known species, of which there is a large number of varieties and hybrids. It is very free flowering, growing to 12 to 18 inches and producing its bright red flowers all summer. Varieties vary in color from white to pink, coral and crimson and in height from 12 inches to 2½ feet. *H. brizoides* is another popular form with pale pink flowers appearing in May.

H. bracteata is a very dwarf form, excellent for planting in rock crevices and wall gardens. *H. hirsuticaulis*, a form found growing in rocky banks in southern Michigan, is specially valuable for its foliage, which takes on a reddish hue in the fall.

HYPERICUM, ST. JOHN'S WORT

The Hypericums are valuable in the garden for their bright yellow flowers and attractive foliage. They should be grown in a rich sandy loam in sun or partial shade according to the requirements of the individual species. There are many species, of which many are not reliably hardy in Michigan.



Fig. 52. *Hypericum prolificum* is one of the finest yellow-flowered shrubs for the background or for planting in the large rock garden.

H. calycinum, Aaron's Beard, an evergreen sub-shrub, growing 12 to 20 inches high and spreading by its creeping woody root stalks, may be used as a ground cover for banks or in the rockery and wall garden. It should receive protection over winter. *H. coris* and *H. reptans* are dwarf forms, the former 6 to 8 inches high, and the latter 2 to 4 inches high, making a mass of moss-like foliage. Both of these are splendid for the rock garden and the wall garden. *H. coris* requires winter protection. *H. Kalmianum*, a native shrub, is useful in a shady situation in the large rock garden. It grows 2 to 3 feet high, is very hardy, and endures drought. *H. olympicum* is a fine shrubby sort, growing 4 to 10 inches high and having rich golden yellow flowers in July. It requires a well-drained sunny position. *H. patulum*, an evergreen shrub 18 to 36 inches high, has yellow flowers and purplish branches. The variety *Henryi* is hardier and more vigorous.

IBERIS, CANDYTUFT

Candytufts are excellent for the perennial border and rock garden (Fig. 53) and are specially valuable in the wall garden or planted on ledges so that they may hang down over the rock. They grow well in any good rich well-drained garden loam and are readily propagated by seed and by cuttings.

I. sempervirens is the best known species. It grows 9 to 12 inches high and bears a profusion of large corymbs of white flowers in May. It is ever-

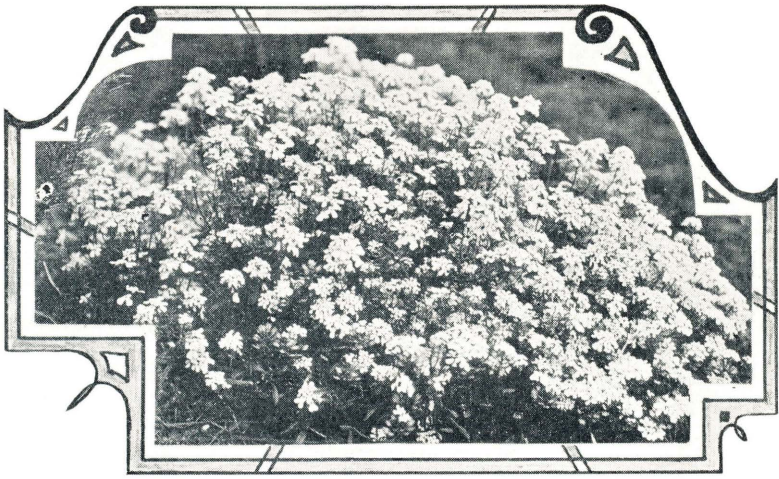


Fig. 53. *Iberis gibraltarica*, perennial or biennial, presents a compact mass of white or rose flowers all summer. It is a popular plant for general use in the rock garden.

green and semi-shrubby in nature. *I. gibraltarica* (Fig. 53) is a pink-flowered species growing about 12 inches high. Other good species are *I. Tenoreana*, *I. saxatilis*, and *I. Jordani*.

IRIS

The large, tall German Irises are not at all suitable for the small rock garden, but a large number of low growing forms are specially suited to the rock garden and some forms may be grown in the wall garden. There are two general groups of Irises—the rhizomatous and the bulbous. Many of the rhizomatous species and some of the bulbous kinds are hardy, at least with some protection in winter. Generally, they thrive in a rich moist loam, although many kinds require a well-drained sandy soil and dry situations. A number of species native of America, such as *I. lacustris*, *I. tenax*, and *I. cristata*, are well worth using in the rock garden. They give the best effect when planted in masses. Most of the rhizomatous kinds are readily increased by dividing the rhizomes shortly after flowering and this should be done every two or three years.

I. pumila and *I. chamaeiris* are common in the rock garden. Both have many varieties in various colors and there is much confusion of the two species. Both grow from 5 to 9 inches high and are valuable for planting in the wall garden, rock garden, and the border; some newer varieties flower in the fall. *I. aphylla* is a hardy species 10 inches tall, bearing dark lilac flowers in May or June. It should be grown in a good garden loam. *I. flavissima* is a yellow-flowered form suitable for a sunny position. It grows

eight inches high and flowers in early spring. *I. arenaria* is a dwarf form of *I. flavissima*, reaching a height of but 4 inches.

I. lacustris is a native of Michigan. It grows but two or three inches high, producing blue or lilac flowers in May and June. It may be planted in a sunny rather moist moraine. *I. tenax*, a hardy Western American form, grows 6 to 10 inches tall and has lavender flowers in April or May. It requires a sunny, rather dry place in the rock garden. *I. cristata*, the Crested Iris, is another hardy, native American species. It produces blue-lavender flowers in April or May. This is an exceptionally beautiful Iris, growing but 4 inches high. It is splendid for the rock garden, but requires a little shade and an acid soil made up of garden loam and leaf-mold. *I. reticulata* is a very dwarf, tufted sort bearing purple and yellow flowers in April.

Other good species are *I. ensata*, *I. Kochii*, *I. graminea*, *I. Lortetii*, *I. chrysographes*, *I. ruthenica*, and *I. Korolkowii*.

LEONTOPODIUM, EDELWEISS

Edelweiss is a common easily grown rock plant with white or gray woolly leaves and small inconspicuous yellow flower surrounded by a star-like cluster of white woolly floral leaves. The plant requires well-drained gravelly or sandy loam in an open, sunny position. The color of the plant is said to be whiter when there is plenty of lime in the soil. There are many forms, all apparently of the same species, *Leontopodium alpinum*, although some botanists describe as many as 50 distinct species.

LEWISIA, BITTER-ROOT

Though Lewisias are not well known, they are increasing in popularity. They are typically American plants, being found throughout the northwestern United States and western Canada. All are rock-loving and most of them require a well-drained sunny situation. Much attention should be given to securing proper drainage for most of the species, and few of them thrive when there is much moisture on the leaves and crown of the plant. They are fleshy leaved, succulent plants, requiring much the same conditions of culture as many of the semi-xerophyllous Pentstemons. The roots should be able to reach moisture, but the foliage should not be wet. During winter and spring they should be protected in some way from wetness.

Anderson McCully, a recognized authority on American alpinists, writes of these plants, "Lewisia, given a well-drained niche, in a deep and rather rich compost of loam, leaf-mold and grit, well studded with stone chips (granite or sandstone), and also mulched with them, settles down to beautify its dwelling place as all good aristocrats should. A rocky crevice on a perpendicular cliff is also to its taste, provided the roots may reach rather rich loam or compost and also receive moisture through the growing season. This moving moisture through the growing season is of equal importance with the need for winter dryness . . . lewisias are frequently grown in the sunny wet moraine . . . but I believe they make a decidedly better showing if they receive a richer diet than the moraine generally supplies."

They should be planted in groups and are best grown from seed.

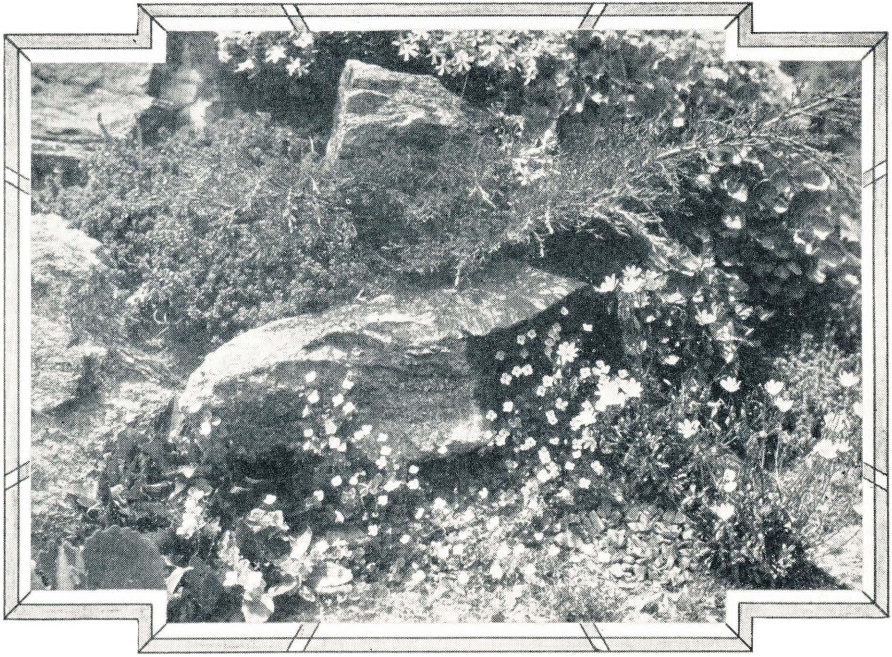


Fig. 54. *Lewisia columbiana*, at the right, ideally placed for protection from rain. Note the stone chips between the plants. *Veronica filiformis* at the left. *Sedum*, *Juniper* and Moss pink above.

