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Responding to your President's request, I gave a talk on Rhododendrons at the November meeting of the American Primrose Society and your editor has asked that I set down a few points of that talk.

I do hope that the title of this little article is not misleading, but Mrs. France is especially fond of Primroses and I am just as fond of Rhododendrons so it is only natural that in a small city garden they, of necessity, be companion plants.

I want to say first that I am writing not as an authority but as a very interested novice in the growing of Rhododendrons. Our interest started a few years ago when we were living on Puget Sound and most of our experiences have been in that area. After the rugged winter of '49-'50 I think that some of the plants we grew there may be less hardy in Portland. Of course that winter was trying throughout the Northwest and I believe that the condition of the individual plant, its location and growth had a lot to do with its survival. Evidently the plants in a southern exposure, with constant thawing and freezing during the winter and the usual drying in that exposure has shown its effect on Rhododendron plantings.

Many, perhaps all of you, know the Rhododendron hardiness and merit ratings as set forth by the Royal Horticultural Society of England but just to review "A" - "F" as shown in catalogs and price lists which indicate the hardness and exposure of the various plants as tested.

(A) Hardy anywhere in the British Isles and may be planted in full exposure if desired.
(B) Hardy anywhere in the British Isles but requires some shade to obtain the best results.
(C) Hardy along the seacoast and in warm gardens inland.
(D) Hardy in south and west but requires shelter even in warm gardens inland.
(E) Requires shelter in most favored gardens.
(F) Usually a greenhouse shrub.

These ratings are fine to a great degree around Puget Sound but I find that there is less weather tolerance in and around Portland, especially with the frigid blasts that come down the Columbia Gorge. Also I think you will find that during the summer we have more clear sunny days here than around salt water, where there is always some overcast even on the clearest day. This is undoubtedly one reason why many plants the English apparently put in full sun, will not prosper here in our full sun.
The asterisks or "stars" from 1 to 4 are given as species and hybrids are tested and are awarded according to their merit. Many that are well worth growing aren't marked, but as they become popular and show their versatility, will be awarded merit.

There are well over seven hundred species belonging to some forty-three separate series. Of these probably a hundred are satisfactory both because of their beauty and adaptability to the average garden. Many species I find desirable either for form or color more than for size or showiness of flower. Some of our friends are left cold by many of the species, but what a strange looking place it would be if all of our gardens were absolutely alike.

The hybrids between these species as well as hybrid crosses run well over the thousand mark, perhaps twice that. I feel that the Royal Horticultural Society has done a remarkable job in testing and growing new hybrids brought to them for trial and examination for award.

You should, I firmly believe, buy Rhododendron plants when in bloom. Then you will know, even though you are buying a named variety, that you are getting the desired color. I have known many who have seen an especially fine specimen, perhaps at a show or in a friend's garden, purchase supposedly the same and be disappointed that their plant was not the same color. Some years ago I bought a well known plant "Day Dream," a Griersonianum cross, and was asked some time later, which one I had bought, the red or the biscuit colored one. I don't know. Last year when it had buds, the frost, or shall I say deep freeze, nipped them. Having moved our plants twice and some three times since the fall of 1949, many have not set buds for this year. I must tell you that when we decided to move to Portland in 1949 we felt we could not leave all of our Rhododendrons at our former home, so before we put it on the market, dug and balled some hundred and fifty plants during August and September and moved them to Portland, all in the back seat and trunk of our car, a few at a time on many trips, and didn't lose even one during the moving or the following harsh winter although many of them don't look too healthy. We still have many that are in temporary beds awaiting a proper location.

Most of the modern gardens are not of sufficient size to use many of the larger hybrids and species so it is rather fortunate that the Rhododendron family includes so many low growing and dwarf plants. Many of the better growers and hybridizers in this country are quick to respond to the demand for dwarf plants for small city gardens and low built homes and are producing some very wonderful things, many being much hardier and of better form and flower than their parents. Of course it is going to take considerable education before the average gardener will pay the same price or even more for a small plant, fully grown, than for one of the 3 or 4 foot older and faster growing hybrids such as Pink Pearl and Cynthia. As yet, most of the dwarf Rhododendrons in cultivation are species, few of the newer hybrids having gotten beyond the hands of the originators and growers, but it will not be long before there will be sufficient quantities of tested plants available.

