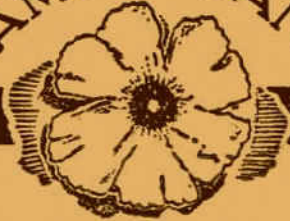


QUARTERLY

of the

AMERICAN



PRIMROSE SOCIETY

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Vol. 3

October, 1945

No. 2

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PRIMULA ALLIONII

Walter C. Blasdale, Berkeley, Calif.

Current seed catalogues, especially those issuing from the North Pacific Coast, indicate an increasing interest in the cultivation of the Auricula on this side of the Atlantic. *Primula Auricula*, which is the dominant species of the Auricula, is but one of twenty-one species which comprise the Auricula Section of the genus. It and the closely related *P. Palinuri* are much the largest and most showy, as well as the most easily grown, of the twenty-one. Both of these exhibit some of the characteristics of succulents, the others are more distinctively alpine as to habitats, size, and habit of growth. Many of them here acquired a well deserved reputation for miffiness which, when associated with a slow rate of growth and a meager production of seed, may explain why they are rarely seen even in the British Isles, the acknowledged center of interest in the cultivation of all types of Primulas.

Primula Allionii, a third member of the Auricula Section of the genus, was discovered in 1908. The specific name given to it commemorates the services of Carlo Allioni, an Italian botanist who wrote a three-volume flora of Piedmont. This is one of the most localized of Primulas, found only within a twelve-mile stretch of the Maritime Alps, a low range which skirts the Italian Riviera. Lovers of alpinists who have reported their journeyings in this area are enthusiastic in their descriptions of its unique habit of growth, the beauty of its foliage, and the relatively large white-throated flowers. Reginald Farrer, with his usual enthusiasm, calls it "the jewel of jewels among our European saxatile species." Will Ingwersen, a well-known grower of alpinists, reports that he found "its colonies, one foot across, a wonderful sight . . . often the leaves completely hidden by its large rose flowers." Such visitors all stress its peculiarly saxatile character. Apparently its roots possess an almost unbelievable capacity to penetrate minute crevices in the limestone rock of this range and to support ample rosettes of grayish green foliage even though there is little or no soil from which to draw needed moisture and mineral salts. In the *Gardeners' Chronicle* (London) for 1913, C. F. Ball, a well known collector, states that he found but few plants which could be collected with a trowel and that the more abundant crevice-rooted plants, even when attacked with a cold chisel and hammer, were released with great difficulty and "much perspiration". Earlier visitors, including Farrer, describe yard-wide cushions found growing in "small grottoes" or "shady caves where neither sun nor rain can penetrate". Such statements have led to the belief that it is a shade-loving species which is scarcely in accord with the experiences of those who have grown it. Ball also alludes to some very luxuriant plants growing in partial shade but notes that they yielded fewer capsules (in August) than those growing fully exposed to direct sunlight.

As suggested by the accompanying photograph the distinctive feature of the species, as grown under glass, is a group of short erect branches bearing small, deep-green, fleshy leaves, which are narrowly

oblong in general outline, but rounded and usually toothed at their free end, and taper to a short broad petiole. The leaves persist for several years after withering and clothe the lower portions of the branches with an inch or more of blackened thatch. In this and other features the species suggests *P. suffrutescens*, the most beautiful (in my opinion) of all the California alpines, the only *Primula* which nature has allotted to that state. However, it would be necessary to reduce the leaves and branches of that species one half to make them comparable with those of *P. Allionii*.



Photo, Walter C. Blasdale

Primula Allionii. Plant in a six-inch pot grown in an unheated greenhouse: Berkeley, Calif., Feb. 10, 1945.

The flower scapes arise from points slightly below the apices of the branches. They are almost too short to be worth mentioning but the two- to five-flowered umbels are not quite sessile. The rose-pink corollas have the usual salver form, are unusually large as compared with the leaves, and, as they are of good substance, retain their beauty from two to three weeks.

One peculiarity, which does not become apparent until the foliage is handled, is the stickiness of the leaves. This is due to a secretion derived from gland-tipped hairs found in great abundance on the upper leaf surfaces and not entirely lacking on the lower surfaces and the corollas. These hairs differ in form from those which produce the solid secretions of the farina-bearing species. The supporting cells are longer, the terminal gland is smaller and collapses shortly after it attains maturity. Since the hairs are colorless they impart a suggestion of grayness to the mature leaves.

Those who have grown or tried to grow *P. Allionii* agree that it is one of the most intractable species of the Auricula Section, at least when

grown out of doors. It is clearly a plant for the alpine house or cold frame. I have had good results with it as a pot plant in an unheated but well lighted greenhouse. The few plants I risked for trial on an open rockery did not long survive. I am in full accord with other experimenters who find it more sensitive to excessive moisture than many alpines, which observation finds support in the preceding description of its natural habitats. Those who report successes with it in England recommend vertical crevices in a rock wall. I grow it in a mixture of equal parts of leaf mould and sand with nearly an equal amount of coarse gravel. I have found no reason for adding limestone to this mixture although it is classed as a lime-loving species. There is a record of success with it when grown on a moraine composed of granite only. Its root system resembles that of the Auricula but its longer cordlike strands seem to call for a deep pot.

The main axes of older plants yield a fair number of stout branches which, at first, grow out horizontally and in time develop a few coarse white roots. They may be used as cuttings before the roots appear or severed after their appearance, and treated as new plants. Propagation by seeds is slower but not difficult. I suspect that the main reason why *P. Allionii* has received so little attention is that so little seed has been available. Even before the war it was rarely to be had from dealers who specialize in alpines. I have not had a single ripened capsule during the course of the ten years that I have grown it.