L. rediviva is the most popular form and is common in eastern rock gardens. It requires a sunny position in a soil mixture of sand, loam, peat, and gravel or sandstone chips. The flowers, rose or white, appear from June to August. After flowering, the plant dies down and enters the resting stage. In this condition, it should not be moved and should be kept dry. Though it is perfectly hardy, it should have a covering of dry snow during the winter. It grows only 2 or 3 inches high. *L. oppositifolia* is a form reaching about 10 inches in height and requiring the same cultural conditions. Both do exceptionally well in rock crevices. *L. Howellii*, a very beautiful species growing from 4 to 8 inches high, has flowers that are pink or rose colored and very attractive in masses. This plant is rather hardy and requires a sunny situation and a sandy soil. *L. columbiana* (Fig. 54) grows 4 to 10 inches high, bearing white- or rose-colored flowers in June and July. It should have a sandy soil and is best planted in a dry crevice facing the west. There is a variety *rosea* advertised as having rosy purple flowers appearing all summer. *L. pygmaea*, the Least Bitter-Root, is a low growing form with rose-red, pink or white flowers. It requires a well-drained, moist, sandy soil of an acid nature. This is a true alpine form, best grown in a sunny moist moraine of gravel and peat or in a cool moist rock fissure. *L. Tweedyi* and *L. Finchii* are also good forms requiring the same cultural treatment as

L. pygmaea. *L. cotyledon* is a variable species, hardy and evergreen, requiring the same general treatment as *L. Howellii*.

LIMONIUM, STATICE

Statice require a deep, loose, sandy loam and a sunny position. They are easily grown from seed.

L. latifolium (*Statice latifolia*) is a low perennial with bluish lavender flowers in July as large panicles on stems 1 to 2 feet high; *alba* has white flowers. *L. tataricum* (*Statice tatarica*), about 1 foot high, has ruby-red and white flowers in July. There are several varieties; *nanum* is a dwarf form; *coccineum* (*Statice coccinea*) has red and white flowers.

L. Gmelinii (*Statice Gmelinii*) grows to about 2 feet and has rose and bluish flowers in late summer. *L. reticulatum* (*Statice reticulata*) grows 6 to 8 inches high, the panicles of pale lilac and white flowers appearing in August. *L. eximium* (*Statice eximia*) has panicles of lilac-rose flowers in August. *L. Bonduellii* (*Statice Bonduelli*) and *L. sinuatum* (*Statice sinuata*) are tender perennial forms that may be treated as annuals.

LINUM, FLAX

The various species of Flax are very easily grown in the rock garden and are very popular. They require, in general, a well-drained sandy soil and full sun.

L. perenne is the most common species; it grows one to two feet high and bears blue flowers from early June to late August. There are several varieties, one having white flowers. *L. austriacum* is an improved form with violet-red or light blue flowers. *L. narbonnense* is slightly dwarfer than *L. perenne*, bearing in June and July flowers that are azure blue with a white center. *L. alpinum* is a low-growing species about 6 inches high. It may be planted in rather dry places, on dry ledges or in rock fissures. It is of prostrate growth and bears flowers of the clearest blue all summer. *L. flavum* is a yellow-flowered form growing 6 inches high. It is listed by dealers in southern Michigan as half-hardy, but it has proven hardy at East Lansing. It requires winter protection.

A number of native American species may be grown in the rock garden. Among these are *L. Lewisii*, *L. virginianum*, and *L. medium*.

LYCHNIS, CAMPION

All of the Campions are easily grown plants requiring a well-drained sandy soil and a sunny situation. They are closely related to *Silene* and *Petrocoptis*. *Silene* is discussed later. The few species of *Petrocoptis* available are usually listed as *Lychnis* and since they require much the same sort of culture, are

considered here. All are suited to the rock garden and some are valuable border perennials.

L. chalcidonica, the common Maltese Cross, growing to a height of 2 or 3 feet, is a well known border plant bearing scarlet flowers in June and July. There are also rose and white flowered forms. *L. Viscaria*, the German Catch Fly, is a tufted perennial growing about 15 inches high and is one of the most beautiful species. It is easily grown, doing as well in the perennial border as in the rock garden and has red flowers. The variety *splendens* is an improved form with rose-pink flowers. There are also white-flowered and double-flowered forms. *L. Flos-cuculi*, the Cuckoo Flower or Ragged Robin, is common in old gardens and is successful in the rock garden. It grows about 18 inches high and has pink or red flowers. There is also a double-flowered variety that is valuable for cutting. *L. Haageana* is a hybrid form bearing scarlet or rose flowers from June to August. It grows about 12 inches high and is very desirable for furnishing flowers and color in the garden when the true alpine are no longer in flower. *L. fulgens* is a splendid rock garden plant, bearing bright vermillion flowers from June to August. It grows about 8 inches high. *L. alpina*, the Alpine Campion, is a popular low-growing tufted form that is also useful in the wall garden. The pink or white flowers appear in May and June. *L. Flos-Jovis*, Jove's Flower, is a red or rose-colored form, about 15 inches high. *L. Arkwrightii* is a hybrid with scarlet flowers.

Petrocoptis Lagascae is a beautiful dwarf form, 4 or 5 inches high bearing rosy-carmine flowers all summer. There is also a rose-colored form of this. *Petrocoptis pyrenaica*, is a pink or rose-colored form, 3 or 4 inches high. There is also a white-flowered form. *Petrocoptis* requires a soil with some peat but otherwise requires the same treatment as *Lychnis*.

MYOSOTIS, FORGET-ME-NOT

Forget-me-nots require a moist rich loam and thrive in partial shade or sun. Some species have a distinct preference for moist or wet situations along streams.

M. scorpioides, usually listed as *M. palustris*, is the true Forget-me-not, has azure blue flowers and is valuable for planting in shaded rock fissures or on ledges with a northern aspect. The flowers appear in May. The *M. rupicola*, frequently listed, is a form of this same species found wild in Scotland.

M. dissitiflora is biennial and requires a moist peaty soil. Other species that may be recommended are *M. cespitosa* and *M. lithospermifolia*.

NEPETA, CATMINT

Nepeta Mussini, growing 10 to 18 inches high, is the most important species for the rock garden. It has gray-green foliage, blue flowers in July, thrives in poor soil, and requires a well-drained, dry situation. A newly introduced

variety, *Souvenir d'Andre Chaudron*, is taller with deeper blue flowers appearing later in the summer.

Nepeta nuda is a compact form with pale violet flowers. *N. hederacea*, Ground Ivy, is a creeping plant useful for carpeting shady spots. It sometimes becomes a troublesome weed because of its rapid-growing character.

OENOTHERA, EVENING PRIMROSE

The Evening Primrose is so common in our American landscape that natives are very prone to overlook it as unworthy of notice. The bright yellow flowers are most pleasing and there are some fine species and varieties that are well suited to the rock garden. They are fairly tolerant of soil variations but thrive best in a light sandy or gravelly well-drained soil. They are sun-loving plants and stand drouth very well.

Oe. glauca Fraseri is a well-known variety growing about 12 inches high, although in a rich loam soil it may attain two or three times this height. It flowers all summer. *Oe. fruticosa*, Sun Drops, is a form growing from 1 to 3 feet high, depending on the soil. It is rather variable and should be given a dry situation in the rockery. The variety *Youngii* is somewhat more dwarfed and is more profuse in flowering. In the East, this plant is found everywhere in poor gravelly soil. *Oe. missouriensis*, often listed as *Oe. macrocarpa*, grows about 12 inches high and produces its beautiful yellow flowers all summer. It is a native of the western states and is specially recommended for the rock garden. *Oe. pumila* grows wild in Michigan. It is rather variable in height, averaging perhaps 1 foot; some individuals are 2 feet high, while others may not exceed 4 or 5 inches. It should be planted in very poor, well-drained, gravelly or sandy soil in the rock garden. *Oe. rubricalyx* is a form of *Oe. Lamarckiana*: the variety After Glow is very widely advertised. It should be treated as a hardy annual. It grows from 1 to 2 feet high.

Oe. speciosa with white or pink flowers, *Oe. caespitosa* growing 8 inches high with white or pink flowers and *Oe. acaulis* growing 6 inches high with yellow flowers are not hardy in Michigan and are best treated as hardy annuals.

PAPAVER, POPPY

The flaming Oriental Poppy is too well known to need description. It is, however, a very large plant and tends to spread rapidly by means of its seeds. For these reasons it is not recommended for general use in the small rock garden, although it can be used advantageously in the extensive rock garden and is especially to be commended for the perennial border.

The alpine and arctic poppies, *P. alpinum*, *P. pyrenaicum*, *P. nudicaule*, and *P. thibeticum* are very desirable for the rock garden. They should be grown in a gravelly or sandy soil in a cool sunny position. They do not like wetness. All forms cross readily and are likely to become much mixed when grown together. *P. pyrenaicum* grows from 3 to 6 inches high and has

yellow to orange flowers. *P. alpinum*, the Alpine Poppy, grows about 6 inches high, while *P. nudicaule*, the Iceland Poppy, reaches 12 to 18 inches. In our gardens, they are likely to prove annual in habit, but once established they seed themselves in each year. *P. pilosum* is a branching form, with red, pink or white flowers, that grows nearly 2 feet high. It is more certainly perennial than the other forms.

PENTSTEMON, BEARD-TONGUE

Some of the Pentstemons require a fairly rich garden loam, others a well-drained sandy soil, while still others require real dry conditions. Most of

the group are beautiful plants and, though only a few have become well known, each year sees new ones listed by nurserymen and dealers in native plants. Plants of this group are particularly valuable because many of them flower late in the season after most of the true alpine flowers are through.