When we first started collecting, we just "happened" to get started with species and I think I am really happiest with them. Of course the hybrids are beautiful both of flower and foliage but so many of the spe-
of buying when we started out. With a small yard it was necessary that we plant the smaller types in order to find room for all that seemed to have followed us home.

Many people seem afraid to grow Rhododendrons with Primroses because of their common enemy, the strawberry root weevil. So far we have had little trouble and believe that with proper baiting and spraying the weevil can be kept under control and will not be any more dangerous than other pests. Both Rhododendrons and Primulas take much the same care, soil and conditions of exposure and, I find, look well together. I know of no prettier combination than a mixed planting of Rhododendrons and Azaleas in the background with a foreground of Polyanthus Primulas in their many colors, or a drift of Sieboldi under a planting of larger Rhododendrons—or even an edging of some of the beautiful little Cinerellas around a single specimen plant.

I should like to take a little time to list just a few of the more dwarf Rhododendrons that are our favorites such as Ferrugineum, the Alpine Rose of Switzerland with small rosy crimson flowers; Impeditum and In- tricatum, both very similar, low growing shrublets with mauve or light purplish blue flowers, sometimes blooming a little all summer; Keskei, a low compact shrub with lemon yellow flowers; Leucaspis, a small brushy shrub with large milky white flowers early in March; Moupinense, a miniature plant with small glossy leaves and beautiful white azalea-like flowers; Penakoense, an aromatic low-spreading shrub with pinkish mauve flowers, usually in blossom by the first of April. I think this one is my favorite rockery Rhododendron, but where there is a chance of late hard frosts it should be well protected in order to save the blooms. There are several good blues of dwarf habit, Blue Diamond and Blue Tit, both with small leaves and a fine compact habit. Also there are many fine Azaleas that make good border plants both in massed plantings or interspersed with groupings of the different Primulas. I noticed just the other day the many Candelabra seedlings coming up under some of the Rhododendrons planted around the edge of our pool where the Candelabras seem to enjoy the extra moisture and where the Rhododendrons are just far enough away to avoid being too wet. The Rhododendrons enjoy plenty of moisture during their growing period but, during the warmer weather, like a little water each day on their foliage to simulate the daily rainfall most of them receive in their native habitat.

If these few lines have encouraged you to try Rhododendrons with Primulas, I am sure you will feel a genuine pleasure in their companionability as we do.

The function of reproduction in plants is interesting not because of its difference from that of the animal kingdom but because of the marked similarity. A brief outline of the process is all that is feasible here and so much of interest is necessarily omitted. The pollen grains, containing the male cells, are developed in the anthers and are transferred when ripe by various agents to the stigma which is coated with a sticky fluid to hold the pollen grains and provide nutrient for their development and germination. From its position on the surface of the stigma, each pollen grain develops a long, slender tube which penetrates the stigma and grows down the style in order to carry the two sperm cells into the ovary. Once in the ovary, each tube approaches and enters an ovule, reaching the embryo sack which harbors the egg cell. When one of the male cells fuses with the egg cell, fertilization is complete and the prime mission of the plants flowering has been accomplished. Blossoms then wither rapidly and the plant devotes itself to maturing the seed.

NOTE: A number of requests have accumulated the past few years for an article on the rudiments of hand-pollinating Primroses. Since the April, 1944 issue (Volume 1, No. 4) is not available to these members (out of print) the accompanying article, which outlines the simple mechanics of cross-pollination, is a reprint from that issue.
bark on this simple and fascinating venture for the first time. For those
the following abbreviated procedure is offered as one method of pollinating
by hand. Taking the polyanthus as an example, the first step is to
select the parents for form, color and size for the eventual attainment of
all three. Those plants exhibiting all three characteristics at the begin-
ing of hand pollination produce outstanding results in one or two genera-
tions.

When the blossom first unfolds from the bud is the ideal time to pol-
linate. The stigma is receptive, the pollen is still green, which means
that it has not self-pollinated, and there is small likelihood that bees have
had a chance to probe for nectar thereby introducing undesired pollen.
Emasculation, or removal of the anthers from the plant, is simply ac-
complished by taking hold of the blossom with both hands, tearing it in
half and pulling the floret, with anthers attached, from the calyx. This
act also removes all attraction for insects.