IMPORTANT NOTICE

General election of officers will be held at the annual meeting of the American Primrose Society, December 18, 1945, 7:30 P. M., Mens' Lounge of the Public Service Bldg., Portland. Members in good standing who wish to exercise their right to vote and who cannot be present, will kindly send request for ballot to the Corresponding Secretary, Mrs. S. R. Smith, Route 16, Box 102, Portland 2, Oregon, request to be received not later than November 20, 1945. Marked ballots must be returned to the Corresponding Secretary before the annual meeting, December 18th, at which time they will be opened and counted.

Members may borrow books from the Society's library as listed on page 71 of the April, 1945 Quarterly by sending a request to Mr. R. W. Ewell, 3275 S. E. Ankeny St., Portland 15, Oregon.

*Life is over, life was gay;
We have come the primrose way.*

—R. L. Stevenson

"A GOODE FLOWRE: THE PRIMROSE"

Sgt. Samuel French Morse

CONCLUSION

Decline and Fall

After 1840, with the rise of the gardening magazine and the decline in the engraver's art as a result of the introduction of modern printing and reproduction methods, most of the botanical prints became unimpressive. The bulk of mid-19th century lithographs and chromoliths are singularly dull. Unfortunately, such illustrations are the best source of information we have concerning the old-fashioned Auricula. And of course, there are exceptions to the rule. One print, in my own collection, of a bunch of Auriculas is dated 1856 (and remains otherwise unidentified), and stands out as one of the most charming of the whole lot. The colors are a little unconvincing—especially a fine light blue—but the decorative effect is more than satisfactory recompense for the lack of scientific accuracy. And occasionally, in the midst of some dull illustrations to the "Floricultural Cabinet," edited by B. Harrison, one comes across a good plate, like that of the Auricula "Oxonian," a fine deep purple self, or the good, hand-colored engraving of a gold-laced Polyanthus, the only one, so far as I know, to appear in the whole run of the magazine.

The French and Belgian publications of the same period clung for a longer time to older methods; but the Auricula, like the Polyanthus, is essentially an English flower. The famous "Revue Horticole" published some plates of Primroses, and the "Revue Belgique Horticole" contains at least one sheet faintly reminiscent of the Volckamer engravings: a page of "nouvelles hybrides Liegeoises," interesting as examples of continental breeding. My acquaintance with the 19th century gardening magazines is extremely limited, and I gratefully leave the subject to a man who knows it well, Mr. Sacheverell Sitwell. I have thumbed through enough of these publications, however, to know that they contain a good deal of practical information and discussion; information which supplements the extensive work of Hogg and Emmerton.

And by no means may one overlook the later prints altogether. The Show Auricula was not always a convincingly real-looking flower, and the stuffiness of certain brilliant rosy purple heads of blossom may well have been a good natural copy; the leaves, at least, always seem authentic. Some of the line-cuts, too, illustrating the construction of show benches, or of special flower pots, cannot be overlooked; the Harrison publication, for example, contains a wood cut showing "a meeting of old-time gardeners," in which periwigged gentlemen sit around a table discussing a large number of new Auriculas. It is uncolored, for which one may be thankful, considering the usual fate of colored woodcuts in the 1850's. And finally, one may purchase separate volumes of many of these gardening magazines for very little, and so build toward a library of interesting lore. Most readers will blush for shame, as they read the vehement defences of favorite varieties, and the condemnation of others, because they do not fit into a pre-determined pattern; they will recognize their own folly, and some of their more unconvincing prejudices.

The Twentieth Century

In our own time, there is little enough to choose from. Perhaps the best plates are those from the Botanical Magazine, which will surely flourish again now that the war has ended. Indeed, the plates are remarkable for their sharpness and their precision; and they carry on the

tradition of the hand-colored lithograph. During the past twenty-five years, almost a hundred species, most of them new Asiatic species, have been figured. Since the Botanical Magazine deals only with plants raised successfully in Great Britain, many of the most tantalizing species do not appear. One goes to photographs for these, to Farrer's great work, and to Sampson Clay's supplement, and to the yearbooks and the "reports of the proceedings" of learned societies, or to the writings of Kingdon Ward, for the information he seeks. There are other isolated sources, of course; one of the most nostalgic of these is the volume prepared by E. H. M. Cox, editor of the late-lamented "New Flora and Sylva," as a memorial to Reginald Farrer: a book, printed fifteen years ago, with reproductions of some of Farrer's flower paintings (including two of Primulas), "The Plant Introductions of Reginald Farrer." The books of Kingdon Ward, and the fugitive articles by Farrer (his books need no mention), then, only broaden the literature.