P. barbatus, a native of the mountains of Colorado, bears light pink to carmine flowers nearly all summer. It does very well in almost any soil, but best in a light well-drained loam. It is very good in the rock garden and in the chinks of a sandstone retaining wall. The variety *Torreyi*, a scarlet-flowered form, is more popular than the type. *P. laevigatus* *Digitalis* is a wonderful native plant found commonly in dry or slightly moist meadows. It grows 2 to 3 feet high or more. The large, white flowers appear on long stems in

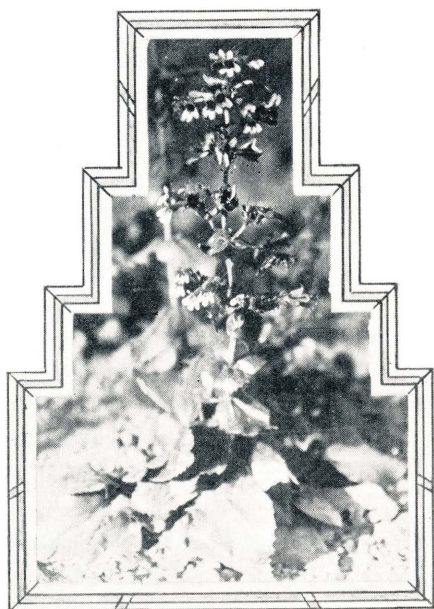


Fig. 55. *Pentstemon confertus caeruleo-purpureus*, one of the best of this splendid group of American plants. The blue flowers appearing throughout the summer make this plant especially desirable for maintaining interest in the rock garden throughout the season. It requires a well-drained situation.

July and August. It is grown easily from seed and flowers the first year if started early. It is suited to the large rockery or the open border. *P. glaber* (Fig. 43) grows 1 to 2 feet high and has blue or purplish flowers. It varies considerably and there are several varieties. The variety *alpinus* is dwarf and *roseus* is a pink-flowered form. Other varieties are catalogued.

P. Menziesii is the type form of a number of varieties used in the rock garden and the wall garden. Its height varies from a few inches to a foot. It is an evergreen shrubby plant, bearing purple flowers abundantly all summer. The branches are usually prostrate and the plant is hardy. Though it may be grown in the perennial border, it is best suited to the rock garden and the wall garden in full sun. The variety *Newberryi* is known as Mountain Pride. It has pink or rose-purple flowers with a faint fragrance. It is especially effective planted in a wall or in the rock garden where it can hang over the face of a rock or over a rock ledge. *P. Davidsonii* is by some considered a variety of *P. Menziesii*. It is a dwarf matted alpine form growing 2 to 3 inches high and bearing blue flowers. *Pentstemon hirsutus* is a native of the north-eastern United States. It has dull, pale mallow flowers and grows well in the moraine or in dry gravel pockets. A dwarf form of this is exceptionally fine. We have called this variety "pygmaeus." *P. fruticosus* is a low-growing species, reaching a height of about 12 inches. By some botanists it is considered to be a variety of *P. Menziesii* and is given the varietal name *Scouleri*; others make these (*P. fruticosus* and *P. Menziesii Scouleri*) distinct forms. It is well suited to the rock garden and the wall garden, requiring a gravelly soil and a sunny situation. It is a low matted shrub bearing purplish flowers and is readily propagated by seeds, cuttings or division. *P. rupicola* is somewhat like *P. Menziesii*. It is a low prostrate shrub growing about four inches high and bearing rose, scarlet, or cherry-red flowers all summer. The foliage is grey-green and it is perfectly hardy. It requires gravelly soil and is especially recommended for the wall garden and for rock crevices. *P. gracilis* is a low growing species, 12 inches high, useful for planting in a moist situation. The flowers, varying in color from lilac-purple to white, appear from May to July or August. It requires a light loam soil. *P. pygmaeus* grows 6 inches high and bears blue flowers from July to September. By some authorities it is considered a dwarf form of *P. hirsutus* (*P. pubescens*). This last, however, flowers in early summer and is commonly found in dry fields throughout the East. They require a dry gravelly sunny situation and are readily propagated from seeds, cuttings, or division. *P. confertus* and *P. confertus caeruleo-purpureus* (*P. procerus*) (Fig. 55), are rather commonly grown. The first is a yellow-flowered species growing from 1 to 2 feet high, while the second is a blue-purple or violet-flowered variety growing 4 to 20 inches high. Flowers appear in June or July. They should be planted in the gravelly moraine. In very fertile soil they become larger and ranker. They are perfectly hardy and do well with proper treatment. The variety is especially recommended for planting in poor soil in the rock garden. *P. Roezlii* grows 12 to 14 inches high and bears pale blue or violet-colored flowers in August. It requires a dry situation, gravelly soil, and full sun. *P. secundiflorus* has lilac or purple flowers on spikes 2 feet high. It is a beautiful plant and well worth a place in the rock garden. The variety *lavendulus* grows only 12 inches high; it has large lilac- or rose-colored flowers. Since it is easier to grow than the species, the variety is better for the small rock garden. *P. humilis* is a dependable and recommended variety for the small rock garden or wall garden. It grows about 10 inches high, forming dark green mats of foliage from which appear deep blue flowers in July. It requires a light well-drained soil and full sun in the rock garden or wall garden. *P. grandiflorus* is a handsome species with large lilac flowers. It grows 2 to 3 feet tall and should be planted in well-drained gravelly soil.

Other species recommended for trial in the rock garden are *P. heterophyllus*, *P. densus*, *P. Richardsonii*, *P. Barretiae*, *P. Hallii*, *P. Eatonii*, *P. unilateralis*, and *P. venustus*.

PHLOX, FLAME-FLOWER

This is a large typically American group of plants, many of which are admirably suited to the rock garden. They require for the most part a well-drained soil.

P. subulata, the Moss Pink (Fig. 56), is a native, growing wild in some places in Michigan. It prefers a dry, rocky, or gravelly soil but thrives in almost any soil. It is a low trailing carpeting plant covered with pink flowers in the early spring. There are numerous varieties varying in growth characteristics and in color of flower from blue to rose and white. *P. Stellaria* is much like *P. subulata*, except that the petals are deeply cut. There has been much confusion between these varieties and often varieties of *P. Stel-*



Fig. 56. *Phlox subulata* produces a mass of bright color in early spring. It is excellent as a ground cover as it presents a solid mossy mat of green throughout the summer after flowering.

laria are listed as varieties of *P. subulata*. *P. amoena*, the Hairy Phlox, grows 4 to 8 inches high, although in rich soil it may attain 1½ feet. The purple, pink, or white flowers appear in May or June. It is suited to the rock garden and should have gravelly soil in a sunny situation. *P. divaricata* (*P. canadensis*), the Blue Phlox, thrives in the open, although it does best where it receives a little shade. It grows very well in the rockery and is useful for naturalizing in open woods. Though many species of this group grow best on a limestone soil, this particular species is said to prefer a well-drained neutral or acid soil to which has been added some leaf-mold. It is an early spring-flowering plant growing 10 to 18 inches high and is to be found growing in Michigan in rocky damp open woods. The flowers are typically pale blue, but there are also pink, lavender, and white forms. Several varieties of this species are listed by dealers in hardy plants. *Alba* is a white flowered variety. *Violet Queen* has rich violet purple flowers; *Laphamii* is an improved form with bright blue flowers. *P. Arendsii* is the name of a hybrid group originated by George Arends of Germany by crossing varieties of *P. paniculata* and *P. divaricata*. Most of these hybrids flower all summer and are very useful in the rock garden, either in the sun or in partial shade. *P. pilosa*, the Prairie Phlox or Downy Phlox, is well-suited to planting in sun or shade

in a high well-drained position in light soil. The flowers are lavender, pink, or white and appear in June; the plant grows 6 to 12 inches high. The variety *splendens* has lilac-rose flowers in large, flat heads. *P. ovata*, the Mountain Phlox, grows about a foot high and has pink or reddish flowers in June and July. It is useful for the rock garden and the perennial border.

P. stolonifera (*P. reptans*), the Crawling Phlox, is a low-growing stoloniferous form making a fine ground cover and bearing its rosy-purple or violet flowers on stems 6 to 12 inches high in May and June. It may be used in the rock garden either in sun or partial shade and is an excellent subject for naturalizing in dry woods. *P. Douglasii* is a very dwarf densely tufted form with purple, lilac or white flowers borne in spring and summer. It requires a rocky, gravelly, limestone soil and is useful for the rock garden in the dry moraine or in well-drained gravelly pockets in limestone rocks. *P. diffusa*, an alpine species found in the Northwest, is an evergreen, creeping plant, making a dense mat of foliage. The flowers vary from white to salmon-pink and rose and appear in June and July. Since this plant must have a very poor gravelly dry soil, the dry gravelly moraine is a good place for it. The plant is so prolific that the old flowers should be sheared off to prevent seed production and exhaustion of the plant. It grows about 2 inches high. *P. adsurgens* is a form 4 to 10 inches high bearing in June and July flowers that vary in color from white to salmon-pink or rose. It requires a well-drained soil to which has been added plenty of pine needle leaf-mold. It is very slow-growing, requires an acid soil, full sun and plenty of moisture. It does well in moist moraines. *P. Hoodii* is a recently listed form considered to be one of the best of dwarf alpine forms. It grows but an inch or two high, is compact or cushioned in form and has silvery foliage. The white flowers cover the plants in the spring. The following species are also recommended for trial: *P. bifida*, *P. Brittoni*, *P. cacspitosa*, *P. condensata*, *P. longifolia*, *P. multiflora*, and *P. speciosa*.