The blossoms of the plant supplying the pollen, which are necessarily
more mature to allow time for the pollen's ripening, are pulled apart in
the same manner and each half of floret held so that the anthers spread
apart like fingers. It is then very easy to rub the anthers over the stigma
of the seed bearing parent when held in this position. In this way the
stigma is completely coated with the pollen of the intended cross with
small chance of foreign pollen finding a foothold. However, in truly
scientific work, the pollinated plant is bagged in cellophane or wax
paper. Since there are five pollen-loaded anthers to one stigma, an excess
of pollen always exists. If the pollen bearing parent is outstanding
enough to warrant its use in fertilizing many plants and there is need to
hold it over, the pollen remains potent for days when put in a tightly
covered jar and stored in the refrigerator.

It is unnecessary to remark that pollination should be done on a clear
day, but even the clearest days in April develop sudden showers, in which
case bagging will prevent the rain washing the pollen. Each plant that
is pollinated should be labeled according to the cross made. In this way
the identity of the seedlings is kept for future breeding purposes.

One of the marks of a well-bred primrose is the thrum-eye, the short-
tyled type of bloom that has the stigma hidden in the tube and the an-
thers in full view at the entrance. When crossing a thrum with a thrum, a
very large percentage of thrum-eyed children is a natural result. This
is called "illegitimate" pollination. Two other illegitimate forms of pol-
lination that are possible but have little or nothin in their favor are a
cross between two pin-eyed or long-styled types, and self-pollination. The
first would be flying in the face of good form and the second, if continued
for any length of time, would result in a loss of vigor. "Legitimate" pol-
lination is the crossing of the long-styled with the short-styled, the pin
with the thrum, or vice versa.

As pointed out by a keen student of plant breeding, this latter type of
pollination was thought to be the only possible one by most of the botan-
ists who expressed themselves on the subject. Credit goes to Dr. Helen
M. Gilkey, Associate Professor and Curator of the Herbarium, Oregon
State College, for finding the following reference in Knuth's Handbook of
Flower Pollination, translated in 1909 by J. R. Ainsworth Davis of Trin-
(Concluded next page)
DISTRIBUTION OF THE VALID SPECIES OF PRIMULA
Howard W. Lynn, Tacoma, Wash.

One of the questions most frequently asked the owner of a collection of Primula plants is, "how many different ones are there?" As far as to how many different named varieties there are, the question is impossible to answer, for these plants have been cultivated for more than four hundred years that we know of, and intensively hybridized for more than a hundred. This has led to uncountable named garden forms, principally in the Vernales, Candelabra, and Auricula sections. A list of the named horticultural forms in the Vernales section alone would probably run to several hundred.

We can, however, definitely establish that there are 681 botanically different plants included in the genus Primula. Of these 185 are known to be in cultivation at the present time and an additional 143 have been successfully grown at one time or another, but are no longer known to be in cultivation. The accompanying chart shows the location of these as to section and subsection, and the number of plants that are known to be in cultivation now, that have been in cultivation at present, and those that have never been in cultivation. It is pointless to list these plants by name at this time, for the genus Primula is overburdened with synonyms, some plants having been described by as many as twenty different names, so that a list of the specific names without a list of the synonyms would only lead to confusion. It is doubly unfortunate that many of the synonyms continue in use, and will probably continue in use no matter what is done. For example, some of the European seed firms list P. polyanthia and also list as species, P. Veitchii, and P. lichiangensis, both of which are merely botanical synonyms for P. polyanthia. P. secundiflora is listed in one catalogue, and P. vittata in another, and these are identical plants. It is well to bear in mind, though, that while plants may be identical as far the taxonomist is concerned, they will be separate forms to the horticulturist. P. Veitchii and P. lichiangensis are slightly different from one another and both are different from the typical P. polyanthia, and might well be kept as separate entities in the garden.

It might be well to define here the terms that are used by the botanist to separate plants into groups. From the largest group to the smallest these are:

FAMILY: A very large group of plants such as the PRIMULACEAE, (family designations always end in ACAE); all the plants placed in this grouping have some resemblance to one another, but not to any other family of plants.

GENUS: (plural GENERA): A group of plants within a family, all of which have a strong resemblance to one another, but only a family resemblance to another genus of the same family. (A good example of this are the Primula, Cyclamen, and Dodecatheon genera of the Primulaceae.)

SECTION: A grouping of plants within a genus, used to classify the plants in the genus most like one another.

SUBSECTION: A breakdown for classification purposes within a section. Plants within a subsection will be very nearly alike.

SPECIES: This is a plant which is markedly different from any other plant. Flower form, leaf form and growth are usually different.