APPENDIX I

Plates from Curtis, The Botanical Magazine, 1786-1833, and 1920-1940

Plate No.	SPECIES	Plate No.	SPECIES
14	<i>P. villosa</i>	8914	<i>P. florida</i>
191	<i>P. marginata</i>	8916	<i>P. Menziesiana</i>
229	<i>P. acaulis</i> var. <i>flore pleno carneo</i>	8918	<i>P. Pratii</i>
392	<i>P. longifolia</i>	8922	<i>P. aerinantha</i>
399	<i>P. cortusoides</i>	8932	<i>P. rupestris</i>
942	<i>P. integrifolia</i>	8939	<i>P. sinolisteri</i>
1161	<i>P. villosa nivea</i>	8986	<i>P. calciphila</i>
1279	<i>P. intermedia</i>	8990	<i>P. suffrutescens</i>
1922	<i>P. decora</i>	9018	<i>P. cardiophylla</i>
2564	<i>P. sinensis</i>	9026	<i>P. Bulleyana</i>
2973	<i>P. mistassinica</i>	9036	<i>P. melanops</i>
3020	<i>P. pusilla</i>	9053	<i>P. Beesiana</i>
3252	<i>P. amoena</i> (first plate, considered poor, but in some copies, very fine)	9064	<i>P. Edgeworthii</i> (Winters)
		9100	<i>P. spicata</i>
		9107	<i>P. Inayatii</i>
		9121	<i>P. effusa</i>
		9138	<i>P. pinnatifida</i>
8468	<i>P. Wattii</i>	9149	<i>P. bella</i>
8535	<i>P. Purdomii</i>	9150A	<i>P. involucreta</i> Wardii
8564	<i>P. vinciflora</i> (Omphalogramma <i>vincaeflora</i> ?)	9166	<i>P. vulgaris heterochroma</i>
		9189	<i>P. Baileyana</i>
8735	<i>P. nutans</i>	9196	<i>P. Cawdoriana</i>
8752	<i>P. anisodora</i>	9210	<i>P. silckimensis microdonta</i>
8762	<i>P. sylvatica</i>	9218	<i>P. Agleniana</i>
8777	<i>P. sinopurpurea</i>	9245	<i>P. latisecta</i>
8791	<i>P. chasmophila</i>	9266	<i>P. Dubernardiana</i>
8796	<i>P. tibetica</i>	9276	<i>P. alpicola</i>
8801	<i>P. bellidifolia</i>	9289	<i>P. concholata</i>
8816	<i>P. chionantha</i>	9384	<i>P. szechuanica</i>
8821	<i>P. spicata</i>	9401	<i>P. Wollastonii</i>
8836	<i>P. pulvinata</i>	9410	<i>P. amethystina</i> subsp. <i>brevifolia</i>
8881	<i>P. nipponica</i> and <i>P. tenella</i>	9451	<i>P. Wigramiana</i>
8884	<i>P. kisoana</i>	9494	<i>P. Sherriffae</i>
8893	<i>P. blattariniformis</i>	9527	<i>P. sonchifolia</i>
8895	<i>P. bathangensis</i>	9584	<i>P. laciniata</i>
8899	<i>P. helodoxa</i>	9593	<i>P. amoena</i> (re-engraving of the earlier plate)
8901	<i>P. eburnea</i>		
8902	<i>P. peginella</i> and <i>P. dryadifolia</i>		
8908	<i>P. heucherifolia</i>		
	Some important Primula relatives figured in the same work		
4	<i>Cyclamen Coum</i>	868	<i>Androsace lactea</i>
12	<i>Dodecatheon Meadia</i>	2163	<i>Soldanella Clusii</i>
44	<i>Cyclamen persicum</i>	8653	<i>Androsace coccinea</i>
49	<i>Soldanella alpina</i>	8972	<i>Androsace spinulifera</i>
743	<i>Androsace villosa</i>		

APPENDIX II

This essay—or compilation of notes—could not, obviously, have been written without the aid of the books mentioned in the text, nor without the encouragement of those persons who share this interest. Thanks, then, must go to these sources and these persons first. I must beg off from the compilation of any bibliography now; perhaps someone else can undertake that task. Life in the Army is so uncertain that it is best to get such fugitive pieces into the mail as quickly as possible.

HUNTING FOR PRIMULAS WITH CAPT. F. KINGDON WARD

Caroline Morse Lord, Frankestown, N. H.

Conclusion

Capt. Ward is honest, even with the Primulas, which he obviously cherishes. "A pert-looking cad with anaemic mauve flowers, common on edges of copses in such doubtful company as *Pedicularis*," is—must I name it?—*Primula sinoplantaginea* ^(c). And *P. szechuanica* ^(c) "is ugly, dowdy and best left buried; it belongs to the Maximowiczii section which are the frumps of an exalted family. They come mostly from Kansu."

P. moschata is "an absurd little plant."

It is interesting as well as helpful to know what other kinds of plants associate with Primulas; after all, one is known by the company he keeps—or the enemies he has:

P. bella ^(a) throws up its violet stars on rocks in glacier beds (where alpine take over when glaciers retreat), and likes the company of *Soldanella*, crimson Azaleas and purple Columbines. ^(b).

P. sikkimensis, ^(a) looking at the Mekong-Salween watershed, appears with large *Thalictrums*, *Anemone*, *Caltha*, and *Primula Watsoni*.

P. Souliei ^(d) on the same watershed, is rare, growing among sedges, *Gentians* and *sphagnum*.

P. sinensis ^(d) grows with *Saxifraga sarmentosa*, *Epimedium*, *Crasulas* and *Orchids*.

P. serratifolia, ^(b) "yellow pools of it lay in the wet hollows, and on the grassy ledges of the cliff nearby grew a beautiful mossy saxifrage with a solitary golden moon flower balanced on the end of a short leafy column."

P. capitata, ^(b) with a mop of rich violet flowers capping a mealy white stalk, was found in high meadows, with fragrant *Orchids*, *Larkspurs* and *Globe-flowers*. Elsewhere it was found near bushes of *Syringa*, *Honeysuckle*, pink *Deutzia* and *Pyrola uniflora*. ^(a)

On the other hand, varieties of Primulas may grow near one another without intruding on the other's territory, as in the case of *P. obconica*. ^(c). In a steep-sided gully are two species of thin-leaved *Obconica*, one above, the other lower down, entirely distinct; their territories meet but do not overlap. "The seeds of both are washed green out of the open calyces, and can only be carried down stream. Yet the upper one never intrudes on its neighbor's territory!"