POTENTILLA, CINQUEFOIL

The *Potentillas* constitute a very large group of plants, some of which are shrubs, some herbaceous perennials and a few annuals. Many species are native to this country. Most of the species do well in rather poor, gravelly, well-drained soil. A few do better in moister situations.

P. fruticosa montana is a diminutive form of the shrubby *Potentilla*, (*P. fruticosa*). It has yellow flowers from June to August and requires a calcareous soil in a well-drained rock pocket. *P. nitida* is a creeping herbaceous form with silver grey foliage. The beautiful rose-colored flowers appear in July and August. This is one of the most beautiful of the *Potentillas* for the rock garden or wall garden. It grows best in full sun in a poor well-drained soil. *P. villosa* has silvery foliage and bears golden-yellow flowers in June and July. It is excellent for planting in the rock garden and in rock crevices in full sun. It should have a poor stony soil. *P. tridentata* is an erect, spreading evergreen species bearing yellow or white flowers from June to August. It is useful in the rock garden and on dry banks. *P. verna* is a European species growing 2 to 12 inches high. It is stoloniferous, making a thick mat and may be used in the rock garden and wall garden. The variety *nana* is a diminutive form. The variety *verna aurea* is preferred by many. *P. argentea* is a form with ascending stems up to 1½ feet long. The flowers are sulfur-yellow in color, appearing from June to August. It requires a dry

sterile soil among rocks; elsewhere it becomes weedy; many consider it an objectionable weed.

Other species sometimes used in the rock garden are *P. gracilis rigida*, *P. pyrenaica*, *P. Gordonii* (*Horkelia Gordonii*) *pygmaea*, *P. cinerea*, *P. nivalis*, and *P. Saxifraga*. The last four are also well-suited to planting in the wall garden.

PRIMULA, PRIMROSE

Most *Primulas* should receive partial shade during hot summer weather. Soil requirements vary for the different species, but the better known kinds require a rich well-drained soil with leaf-mold.

P. polyantha (Fig. 21) is a horticultural form supposed to be derived from *P. veris*, *P. elatior*, and *P. acaulis* (*P. vulgaris*). It is variable in color of flowers and other characteristics. Some plants bear single flowers on each stem while others have several to many flowers in a scape. There are many varieties and improved forms of all of these. All are hardy in Michigan and should be given a rich well-drained soil with partial shade in the summer. *P. amoena*, with much of the same requirements, has purple or lilac flowers which appear in early spring. *P. auricula* is a European species growing about 4 inches high and bearing yellow flowers in early spring. It should have a limestone soil. It is perfectly hardy but suffers from the heat of summer. It is valuable for both the rock garden and the wall garden. The garden Auriculas are derived from this group, probably with *P. auricula* and *P. hidsuta* as the original parents. They are hardy and run to a great variety of color forms. Usually, the flowers are yellow or white with markings of chocolate, plum, maroon, violet, or purple. Other species requiring the same general treatment as *P. auricula* are *P. glaucescens*, *P. hirsuta*, *P. marginata*, *P. minima*, *P. pedemontana*, and *P. viscosa*. *P. marginata* is said to do well in the moraine. All of these are low-growing species from 2 to 6 inches high, bearing rose, lilac, purple, or violet flowers in early spring or early summer. All require a soil of loam, sand, and leaf-mold or peat, except *P. marginata*, which requires a deep sandy loam, and *P. hirsuta*, which should have an acid peaty soil. All may be planted in the rock garden or wall garden in a well-drained place. *P. minima* and *P. marginata* may be planted in rock fissures, dry and well-drained for *P. marginata* and moist for *P. minima*. *P. japonica* grows 8 to 24 inches high and has purple, rose, carmine, or white flowers, which appear from late spring to mid-summer. It should have a cool partly shaded situation in a deep moist spongy soil. It is perfectly hardy and is offered in numerous varieties. This primrose is representative of a group of rather tall growing species requiring much the same treatment. They are specially effective planted along streams in partial shade. Other species requiring similar treatment are *P. pulverulenta*, *P. Bulleyana*, *P. Beesiana*, *P. Cockburniana*, *P. Poissonii*, and *P. helodoxa*. *P. pulverulenta* grows 1½ to 3 feet

high and has rose-purple or violet flowers in June and July. *P. Bulleyana* grows to 2½ feet, with bright orange flowers in May and June. *P. Beesiana* grows to 2 feet, with fragrant, carmine-rose flowers in May and June. *P. Cockburniana* grows to 18 inches and has bright vermilion flowers in May and June. *P. Poissonii* sends up a flower scape from 3 to 5 feet high, bearing rose or bright carmine flowers in June. *P. helodoxa* grows to 2 feet with yellow flowers appearing in May. *P. involucrata*, a Himalayan species, growing 6 inches high, has white flowers in June. It requires a cool half-sunny position in the rock garden and prefers a spongy leaf-mold and sufficient moisture. A number of species are very similar to this and require much the same cultural treatment. *P. rosea* has rose-red flowers in very early spring and grows 4 to 8 inches high. It requires a fairly damp situation in the rock garden, rock moraine, or along a stream. This is one of the best of the alpine primulas.

P. luteola is a yellow, early flowering species growing about a foot high. *P. frondosa* produces pink flowers in April and grows 8 inches high. *P. longiflora* has purplish flowers appearing April to July and grows 4 to 12 inches high. It requires a cool shady situation in the rock garden. *P. farinosa* is an extremely variable species found in alpine and arctic regions of the northern hemisphere. It occurs around Lake Huron and Lake Michigan. The flowers, appearing in June and July, are usually pale lilac. It requires a light fibrous sandy loam with some peat, perfect drainage, and abundant moisture. It may be used on moist limestone ledges that are slightly shaded. *P. mistassinica* is found in New England and around Lake Superior and at several points in the lower peninsula of Michigan. It grows 6 inches high, bears light pink flowers in April and May, and requires the same culture as *P. farinosa*. *P. denticulata* is a lilac-flowered kind growing one foot or more high. The lilac-colored flowers appear in early spring. A rich well-drained moist loam in a partially shaded sheltered situation in the rock garden suits it very well. There are a number of varieties of this species—*alba* is white flowered; *rosea* is pink flowered; *pulcherrima* is a very fine vigorous sort; *cachemiriana* is a popular rich purple-flowered variety. *P. erosa* (*P. crispa*) is a pale mauve-flowered species requiring the same treatment and is much like *P. denticulata*. It does well in the rock garden in moist or wet situations. *P. capitata* is a very fine blue-flowered variety growing about 8 inches high with flower heads up to 16 inches. The flowers appear in late July. It does best in a well-drained peaty soil in half shade. Though not difficult to grow, this species must be protected against winter wetness and cold drying winter winds. *P. Mooriana* is similar to *P. capitata* and requires the same cultural treatment. It has rich purple flowers and grows about one foot high. Both of these species grow naturally in bog-like situations. *P. Forrestii* is a species rather widely advertised in recent years. It grows about 9 inches high and has bright yellow or orange flowers. It is said to be difficult to grow and rather uncertain as to hardiness. It does not endure overhead moisture and should be planted in rock crevices where the roots can reach abundant moisture. It requires a well-drained limestone soil and partial shade. *P. Littoniana* differs from all other primroses in its inflorescence. The violet-blue flowers are borne on stems up to 2 feet high. It should have some shade and an acid soil. It does well around the edge of rhododendrons. *P. sikkimensis* is large, reaching a height of 2 feet, bearing fragrant yellow flowers. It requires shade in a cool, moist situation such as along shaded streams. *P. Florindae* is very similar but somewhat smaller and requires the same treatment. *P. chionantha* is a white-flowered species from China growing about 1 foot high. It does not like winter wetness and is likely to rot unless protected. Three American species—*P. angustifolia*, *P. Parryi* and *P. Cusickiana*—require the same treatment as *P. chionantha*.

SANTOLINA, LAVENDER COTTON

One species, *Santolina Chamaecyparissus* (*S. incana*), is commonly grown in rock gardens. It thrives in dry sandy soil in a sunny position. It is a semi-shrubby plant with small yellow flowers and handsome gray foliage. The variety *incana* is listed, but seems almost identical.

SAPONARIA, SOAPWORT

In general, the Soapworts are easily grown, suitable for the rock garden or wall, require a sunny location and a light sandy or gravelly soil. They are readily propagated by seeds or division.

S. officinalis, the common Soapwort or Bouncing Bet, grows to about 12 inches (or higher in a rich soil) and produces a mass of light pink flowers in late July or August. For best effect, it should be planted in masses. There are numerous varieties. The most important species for the rock garden is the Trailing Soapwort, *S. ocymoides*, an evergreen form 6 to 8 inches high which makes a solid mat over the ground. Its light pink flowers appear in masses in June and July. Varieties: *splendens* has large rose, *alba* white, and *splendissima* large deep rosy crimson flowers.

S. caespitosa is a caespitose* form 3 to 6 inches high with rose-colored flowers appearing in June. *S. lutea* with earlier yellow flowers is even more dwarf. *S. bellidifolia* is another yellow-flowered species, growing from 8 to 15 inches high and blossoming in June and July.

SAXIFRAGA, SAXIFRAGE

The Saxifrages have been divided into some 16 sections. Culture of the various species differs considerably, but in general the species within a given group require much the same cultural treatment. Only the most important groups are discussed here. There are so many, all good, that only the best known can be mentioned. Perhaps the most important groups of Saxifrages are the mossy (*Dactyloides*), the encrusted (*Euaizoonia*), the cushioned (*Kabschia*), and the *Megasea* (*Bergenia*).

The Mossy Saxifrages (*Dactyloides*) constitute the largest group; this group is very popular. These are trailing or caespitose in habit and evergreen, giving the appearance of a dense carpet of moss. They require a cool, porous well-drained soil in a partially shaded position in the rock garden. Stone chips should be mixed into the soil. With proper soil conditions, they are not difficult to grow. Old plants tend to die out in the center. This can be largely prevented by mulching the center of the plant with a little soil. A few easily obtainable forms are suggested for use in Michigan. *S. adscendens* (*S. aquatica*), a low-growing form, produces white flowers on 6-inch stems in June. It is a native of Europe and western America. *S. decipiens* grows about 3 inches high, producing white, yellowish or pink flowers on 6-inch stems in May and June. There are several popular varieties of this species; *groenlandica* has greenish white flowers, *Sternbergii* is

*Dense, tufty, low, matted clumps.

a white-flowered sort for the moraine, and *bathoniensis* is a large growing form, growing about 1 foot high and bearing large scarlet-crimson flowers. It requires moisture and some shade. *S. moschata* is a yellowish or rose-colored form growing as much as 5 inches high. The variety *Rhei* is rose-colored. Flowers appear in April and May.

Other recommended forms are: *S. trifurcata*, *S. trifurcata ceratophylla*, *S. tenella*, *S. Camposii*, *S. hypnoides*, *S. cespitosa* and *S. muscoides*.

The Encrusted Saxifrages (*Euaizoonia*) are hardy rock-loving plants. They must have a well-drained soil and dry sunny situation. They should be so planted as to best guard against water lodging in the crowns. They are all lime-lovers and should be set in limestone rocks or in soil mixed with plenty of small pieces of limestone, and should have a surface mulch of stone chips. They are specially suited to planting in walls and in vertical crevices in rocks and are best propagated by division. They are distinguished from other Saxifrages by the lime encrustations on the foliage. *S. Aizoon* is the best known and most popular of the encrusted species; it has produced many varieties and hybrids. The height varies from 4 to 18 inches. The flowers, mostly white with pink dots, appear in June and July. It is suitable for planting in well-drained borders as well as in the rock garden and some growers state that it thrives better in sandstone than in limestone.* *S. lingulata* grows a foot or more in height; its white flowers appear in June and July. The variety *lantoscana* is one of the best of the encrusted group. *Saxifraga longifolia* is a splendid white-flowered species, 1 to 3 feet high which should be planted in a rock crevice in a horizontal position. The large flowers grow out horizontally from the thick rosette of foliage. Its interesting manner of growth and large flower head make it an exceedingly popular species. Unfortunately, it dies after flowering and must be grown from seed. It crosses readily with other forms. *S. MacNabiana* is one of the most easily grown of the encrusted species. In May it provides a spike, 1 to 1½ feet long, of white flowers with crimson spots. *S. Hostii* is an excellent species thriving under varying conditions.

Other recommended encrusted species are *S. Andrewsii*, *S. cartilaginea*, *S. cochlearis*, *S. Cotyledon icelandica*, *S. cotyledon pyramidalis*, *S. altissima*, *S. catalaunica* and *S. crustata*.

The Cushion Saxifrages (*Kabschia*) are all low growing, mostly cespitose, each branch being a close rosette, the whole forming a dense thick cushion. Some of the species require special cultural treatment, but in general they are not difficult, under proper growing conditions. They should be given a light rich well-drained soil containing some leaf-mold and broken pieces of

*The National Horticultural Magazine, April 1932, p. 130.

limestone. Limestone chips should be distributed over the surface of the soil around the plants. They should be slightly shaded from the mid-day sun during the hot part of summer. They are most effective in rock crevices and walls facing east or west. The crowns should be protected from water, but the roots should be able to reach moisture. Some of the species may be found to do best in the moraine. The majority have comparatively large flowers.

S. Burseriana is an especially splendid species with large white flowers appearing in early spring. The blue-grey green foliage forms cushions up to a foot in diameter. Like most of the species of this group, it should not be watered from overhead. There are numerous varieties: *Gloria* is a large flowered form with pearly white flowers; *grandiflora* is like *Gloria*; *major* is less cushion-like than the type with larger red flowers; *magna* is densely tufted and has large crinkled, white flowers; *speciosa* has narrower foliage; *sulfurea* has sulphur yellow flowers; and *crenata* has flowers with fringed petals. *S. apiculata*, a hybrid form with yellow flowers (variety *alba*, with white flowers) appearing very early in the spring, is one of the best for Michigan gardens. *S. sancta* is a strong growing deep yellow flowered form blossoming in June. The variety *speciosa* is paler yellow and shows some of the characters of the encrusted Saxifrages. *S. caesia* produces white flowers above the silvery blue rosettes from June to August. *S. lilacina* is an easily grown form with rosy lilac flowers appearing in early spring. It may be planted in the wall garden or in the moraine but is intolerant of lime.

Other good species are *S. marginata*, *S. arctioides*, *S. Boryi*, *S. Desoulavryi*, *S. Frederici-Augusti*, *S. Grisebachii*, *S. Ferdinandi-Coburgi*, and *S. Stribnyi*. There are also many hybrids, the best known of which are: *S. Arendsii*, *S. Bertolonii*, *S. Borisii*, *S. Elizabethae*, *S. Haagei*, *S. Irvingii*, *S. Obristii*, *S. Petraschii*, *S. patens* "Elliott's Variety" and *S. Clarkii*.

The *Bergenia* or *Megasea* group includes the largest of the Saxifrages which are further distinguished by their large, leathery leaves. They are the most easily grown of the Saxifrages, thriving either in a partially shaded position or in the sun. They require a rich soil mixed with plenty of small stones. *S. Cordifolia* has rose, lilac, or purple flowers in April or May and grows from 6 to 16 inches high. *S. splendens* is a hybrid form with large white or pink flowers borne on 18-inch stems in the spring. *S. crassifolia*, with rose or lilac flowers borne well above the foliage, is much like *S. cordifolia*.

A number of species in the various other groups are well known and valuable. *S. aizoides*, the Yellow Mountain Saxifrage, requires a peaty soil and should be planted in masses in stony crevices, walls, or among stones near trickling water or in the moraine. It is an easily grown evergreen tufted plant from 2 to 6 inches high with yellow flowers appearing from June to

August. *S. bronchialis* requires the same cultural treatment, is a trifle larger, and bears yellowish white flowers in May. *S. cuneifolia* grows 4 to 6 inches high and has white flowers in June and July. It should be given light rich soil and a cool, shaded corner in the rock garden. *S. oppositifolia* is an ever-green, prostrate, carpeting, species bearing violet lilac, or rosy-purple flowers in the spring. It grows 2 to 6 inches high and requires a deep well-drained moist soil made up of gravel and fibrous loam. It should do well on walls or in rocks with a north exposure. There are many varieties of this species.

A number of native American species are very satisfactory. *S. virginicensis* bears white flowers in May on stems 6 to 10 inches long above little rosettes. It may be planted in sun or partial shade in masses in the rock garden or on dry rocky slopes. *S. mertensiana* has white flowers and grows from 4 to 12 inches high. It requires a moist, peaty soil in rock clefts and a shaded position. *S. odontophylla* is a white-flowered sort, requiring partial shade and a well-drained, moist, peaty soil.

SEDUM, STONECROP

The Sedums require light, well-drained sandy or gravelly soil in a sunny dry situation. Some of them grow very well in a well-drained border and many tolerate partial shade in a dry situation. The taller kinds generally are more tolerant of moister, richer soil conditions. Many kinds appear in the lists and catalogs of American dealers and there is very great confusion of the nomenclature, many of the species appearing under various names.

S. spectabile, the Showy Sedum, is commonly grown in the perennial border but it is fully as valuable for the rock garden. It requires a heavier soil than the majority of the Sedums and is very easily grown. The flowers, varying from pink, rose, or purple, to white, are borne in August on stems 15 to 24 inches high. A group of the Showy Sedum in a wide rock garden pocket is a beautiful sight and is particularly valuable because of the need of color and interest in the rock garden at this season. *S. acre*, Golden Moss or Wall Pepper, is second in popularity among the Sedums. This is a low-growing, trailing cespitose species bearing an abundance of yellow flowers in June or July. It thrives in a dry situation on rocks, ledges, or in walls and grows exceptionally well along the top of a retaining wall. It has numerous varieties. Variety *album* is a white flowered form. *S. album* is another very splendid, popular species. It is creeping, cespitose, 4 to 6 inches high, and bears an abundance of small white flowers in July and August. It grows well in pockets in the rock garden and on gravel slopes in the wall garden as well as in the well-drained border. There are a number of varieties; the variety *murale*, with pink flowers and purplish foliage is especially popular. *S. anglicum* (Fig. 57), with rose or white flowers, grows about 5 inches high. *S. sexangulare*, the Hexagon Stonecrop, is a low-growing species scarcely distinct from *S. acre*. *S. spurium* and *S. stoloniferum* are two species almost

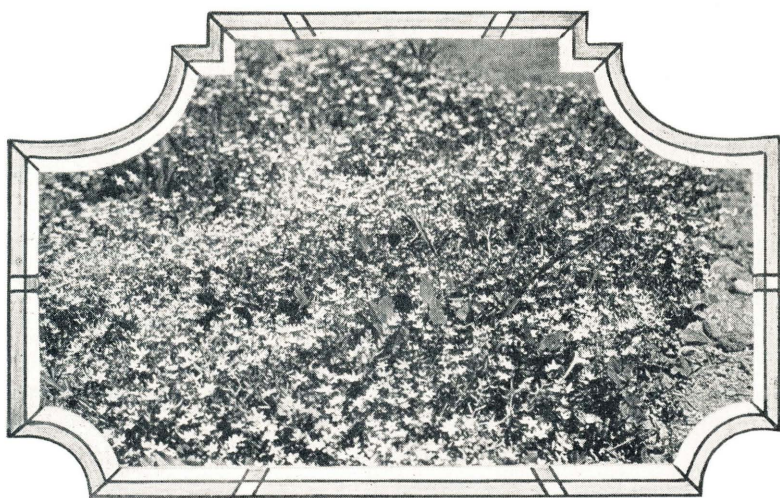


Fig. 57. *Sedum anglicum* grows well when planted in well-drained gravelly soil in a sunny position. It is low growing, spreading and valuable as a ground cover.