There are so many differences among Primulas that it is tempting to copy all of Mr. Ward's descriptions. The following may lure both reader and explorer, but never satisfy the collector of things unusual:

P. encyclia ^(a) is found in mossy beds starred with lilac and violet fringed petals; eye, yellow or red, a delicious dwarf, bearing flowers in pairs or threes on crimson threads. Coral red runners radiate from the plant and throw up sprigs of chubby leaves which take root; thus cuttings strike easily; the tiny leaves borne on crimson stalks are deeply cut after the manner of a *Geranium*; it flowered profusely on banks and rocks, beneath the heavy shade of *Rhododendrons* and *Magnolias* within splash of cascades.

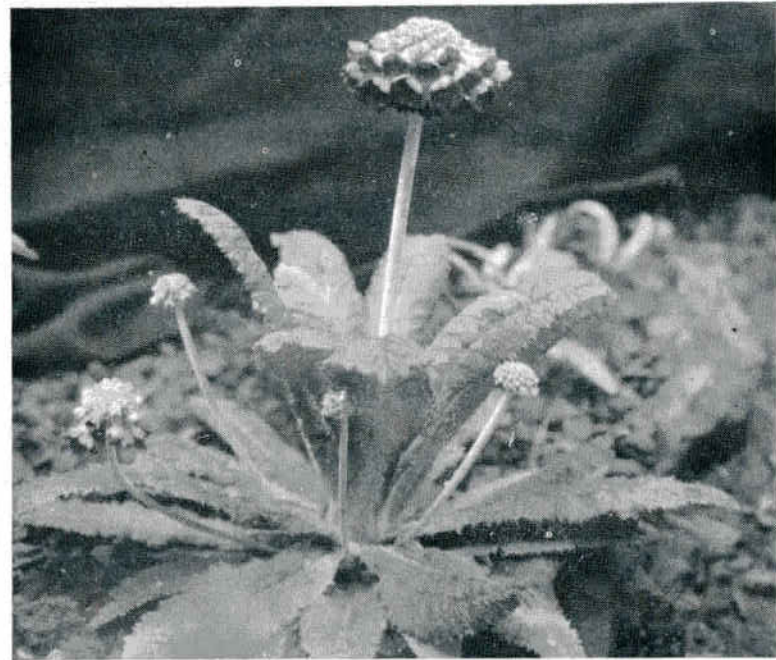
P. siphonantha ^(a) is frail, looking like the ghost of *P. Cawdoriana*;

*The small letters refer to books by Capt. Ward, named at the close of this article).

the scape is about 4 inches high and springs from a tiny rosette of downy leaves; there are two or three pallid violet flowers, delicate, but surviving wind and rain at 11,000 feet; it belongs to the *Soldanelloideae* Section, too homesick to live away from their alps.

P. chamaethauma, ^(a) "Wonder of the Snow", refuses to grow at sea level; extremely abundant in high alpine valleys of the Seingku, above 13,000 feet. A turf slope was absolutely violet with its cabbage leaves and massive heads.

P. silaensis, ^(a) Claret Cup, grows on patches of gravel carefully avoided by the foregoing. It is exquisite, about an inch high with thread-fine stem; wine-purple bell flowers hang singly or in pairs, rarely threes; the spoon-shaped leaves form neat rosettes on the ground from which rises the fairy staff with the red bell swinging by a ligament from its apex; it is one of the most charming of the Jewel Primulas (*Amethystina*).



Photo, J. G. Bacher

Summer-blooming *P. capitata Mooreana* with its frosted, violet-tiled pagoda roof, heliotrope fragrance, and easy culture is one of the best Himalayan Primulas.

P. deleiensis ^(a) grows on an almost vertical rock face to which a veneer of mud and turf give it a sense of false security.

P. Dubernardiana ^(a) is a rock Primula; in the darker and damper crevices of the cliffs they form magnificent cushions of fresh green foliage without flowers; those on a sunny cliff-face, though stunted in appearance, were a mass of bloom.

P. Florindae ^(a) was named for Mr. Ward's wife and is a sociable plant, for, he says, large streams are sometimes held back by clumps of them. It is a round leaved variety with yellow blossoms on stalks that are sometimes several feet high.

P. microdonta var. *alpicola*, ^(a) "Moonlight," on the other hand,

likes to grow by itself. It is fragrant and comes from Tibet where "it turns the green July fields into sulphur seas."

P. calliantha ^(c) grows on wet mossy rocks in the depths of the forest where the light is always subdued; aristocratic-looking, it challenges us coldly. "It is tall and proud, but lovely beyond belief, with an aloof and icy pride. The flowers are large and mauve with yellow eye, and delicately fragrant, which so few *Primulas* are; and the silver meal lining the calyx glistens between the purple teeth like moonlight through a slit in the clouds. The dark green leathery leaves project stiffly from the fat onion-like neck which rests upon the ground, and must be protected with a covering of snow through the long winter, lest under the influence of damp it deliquesce into pulp. A fine plant for shady nooks in the rock garden. . . . but temperamental I fear."

P. Werringtonensis ^(c) was the most gorgeous *Primula* in the district of Kong; "the flowers are a glib crimson with plenty of punch in them; they flamed and raved in the wooded limestone ditches in early June." One was found on the stony bank of To-lo-ho River.

P. pulchella ^(c) is a dainty *Nivalid*, more dependent upon the right kind of soil than on other conditions, growing in deep forest or open downs, wherever raw limestone creeps out, though it varied in size and flower.