indistinguishable and by many botanists considered the same. They are hardy trailing forms with pink flowers appearing in July. They grow 6 to 8 inches high, spread rapidly and are especially valuable as ground covers on gravel banks. The variety *coccineum* has rosy-crimson flowers. *S. reflexum* is a yellow-flowered trailing variety with flower stems 8 to 12 inches high. It is very valuable in the rock garden or the wall garden and may be grown also in the border. It requires a light sandy or gravelly soil and a sunny situation. The variety *cristatum* is an interesting fasciated form. *S. sarmentosum* is a fine dwarf species used for planting in rock crevices and for the wall garden. It is a rapid growing, prostrate form with yellow flowers appearing in June. Unless kept within bounds, it may become a nuisance. *S. Kamtschaticum*, Orange Stonecrop, is a creeping species with orange yellow flowers on stems up to 10 inches high. The flowers appear in July and August. In the winter, the foliage assumes a reddish color. It is an excellent variety for planting in the rock garden or wall garden and does well in a well-drained border. Variegated-leaved varieties are listed. *S. hybridum* is a creeping form with yellow flowers. *S. Middendorffianum hybridum* is similar to *S. hybridum*. Its foliage becomes a rich crimson in the fall.

S. ternatum, a native of southern Michigan, is a white-flowered creeping species specially valuable for shaded locations in the rock garden or wall garden. It grows 6 to 8 inches high. *S. lydium* is a pinkish-flowered sort growing 4 or 5 inches high. It may be planted in the rock garden or in the wall garden. *S. populifolium* is a white or pinkish-flowered species from Siberia. It grows 6 to 10 inches high. *S. pulchellum* is

valuable for its winter color. Apparently there are two forms of this in the trade, one biennial and the other perennial. *S. caeruleum* is an annual with pale blue or lilac flowers.

There are many other fine *Sedums*, but the above are among the best known species and are easily obtained.

SEMPERVIVUM, HOUSELEEK

The *Sempervivums* (Fig. 58) are among the easiest of the hardy plants to grow in the rock garden. They are all evergreen plants with foliage arranged in small, dense rosettes (Fig. 59). They require a dry, well-drained situation and light sandy or gravelly soil. There are a large number of species and varieties, any of which is suitable for the rock garden or wall garden. Species which refuse to flower may be encouraged to do so by removal of some of the young rosettes.

S. tectorum, the Common House Leek, is a form with red tipped rosettes and bears pink flowers on 6-inch stems in June and July. It requires a sunny location and limestone soil. *S. soboliferum*, commonly known as Hen and Chickens, has pale yellow flowers on flower stems 6 to 9 inches high. *S. arachnoideum*, the Cobweb Leek, is so named because of the long, silky hairs connecting the leaves and giving the colonies of rosettes an appearance of being covered with a cobweb. The flowers are red on 6-inch stems, appearing in June and July. It requires a hot dry sunny situation in the rock garden or in the wall garden. *S. globiferum* is very similar to *S. soboliferum*. *S. Doellianum* is much like *S. arachnoideum*. *S. Funckii* has small brown-tipped green rosettes. The flowers are red-purple on stems 6 to 9 inches high. *S. Schottii* (*S. glaucum*) has rosettes slightly tinged reddish and red flowers on 8- to 12-inch stems. *S. atropurpureum* is similar but has distinctly purplish rosettes.

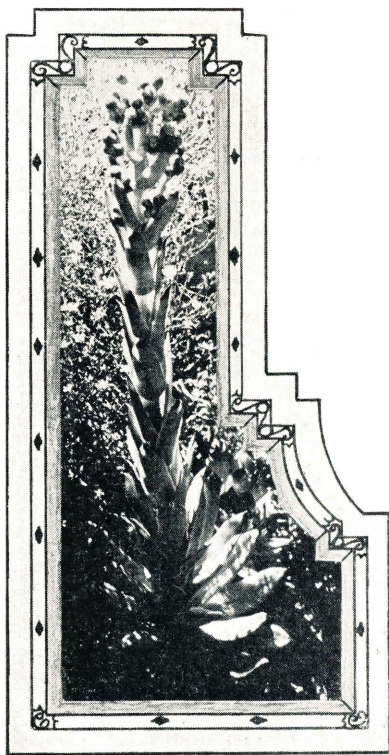


Fig. 58. *Sempervivum* is a large group of rock garden plants especially adapted to sunny dry situations in gravelly soil in rock fissures, or in shallow soil between rocks.

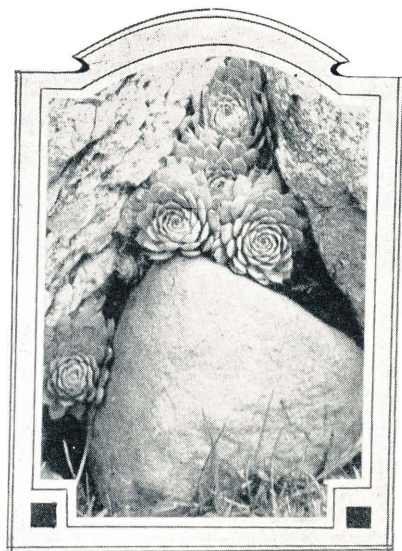


Fig. 59. There are many species of Houseleek that develop their distinctive rosette forms in the confined crevices of rocks or other warm sunny places.

SILENE, CATCHFLY

Though the *Silenes* are of easy culture, the rock garden kinds require diverse treatments.

S. acaulis, the Moss Champion or Cushion Pink, growing 2 inches high, forms a thick moss-like tufted carpet. The plants are covered with rose purple flowers in June and July. They can be planted in the wall garden and moraine as well as the rock garden with slight shade, in a moist rich sandy acid loam. There are numerous varieties. *S. alpestris* is a caespitose form requiring lime in the soil. It grows 3 to 6 inches high and is a mass of pure white flowers from May to July. It is valuable for planting in a sunny position in the wall garden as well as the rock garden. *S. Schafta*, the Autumn Catchfly, is a tufted trailing species covered with rosy pink flowers all summer. It grows 3 to 6 inches high and because of its late flowering habit, is exceptionally valuable for the rock garden. It is easily grown in a light rich soil in full sun. *S. Saxifraga* is densely caespitose with a mossy appearance. It has whitish flowers appearing abundantly all summer and is specially advised for the wall garden.

S. virginica is a native scarlet-flowered species, commonly known as "Fire Pink." It grows about 1 foot high and flowers in May. It requires a light porous peaty soil and does well in the rock garden, either in full sun or partial shade. *S. Douglasii* grows about 1 foot high. The flowers, white or pink, appear all summer from June

to September. Other good species are *S. Lerchenfeldiana*, *S. maritima*, *S. pumilio*, *S. quadrifida*, and *S. suksdorfii*. *S. Armeria*, *S. Asterias*, and *S. pendula* (Fig. 60) are desirable annual forms.

THYMUS, THYME

The Thymes are well known, easily grown plants thriving in dry gravelly soil in full sun. They are valuable for planting in rocks, walls and in dry, barren situations, and are best propagated by cuttings or layers.

T. Serpyllum, Creeping Thyme, is excellent in the rock garden or wall garden. It is a shrubby trailing or caespitose species. It is a variable species, many varieties being listed. Some of these are: *lanuginosus* (Woolly Thyme); *carneus*, pink flowered; *albus*, white flowered; *vulgaris* (*T. citriodorus*) (Lemon Thyme), with distinct lemon odor; *vulgaris argentea*, leaves silvery margined; *vulgaris aureus*, leaves golden-margined; *splendens*, a fine red-flowered form; *coccineus*, a crimson-flowered form; *albus minor*, a very dwarf compact white flowered form.

T. vulgaris, the Common Thyme, grows about 6 inches high and is commonly grown in the garden and may be grown in the rock garden. It is best propagated by seed. There are numerous forms. *T. pectinatus*, often listed as *T. odoratissimus*, is the Lemon Scented Thyme. It is a bushy perennial with pale purple flowers and fragrant foliage. *T. nitidus* is listed, locally, by Michigan dealers in these plants, but its hardiness is doubtful. It has rose-colored flowers appearing in July.



Fig. 60. *Silene pendula* is an annual well suited to the rock garden, wall garden or as an over-hanging cover of rocks or ledges. The pink, white or carmine flowers continue to appear throughout the summer.

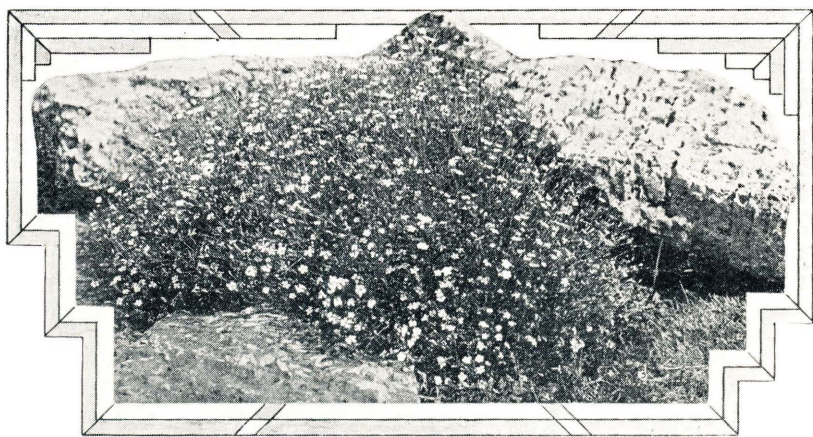


Fig. 61. *Tunica saxifraga* has slender wiry stems and pale pink or white flowers. It thrives under all conditions and is valuable for general planting in the rock garden.

TUNICA, TUNIC FLOWER

Tunica Saxifraga, Tunic Flower (Figs. 41 and 61), is a low-growing hardy plant with slender wiry stems and small white or pale pink flowers. It thrives in dry, gravelly soil and may be planted in the rock garden, wall



Fig. 62. *Veronica spicata nana* has blue flowers throughout the summer. Its dwarf habit, continuous flowering character, and ease of culture make this plant desirable and popular.

garden or border. There are several forms: *alba* has white flowers; *flore-pleno* has double rosy pink flowers.

VERONICA, SPEEDWELL

The Speedwells are easily grown plants, requiring rich well-drained porous soil. Though many of them are too vigorous for general use in the small rock garden, others are extremely useful.

V. spicata, the Common Spiked Speedwell, occurs in a number of varieties, including dwarf forms suitable for the rock garden. Variety *nana* (Fig. 62), blue-flowered, grows 6 to 9 inches high; variety *corymbosa* grows 12 inches high and is pale blue. *V. incana*, the Woolly Speedwell, grow 1 to 1½ feet high, has silvery foliage and produces blue flowers from July to September. It requires a sunny position in the rock garden. *V. Teucrium* (*V. rupestris*), the Rock Speedwell, growing about 18 inches high, bears blue flowers abundantly from July to September. The variety *prostrata* is more prostrate. Many other varieties are used very generally in the rock garden and are also useful for planting in a dry wall. *V. alpina* makes a low, spreading plant with small blue or violet flowers. *V. cusicki*, of the western American mountains, is said to be a better form with larger flowers. *V. caespitosa* is a caespitose species forming a dense cushion covered with pink- or rose-colored flowers in May and June. It grows 1 to 3 inches high and is a valuable plant for the rock garden or wall garden. *V. repens*, the Creeping Speedwell, a very dwarf (1 inch to 2 inches high) prostrate species, forms mats of green foliage covered with light bluish flowers all summer. It grows in full sun or partial shade in a warm situation. It prefers moist soil, but endures dry conditions. It is valuable in the rockery where it can spread, making large patches. There are various forms. It may prove tender, in some sections, under severe winter conditions.



Fig. 63. *Veronica gentianoides* is a slender, tufted species with numerous spikes of porcelain blue flowers in midsummer.

Other species recommended for planting in the rock garden are *V. filiformis* (Fig. 54) *V. pectinata*, *V. multifida*, and *V. fruticulosa* (*V. saxatilis*).

Shrubby New Zealand species of Veronics are generally considered tender. However, *V. Traversii* is listed by Michigan dealers and is said to be very hardy. It makes a dense globose plant 3 to 4 feet high, with white flowers appearing in midsummer. Possibly other of these shrubby forms would survive the winter along the lake shores, as they seem to require a moist atmosphere.

Some of the larger herbaceous Veronicas are also useful for planting in the larger rock garden. *V. austriaca* and *V. gentianoides* (Fig. 63) are both good garden forms, growing 1 to 2 feet high. Varieties of *V. Spuria* are also commonly used in rock gardens.

VIOLA, VIOLET, PANSY

The *Violas* may be divided in two groups—(1) the pansies and tufted violas, and (2) the true violets. Generally they all require a cool, rich loam with leaf-mold, although a few species need a well-drained light soil. Most of them do best in a little shade, although some, as *V. cornuta*, *V. pedata*, and *V. gracilis* thrive in full sun.

V. cornuta, the Tufted Pansy or Horned Violet, is a well-known species of which there are many splendid named varieties. The species has blue flowers which appear continuously all summer. The plants grow 6 to 8 inches high, thrive in sun or shade in moist rich loam and are valuable in the lower parts of the rock garden or in any situation where the roots can reach sufficient moisture. Jersey Gem is a very popular violet colored variety. Royal Gem is even finer. *Lutea splendens* is the brightest and most profuse flowering variety; its blossoms are bright yellow. Apricot bears large apricot-colored flowers. Blue Perfection has light blue flowers. G. Wermig has violet-blue flowers. *Alba* is white flowered. Maggie Mott is clear blue. *V. gracilis*, a species growing up to 12 inches in height, produces violet or yellow flowers from May to August. Several varieties are listed. These are very valuable in the rock garden. *V. calcarata* has dark lilac to white flowers appearing in early spring. The plant grows four inches high and prefers a limestone soil. *V. lutea* grows three to eight inches high and, as the specific name indicates, has yellow flowers, but occasional plants produce a bluish violet flower. Variety *grandiflora* has larger flowers, produced all summer. *V. rothomagensis* is a low growing species with lilac flowers; it is suited to the wall garden.

There are many species and hybrids of the true violets. Any of them is a likely subject for the rock garden. In any case, they should be given growing conditions as near those of their natural habitats as possible. All woodland growing species should receive a covering of leaves over winter.

V. papilionacea is a native species with large violet blue flowers. It grows about 10 inches high and prefers a moist, open, or partly shaded situation. *Var. Priceana* has white flowers with blue centers. *V. pubescens*, the "Downy Yellow Violet," another native species, grows about 7 inches high. *V. bosniaca*, a European species, about 3 inches high, produces rosy purple or pinkish flowers from May to August. *V. pedata*, the well known "Birdsfoot violet," is a native species found in dry sunny situations. Its flowers are large, of a beautiful lilac color and abundant from April to June. The variety *bicolor* is white and lilac or lilac and purple. Groups of these in the rockery produce a beautiful effect. They are readily grown from seed. *V. blanda*, the Sweet White Violet, is a dwarf native violet found in moist rich woodlands. *V. odorata*, the Sweet Violet, a European species, has numerous varieties. This is the violet grown and sold by florists. Some, if not all, of the varieties are hardy if given a covering of leaves over winter.

Other species that may be suggested are *V. arenaria*, *V. Mumbyana*, and *V. Ribiniana*.

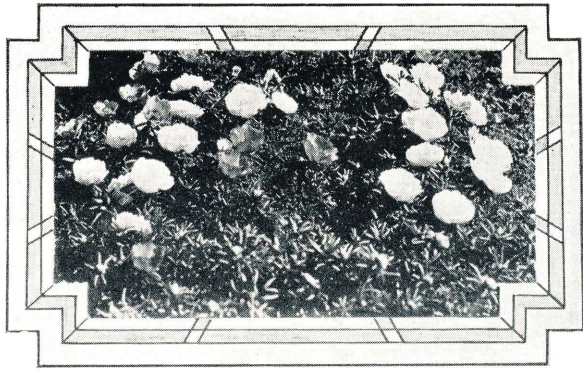


Fig. 64. *Portulaca grandiflora*, an annual, quickly carpeting the ground and thriving in a warm dry situation is valued for its rich color effects in the summer.

ANNUALS FOR THE ROCK GARDEN

Many annual flowering plants are better suited to growing in the rock garden than in any other place. Many of these annuals grow and flower quickly, some within the short space of eight weeks. Many are so hardy and prolific as to become something of a nuisance. They mature such an abundance of seed which may spread to places where they are not desired and so give the gardener considerable labor in removing the resultant seedlings. If the old flowers are cut off before seeds mature, this nuisance can be largely forestalled.



Fig. 65. *Layia elegans*, Tidy-Tips, is a very showy annual native of the western mountains. The beautiful yellow daisy-like flowers are valuable for their effect in July and August.

Annuals are also valuable for filling vacant spots, particularly in new rock gardens. Bulbs and some other plants occupy their position for such



Fig. 66. *Dimorphotheca aurantiaca*, a rich orange-flowered annual that flowers profusely all summer and is effective when used in masses.

a short part of the season that for the remainder of the year they leave bare spots. The annuals may be used to cover such bare spots. Finally, annuals provide interesting spots of color at times of the year when there may be a decided lack in the rock garden. Most of these annuals do not require special cultural consideration, but some annuals may be found that will suit any condition which may prevail in the rock garden. Most of them do well in gravelly soil. These plants should, for the most part, be planted by sowing the seed where they are to grow. Scatter the seed broadcast and allow them to come up as they may. This gives a more natural effect and the

plants, being crowded, afford a mass color effect when they come into flower.

Plants, such as *Arctotis* or *Dimorphotheca*, which make comparatively heavy vegetative growth and require more space, should be thinned out after they have grown sufficiently to crowd. Some annuals suited to use in the rock garden are listed below.*

Alyssum maritimum (Fig. 46)

Anagalis linifolia

Asperula orientalis

Brachycome iberidifolia

Calandrinia sp.

Dimorphotheca aurantiaca (Fig. 66)

Eschscholtzia californica

Gilia sp. (Fig. 36)

Gypsophila elegans

Helipterum sp.

Layia elegans (Fig. 65)

Leptosyne sp. (Fig. 33)

Limnanthes Douglasii

Linum grandiflorum

Lupinus nanus (Fig. 40)

Lychnis Coeli-rosa oculata

Malcomia maritima

Mentzelia sp.

Nolana paradoxa

Phacelia sp.

Papaver Rhoeas

Phlox Drummondii

Portulaca grandiflora (Fig. 64)

Saponaria calabrica

Silene Armeria

Statice sinuata

*A more complete list will be found in the supplement to this bulletin.