Miss Brenda E. Newton, Reference Librarian of Massachusetts Horticultural Society has kindly furnished me with the following information from the *Gardeners' Chronicle* of London:

MR. F. KINGDON WARD, V.M.H. How many new plants Mr. F. Kingdon Ward has introduced from eastern Asia is not possible to state because many of his introductions have yet to be determined by competent botanical authorities, nevertheless the number must be very large, especially among *Rhododendrons* and *Primulas*. He has made eleven successful expeditions to the Far East, and the account of his latest journey, now appearing in these pages, will give readers some idea of the difficulties of such an expedition, and of the scenery and vegetation in the district traversed beyond the Burmese frontier. A man who repeatedly risks his life in efforts to secure plants that may enrich our gardens deserves well of all gardeners and merits whatever high honors may be available in the horticultural world. The Royal Geographical Society has shown its appreciation of Mr. F. Kingdon Ward's work in defining rivers, mountains and valleys in hitherto unexplored territory. Now, happily, the Royal Horticultural Society has added its appreciation from the horticultural point of view, by awarding him the Victoria Medal of Honour in Horticulture, and thus he takes his rightful place in succession to those famous collectors to whom a similar honour has been accorded—Boxall, Balfour, Forrest, Henry, Wilson, Burbidge, Elwes, Hooker, Peter Veitch and Maries. . . . On June 7 he will lecture before the Royal Horticultural Society, and on that occasion will be presented with the Victoria Medal of Honour. . . . his lecture will deal with certain features of his recent expedition. (*Gdnrs. Chron.*, III:322, 1932)

Mr. Ward has also received the Livingstone Medal from the Royal Scottish Geographical Society, and the George Robert White Medal from the Massachusetts Horticultural Society. Perhaps the greatest honor of all is for us to think of him as we work among the plants which he labored to introduce; or even read about those which he has described but which for various reasons could not be made to live elsewhere than

in their native haunts. Or will persistence and care overcome all difficulties?

Mr. Ward's home is in Berkshire, England and his books were published in London.

Of the books named below, (b) contains an appendix of interest to many besides plant hunters: a list of mammals, birds, reptiles, amphibians and insects collected by other members of the party; a report of the weather, month by month; and a detailed list of the distances between stopping places; as well as a list of more than 200 kinds of seeds collected by Mr. Ward. All of these books are good reading and make one thankful even for armchair travel. Plant hunters, being more or less scientific, have a great deal to say about the people they meet and work with, their customs, manners and homes; "native material" can include attractive Daru girls as well as purple *Primulas* in Hanging Valley.

Reference to Ward's books mentioned in footnote on page 22.

(a) *Plant Hunting on the Edge of the World*; (b) *A Plant Hunter's Paradise*; (c) *The Romance of Plant Hunting*; (d) *The Land of the Blue Poppy*.



Seeds

Members will appreciate the thoughtfulness of Mrs. John L. Karnopp and Helen Garrett of Monroe, Oregon, in saving seeds of the following *Candelabra Primulas* for those who wish to send a self-addressed, stamped envelop to the Corresponding Secretary, Mrs. S. R. Smith, Route 16, Box 102, Portland 2, Oregon: *Primulas pulverulenta*—Bartley strain (pink), *japonica* (four varieties in white, pink and red), and *helodoxa* (yellow), the first two being herbaceous, the last evergreen. These, and *P. florindae*, may be had separately, or in mixture. Seeds of *P. Cockburniana*, an herbaceous, smaller *Candelabra* (tangerine), and *Candelabra* hybrids are contained in the mixture only, the quantity being insufficient for separate packets.

Seeds may be had free of charge by any member of the Society in good standing; reports on the progress of plants will, of course, be of great value to others in the same district. Seeding and cultural conditions for these *Candelabras* are not different from the outline given for *P. florindae*, page 38, Volume 1.

Those having seed of *Primula* species in small quantities may wish to pool it for distribution by forwarding to the Secretary, thereby scattering the fruits of their gardens throughout the land giving pleasure to all who love *Primulas*.

Late fall and winter sowing of seeds provides natural frost action which brings on good germination in early spring. After sowing, protect container with pane of glass, expose to the elements, and keep moist. Uncovering during snow aids the process.

HYBRIDIZING FOR DOUBLE PRIMROSES

Donald Neil O'Connell

Double Primroses have been in cultivation for well over three hundred years, yet there are probably fewer varieties in general cultivation today than there were in the middle of the last century. Indeed, the majority of the currently grown forms are the originations of the last century. The best of these old varieties seem to be in a process of gradual extinction. Few people today grow the celebrated Rex Theodore, Dernel-eughi, or Prince Silverwings; and even Mme. Pompadour, Rose du Barri, and Cloth of Gold are extremely rare, and those few types which are in general cultivation would tend to be of poor constitution. Further, very few of these old varieties have been established on this continent. Because of this scarcity of double forms and their weak constitution, it is highly desirable that gardeners undertake to produce new varieties, particularly in this country, where the handful of varieties in cultivation cannot readily be augmented by foreign importation. Many attempts have been optimistically made, but the plants invariably arrive either embalmed by the long, dry trip or sadly moribund. The chief reason that attempts have not been made by gardeners in this country to breed new double forms is probably a lack of knowledge of the method for creating these forms and of the genetic principles underlying these methods.

The hereditary characters of the Primrose are carried from generation to generation by chromosomes, which are chain-like bodies in the nuclear germ plasm of the sperm and egg cells. These chromosomes are made up of submicroscopic bands which are called genes and are the factors which condition the characters of the plant. The Primrose, the Oxlip, and the Cowslip each have twenty-two chromosomes in the nuclei of their cells. These chromosomes normally occur in pairs, one of each pair having come from each of the plant's parents. Thus, each parent contributed eleven chromosomes. These two sets of chromosomes are identical in shape and carry an equal number of similar genes. There are in each set, however, eleven different kinds of chromosomes, each different from the others in shape and in the genes it carries. Each of these different chromosomes has as its mate a corresponding chromosome from the other set of eleven. There are, therefore, eleven pairs of identical chromosomes in these species. Each member of these pairs consist of an equal number of corresponding genes arranged in the same order on each chromosome. By means of a complicated reduction division, the number of chromosomes in the germ cells of the Primrose is halved. In the pollen grains of each plant, as in the ovules, there are eleven chromosomes. When the generative nucleus of the pollen tube unites with the egg nucleus in the ovule, the resultant fertilized seed embryo has its normal complement of 22 chromosomes. Since the half complement of eleven chromosomes in the pollen of a plant is identical in nature to that of its ovules, it makes no difference genetically whether any given plant is used as the male or female parent. However, for other reasons, the double parent must always be used as the pollen parent.

The factors affecting the hereditary characters of Primroses are, of three types: dominant factors, recessive factors, and blending factors. These are perhaps best explained by means of an example. In using genetic symbols, we represent the dominant factor by a capital letter and its corresponding recessive factor by a small letter. The initial letter of the dominant character is generally used for both genes. Rep-

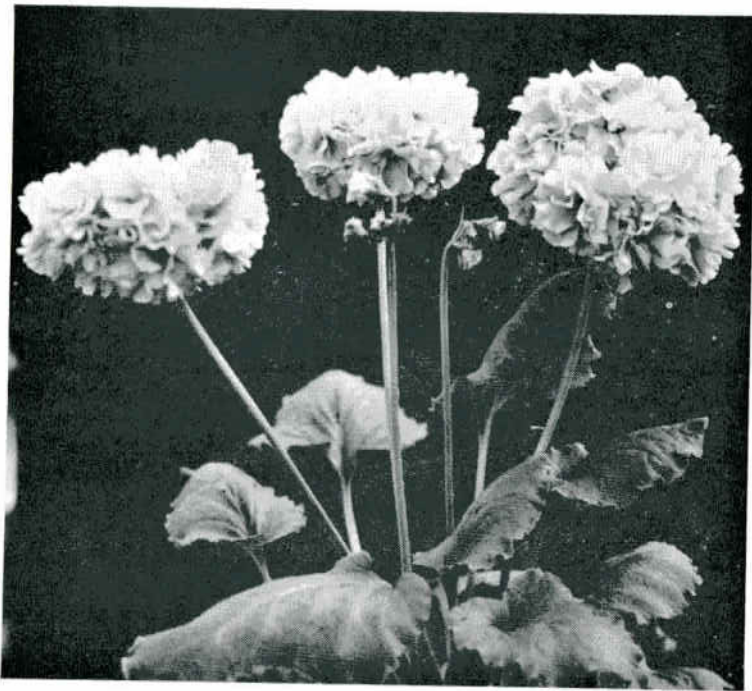
resenting the red color factor in a flower by "R" and the white factor by "r", there are three possible genetic combinations in any one plant: "RR", "Rr" and "rr". Flowers produced by the first of these are red, but flowers produced by the second combination are also red. Even though these flowers carry the factor for white, it does not show in any way, for it is recessive to the red factor. Only the third type plant produces white flowers. In other plants, the red factor, "R", and the white factor, "r", may lack dominance, producing a blending effect. In this case, the first combination would produce red flowers, the second would produce pink, and the third would produce white. Note that the capital letter is still retained, although its purpose is now merely to differentiate it from the factor producing white flowers and not to show dominance. In the first example cited above, the genotype of red plants cannot be determined by their phenotype, i.e., their appearance. The two genotypes "Rr" and "RR" both produce red flowers of identical appearance. This is most commonly the case with plant characters and is most confusing to the tyro, particularly when the color factors of a plant are of this type. Plant colors cannot be mixed by the hybridizer's brush as they can by the painter's.

Hereditary characters in Primroses may be divided for convenience's sake, into two general types: unit characters, which are those characters conditioned by a single pair of genetic factors and carried by a corresponding pair of genes; and those characters conditioned by multiple factors, i.e., more than one pair of genetic factors. It is important to point out here that there are often many more than two different genes occupying the same chromosomal locus and therefore conditioning the same character, although conditioning it each in a different way. But only two of them can be active in any one plant, since only one gene can occupy a given chromosomal locus, there are only two of each type of chromosomes, and genes always occupy the same relative position—normally—on their chromosome.

In Primroses, the factor producing single blooms is dominant to that producing double blooms and also to that producing semi-double blooms. The number of petals in the bloom is a unit character, conditioned by a single pair of genes carrying any two of the above factors or combination of two factors.

Double Primroses may be divided into two types. The more common of these two types—at least in American gardens—is that one in which both the male and the female reproductive organs have been completely replaced by petaloid modifications. Typical of this type are the Old Double Lavender, the Old Double White, and the new polyanthus double Juanita. As these produce neither seeds nor pollen, they cannot be used in hybridization. The second type does produce pollen. In this type, the female organs have been completely modified, but of the male organs, only the filaments, which bear the pollen-filled anthers, have been replaced by petaloid formation. This is the only available type which can be used in producing new double Primroses. Old Double Sulphur, Marie Crousse, and Double Purple are of this pollen-bearing type, as are also the Double Yellow, Double Red, Double Buff, and Semi-Double Yellow varieties of Auricula. All of these varieties are commercially available either in the United States or in Canada. They are by no means common—the double Auricula forms being much scarcer than the double Acaulis and Polyanthus forms mentioned—but are the least difficult varieties to obtain of those doubles in current cultivation in this country and Canada.