BULBS FOR THE ROCK GARDEN

Many hardy bulbous plants are valuable in the rock garden, not only because they are interesting and beautiful, but also because many of them add color in places where other plants have not started or are not showy at a time when these bulbs flower. Most of these are spring flowering, but some kinds flower later, some even in the fall. The early flowering kinds are particularly useful for planting under low growing, creeping, matting rock plants in such a way that they will come up through the other plants. Later their foliage dies down and nothing more is seen of them until the following spring.

Care should be used in selecting kinds for use in the rock garden. Tall growing tulips and narcissi may be out of place in the higher parts of the rock garden, but pleasing in lower parts. They are, however, too large for the small rock garden. The dwarfed types, such as *Tulipa Clusiana*, are usually much better for general use. Most of the small growing kinds should be planted in groups so that the natural mass effect can be obtained. In

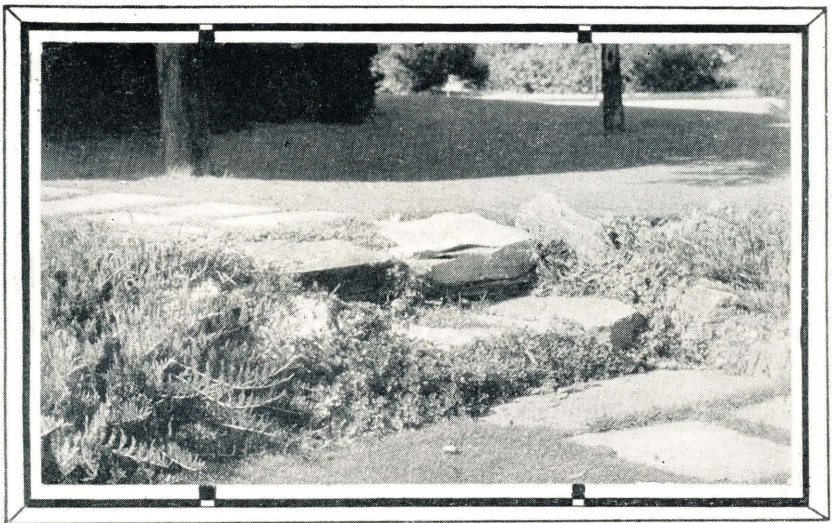


Fig. 67. Dwarf evergreen or deciduous shrubs are particularly appropriate adjacent to stone steps.

planting bulbs of all kinds, it is important to set them deep enough. A few of the better kinds are named in the following list:*

Bulbocodium vernum
Chionodoxa Luciliae
Chionodoxa Sardensis
Colchicum autumnale
Crocus sp.
Eranthis hyemalis
Galanthus sp.
Leucojum vernum

Muscari botryoides
Narcissus cyclamineus
Ornithogalum umbellatum
Scilla sp.
Tulipa Clusiana
Tulipa Eichleri
Tulipa Greigii
Tulipa suaveolens

*A more complete list will be found in the supplement to this bulletin.

SHRUBS FOR THE ROCK GARDEN

A rather considerable number of dwarf shrubs have value in the rock garden (Fig. 44). In the selection of this material, it is important to employ such kinds as will least interfere with the proper growth of the rock

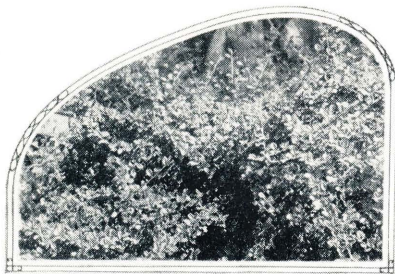


Fig. 68. *Cotoneaster horizontalis*, an evergreen shrub, is effective in the rock garden.

plants. In general, this means that dwarf trees and shrubs selected should be those whose roots extend downward rather than horizontally. Proper attention to details of soil and planting help materially in encouraging downward root growth and in the discouragement of horizontal root systems. Placing of this type of plant material in the rock garden should be done with extreme care. The combination of the wrong materials may well spoil the entire effect of the

garden. Coarse growing herbaceous plants combined with dwarf trees or shrubs look entirely ridiculous. The most dwarfed of rock plants should be

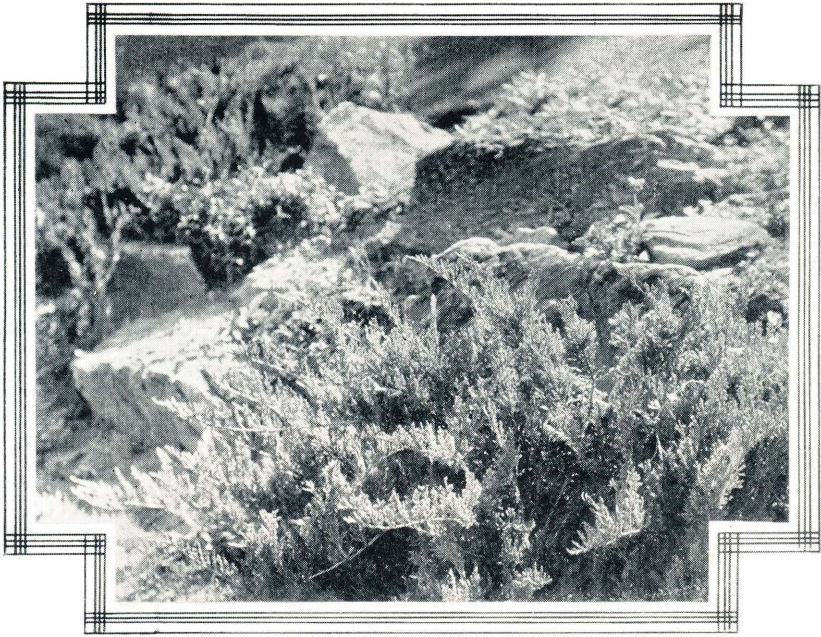


Fig. 69. The low, spreading form of junipers, such as *J. horizontalis*, *J. sargentii* and *J. tamariscifolia*, are particularly suitable for the rock garden.

used around dwarf trees and shrubs (Fig. 54). A few kinds that may be used are listed below.*

Buxus sempervirens

Calluna vulgaris

Caryopteris mongolica

Cotoneaster horizontalis (Fig. 67)

Cotoneaster microphylla

Daphne Cneorum

Evonymus radicans

Hedera helix glomerata

Juniperis horizontalis

Juniperis horizontalis Douglasii

Juniperis sabina tamariscifolia (Fig. 68)

Lonicera nitida

Lonicera spinosa Alberti

Picea excelsa nana

Pinus montana Mughus (Fig. 69)

Rhus canadensis

Rosmarinus officinalis

Taxus canadensis

Taxus cuspidata nana

Thuja, dwarf forms

Viburnum opulus nanum

*A more complete list will be found in the supplement to this bulletin.

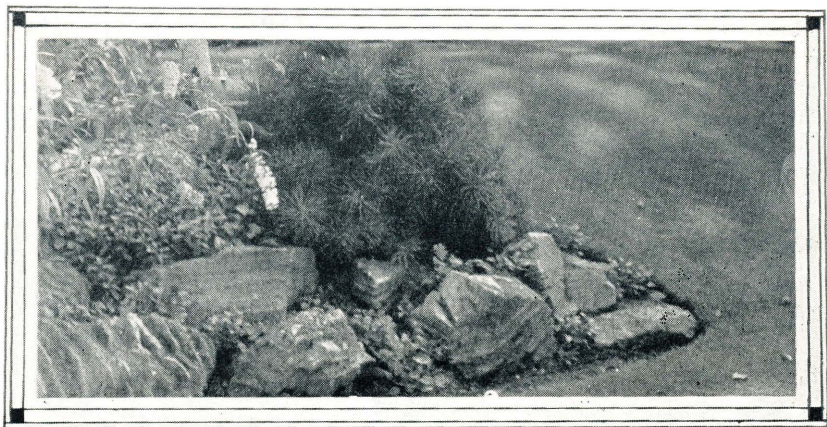
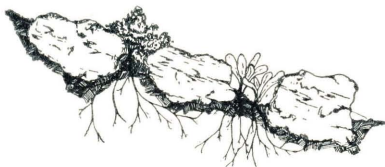


Fig. 70. The dwarf Mugho pine is an admirable evergreen for the rock garden.

A Supplement to this bulletin is being printed in a small edition, containing lists of plants for use in the rock garden, together with brief notes on the habits, flowers, and cultural requirements of each. Rock garden enthusiasts who desire information on less commonly grown plants may obtain this upon request by addressing the Director of the Michigan Agricultural Experiment Station, East Lansing, Michigan.



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Don'ts for the Rock Gardener

To prevent a few of the worst errors commonly committed in the making of rock gardens, the following don'ts are listed:

Don't make a rock pile. It is not a sightly development.

Don't make a mound garden unless it is very low and can be well screened in back with shrubs or trees.

Don't place the rock garden in the front lawn. It is not a fitting and harmonious type of development for that area.

Don't use fancy colored or unique shaped stones. The rock garden is not a museum.

Don't mix different kinds of rocks. Rocks of similar form, color, and texture are more in unity.

Don't stand the rocks on end. They should be placed to appear natural, stable and permanent.

Don't expose unweathered or freshly cut surfaces. Rock should be embedded to the weathered line to appear as having been there from time immemorial.

Don't use small rocks. Good sized rocks are required to appear stable and naturalistic.

Don't let rocks monopolize the area. They are simply to produce the setting for the plants which should cover the larger part of the area.

Don't expect a rock garden for sun-loving flowers to be successful in the shade.

Don't use vigorous perennial garden plants in the rock garden with alpine.

Don't allow a few vigorous, spreading rock plants to take possession.

Don't be afraid to admit mistakes in the making of the rock garden. Re-make it and be proud of the improvement.

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