In breeding, the double varieties must, by their very nature, be used as the pollen parent and the single varieties as seed parent. (Seed-bearing double Primroses are a botanical possibility although probably unknown in present-day gardens. There are, however, seed-bearing hot-house varieties). Using genetic symbols, the dominant factor producing



Photo, J. G. Bacher

Double *P. obconica* "Portland Beauty" originated by Mr. J. G. Bacher. A rare example of a fully double flower retaining both male and female reproductive organs.

singles may be represented as "S" and the recessive factor producing doubles as "s". The double crossed onto the single would be represented thus: "SS" x "ss". The first-generation hybrids resulting from this cross would all carry the factors "Ss". Even though both factors were present, only the dominant factor would show, of course; the hybrids "Ss" would be phenotypically indistinguishable from ordinary single Primroses of the type "SS". To obtain the desired double forms, these first-generation plants should be crossed. Since they produce both pollen and seeds in the normal manner, crosses are possible both ways. This second, and final, cross would be illustrated diagrammatically thus, the two factors carried by each parent appearing in the light squares to the top and side of the dark squares, in which the hybrid combinations they produce are shown:

	S	s
S	SS	Ss
s	Ss	ss

Fig. 1. Ss x Ss.

This cross yields three types of hybrids genotypically, in the ratio of 1:2:1: "SS"; "Ss"; "ss". However, there are only two types phenotypically, in the ratio of 3:1; singles; doubles. We find that 25% of the second-generation hybrids are of the double type. Actually the percentage is generally a little less than this. The proportion of double forms can be increased to 50% if, instead of performing the above cross, one performs a back-cross, pollinating the first-generation hybrids with pollen from a double variety, thus diagrammatically:

	s	s
S	Ss	Ss
s	ss	ss

Fig. 2. Ss x ss.

It would be preferable to use pollen in the above cross of some double variety other than that used in the initial cross. This would prevent any unnecessary inbreeding, which might weaken the resultant hybrids, particularly if the double Primrose used lacked vigor, as so many of them do—although inbreeding does not, contrary to popular opinion, invariably do so.

In selecting prospective parents for hybridizing, one should always strive intelligently to improve the strain. Indiscriminate hybridization is much more liable to weaken than improve it. Careful selection of parents is particularly necessary when one is breeding for double Primroses, due to the general lack of vitality in existing garden forms. In working for double Polyanthus and Polyanthus-primrose varieties, a strong, straight flower stock and firm, round head of bloom are vital considerations. In all forms, single or double, size is never as important as good form, thick texture, and strong, clear color. These three essentials make for true quality of breeding; without them, size means nothing. Color range can be increased by keeping in mind the two main types of coloring components found in Primroses: the hirsutin pigments, which are found in the epidermal layer of the bloom and produce lavender, blue and purple shades; and the flavonal pigments, which are in the under layer of the petal and produce the yellow and buff shades. A wider color variation will result from crossing varieties colored by the epidermal pigments with varieties colored by the flavonal agents, or by crossing together varieties colored by both types of flower pigments.

With the great need for improvement in present double Primrose varieties and their increasing scarcity, the breeding of new and better double forms will appeal to many gardeners. Although the necessary breeding program may take from three to four years, its results more than justify the patience involved, and it is hoped that many gardeners will undertake the production of these lovely double forms.



CATCHING UP ON SOCIETY AFFAIRS

The Society, like those who comprise it, finds fall an excellent time to put its house in order and reports at this time on extra-activities pursued during the past six months of gardening. Returning to the enchanted months of April and May when gardens were pictures out of nature's color book, many members will recall with delight the three garden parties given by Mrs. A. W. House, Mr. and Mrs. John L. Karnopp, and Mr. Henry Wessinger. Mr. Wessinger has long been known for his choice Polyanthus and the distinguished use to which he puts them in his garden which extends over several acres of Portland's west hills. Used in color combinations with native evergreens, Azaleas and



Photo, Leo Simon

Along one of the Primrose terraces in Mr. Henry Wessinger's garden, Portland

Rhododendrons, the garden commands an unimpeded view of the Cascade Range which halves the State. The large semi-circular lawn is finished off in a yard-wide border of white and gold Polyanthus with a ribbon of Forget-me-nots. Cascading below are a series of terraced rockeries in long undulating sweeps with great splashes of pastel, flame and golden Primroses flecked occasionally with the clear blue of more Myosotis, while colonies of Trilliums and Fritillarias keep to the shrubbery above.

By contrast, Mrs. House's garden is located in the city proper and built somewhat on the order of the English herbaceous border for continuous bloom throughout the year. Auriculas of great beauty, specimen plants of all types, and the growing and testing of various European and domestic strains of Polyanthus, Acaulis and Asiatics make her garden of educational value as well as one of intimate charm. That Mrs. House possesses the green thumb is borne out by the superb plants which populate her garden with such enthusiasm—an enthusiasm unchecked in the little Juliana hybrids which at times run all over the paths instead of adhering unswervingly to their assigned line of duty as edging material.

The garden of Mr. and Mrs. Karnopp is totally different from either of the foregoing, except in its commanding view much like that of Mr. Wessinger's garden. It rises abruptly by a series of massive rock terraces to a height of thirty-five feet above street level, is well wooded, with varying degrees of shade which could have been a problem had not the owners, early in the garden's development, pioneered with Asiatic Primulas and found themselves launched on an absorbing hobby. In keeping with the rock work, the cool, mountain pool, and the over-all height of the garden, Candelabra Primulas have been established in sizeable settlements, one color blending into another in a pattern harmoniously exotic. Primulas pulverulenta and its pink sport, japonica, Cockburniana, Bulleyana, burmanica, helodoxa, and hybrids bred by Mrs. Karnopp dominate the Astilbe, Funkia, Meconopsis, false Solomon's Seal, and many varieties of ferns used as a foil to accentuate color and line of the Primulas. More there were, some past bloom, others yet to come, and, like many other gardens, it is a rare month when there are none to pick.

An activity with a spontaneous beginning in a member's garden last June and one which promises a lasting influence on the Society, is a study group which really studies; in fact, willingness to work, study and experiment cooperatively is the one requisite for admission besides being a member in good standing. Realizing the need of first-hand information and experience in growing Primulas of the Auricula and Asiatic groups, this nucleus was formed from which may spring knots of students whose specialized interest may narrow down to certain Sections of the genus, and hybridizing for new strains. The group is loose-knit and informal having a steering committee in place of elected officers to outline the work which is decided upon. In addition to the history and background of the Primula under discussion, various cultural conditions and seeding methods are discussed and demonstrated, records kept, and reports of experiments made.

A brief resume of the August meeting will give an idea of the work. The consideration of *P. rosea grandiflora* as a typical species of the Auriculatae Section was decided upon in July and each member of the group came prepared with what information could be found on the subject. Small *Rosea* seedlings were exhibited and a demonstration of dividing given. Seed planting occupied the second half of the program, each member having brought a sample of seeding soil, drainage material, and container, the preparation of which was explained and discussed. Actual sowing of seeds completed the demonstration. The variation of soil from clay to gravel, even in a very limited area, was readily seen, and the need for adapting the old rule of equal parts garden soil, leaf mould or peat, and sand was a natural conclusion. In closing the discussion on soils attention was directed to natural growing conditions in Asia.

It is a compliment to this serious-minded group that adjournment after two hours is difficult. Meetings are held the fourth Thursday of each month at 1 P. M. in Room D, Portland Public Library, Southwest Tenth and Taylor Streets. Mrs. John L. Karnopp, who has been appointed chairman of the program committee for the Society, will gladly furnish information on the study group.

Six meetings have been unreported and a brief outline will keep members posted on the general trend of activities. July and August meetings were purely social and held in one of the city's parks. But for discussions on the need for expansion in the coming spring show, all business was suspended. In June, colored slides of the current spring show were shown and the Society's revised constitution adopted.

Asiatic Primulas took up most of the May meeting with Mrs. John L. Karnopp leading a discussion group on soils and the habit many species have of developing new roots in mid-summer necessitating ample moisture for the period. Although fertilizing was not recommended—leaf mold being considered the ideal food for Asiatics—Denticulatas planted in a Rose bed generously treated to potash and phosphorous had been outstanding.

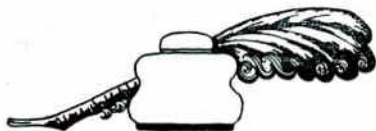
The major part of the April meeting was taken up with discussions of the show and judging points. Ross Nickolas speaking on fertilizers at the March meeting suggested mixing humus with chemicals such as twenty-five pounds of sheep guano with one hundred pounds of commercial fertilizer. He urged the planting of legumes on idle soil to capture free nitrogen and said it had been found that a 50c investment could yield up to \$35 worth of nitrogen in this way.

Regular monthly meetings are held the third Tuesday of the month in the Mens' Lounge of the Public Service Bldg., Portland, 7:30 P. M. Visitors are always welcome.

The past six months have brought a substantial influx of new members to whom the Society extends a cordial greeting. And to those who have substantially aided the Society by becoming sustaining members, an extra note of thanks for their graciousness.

This is a rapidly growing group of members, new and old, whose earnest interest has prompted the taking out of a \$5 Sustaining Membership instead of the \$1.50 Active Membership. In addition to those whose names appear on the roster of the 1945 year book are Mrs. G. O. Guy, Seattle; Mrs. Blossom R. Rogers, Puyallup, Wn.; Mrs. Chester Maris, Smith River, Cal. (two years); Mrs. E. Connaway, Multnomah, Ore.; Mrs. Gordon Brown, Hood River, Ore.; Mrs. Larkin Grubb, Ashland, Ore.; Mrs. W. R. Wilmot, Mrs. Philip Hart, Mr. Henry Wessinger, Mrs. Florence Holmes Gerke, all of Portland; the Northwest Gardens Magazine, Seattle; and Dr. W. O. Hillery, Seattle. In Dr. Hillery's letter to the Treasurer dated July 18th, he congratulates the staff on being able to do so much with so little and suggests that one hundred such members club together to additionally support the work. He will be pleased to know that one-fifth of that number at this time voluntarily sustain the Society.

Special thanks are due another new member, Mr. Neil Mudie of Portland, for furnishing and printing the cards which are sent to notify the local membership of monthly meetings.



Fall and Winter Care

Suggestions for transplanting seedlings in the fall are to be found in Volume 1, page 14; and Volume 2, page 22. Protection is recommended when planting after September in climates with short fall growing weather.

Winter mulching with evergreen boughs is outlined on page 16, Vol. 1; the easy and effective method of ice protection is given on page 40, same volume. Use a gentle spray when watering during a freeze to avoid bruising leaves. Where snowfall is early and remains late, no other protection is needed. Leaves are good mulching material in dry climates but may rot crowns in wet. Any good mulch between and around plants is advantageous.

Poisoned bait placed here and there under plants and in habitually used mole runs will destroy mice before much eating can be done.

Seeds of *P. malacoides* Ready for Members

Mr. Harry E. Nelson, Division of Horticulture, San Francisco Junior College, has sent a generous supply of *P. malacoides* seed for all members who wish to acquaint themselves with this dainty half-hardy Primula. Very easy of culture, it is an excellent subject for mild-climate gardens, greenhouse culture and potted plants for the house. To obtain seeds, see page 25.

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