FORM: Many botanists do not even like to classify forms for it denotes a very minor change, such as a difference in flower color, or a difference caused by environmental conditions.

In the following chart the columns are as follows:

T — Total number of plants in each grouping.
N — Number of plants that have never been in cultivation.
O — Number of plants that have been flowering at one or more times but which are not known to be in cultivation at this time.
C — Number of plants known to be in cultivation at the present time.
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One of the rare yellow-colored members of the Farinosae section, the fragrant clear blooms of P. luteola beautify the moist meadows and spring-sides of the Eastern Caucasus at an altitude of 4600-9800 feet. Discovered by Ruprecht about 1861, it was introduced into England about six years later. In cultivation it likes a rather heavy or peaty soil with a good water supply during the spring and summer months.

Species is also of the subsection Auriculata.

Butte, April 11, 1951

"... I picture to myself you, and the other members, simply running around in circles among your loveliest plants, choosing which shall be exhibited. It must be hard when all are so beautiful. I would give almost everything to be there with you, and think another year I shall try to come. The only compensation lies in the fact that I save myself from the sins of envy, jealousy and greed, and—no doubt—a severe illness which might be brought on by a dreadful sense of frustration.

"When we returned from Mexico, the contrast was simply awful. We came back to mid-winter at its worst with below zero blizzards, ice, drifts, etc., the worst March ever. Then a thaw and very warm weather for ten days and yesterday down again to 17 above zero and snow, which is bad after plants start growth.

"I suppose you are curious as to the results of my experiment.* Well—some good, some bad. I lost Royal and Schneekissen in my new bed and also P. secundiflora, probably Kisoana, and Saxatilis hasn't shown up yet, perhaps it is too early for the deciduous types. Secundiflora was a good second-year plant from seed and Saxatilis I moved and divided. The baby seedlings haven't come up either. As I may have told you we had -50 degrees after a mild fall and winter, and I'm sure there was very little snow, although I had covered the plants with rock wool. Royal had done quite a bit of blooming in the fall and on a newly-set plant perhaps was weakened. And Schneekissen NEVER lives over. (I'm sure I have had it given to me or bought it at least twelve times.) At least they died with their boots on which is a step in the right direction—meaning no pun—but that they did not separate. They died from severe freezing. Many rock plants that I consider as tough as leather, as encrusted Saxifrages, died and my small shrubby Penstemons are in very bad condition even though they were covered with rock wool and snow. I wish our scientific expert would tell us how deeply plants are affected by terrible cold—that is, how far it penetrates and just how deep a snow-covering must be to counteract the effects of -50 degrees. Twenty below zero doesn't bother plants much under the usual conditions of covering plus snow. To add to the unusual temperature we had a week of it, not always -50 but -46 or -44 at night, and never higher than -16 during any day for a week. And that was really something.

"Now for the good news: Juliana Dusky lived over beautifully—it shows its Kinlough Beauty blood—P. rosea is coming up all over, P. Parryi has such a big resting bud that I hope that it presages a real bud (I'd be a proud woman if it bloomed). Primulas dairalica and frondosa are big and hearty and covered with buds. This in the new bed. Then I have two lovely Cinderellas under the edge of dwarf evergreen, and this is really sensational. You sent me a plant labeled 'Aculis red' and I remember thinking when I planted it "Well, I can kiss YOU goodbye." However, it is as good as a Prim could be. I never before kept even the slightest vestige of an Aculis. Then have another under a juniper — Cinderella or Miniature Polyanthus — and all the Polyanthus I put on the north side of the house. I would have saved all had I put them there, but

I experimented. I am so pleased that I kept so many I am going to get a few more. I made the discovery that they seem to like being planted at the edge of a juniper, of which I have a good many. With drainage, of course. I feel I learned a good deal and with more favorable weather I would have had even better results.

"In other parts of the rock garden, (Julianas) Mrs. McGillivray, Helena, Crispi, Rae, Primrose Lodge, Nettie Gale, Lady Greer, Kinlough Beauty and Blaukissen are doing well, also Gloria, still in her crevice. Blaukissen I have had for several years and it is VERY hardy. It seems to me that they are reasonably hardy if they once get established, but getting them over the first year is the problem. Still I have made quite a bit of progress, but I am afraid to tamper with them when once settled down . . .

"As to others—my Marginata hybrid has buds, so has the red crimson Pubescens, Mrs. Berry; Mrs. Wilson and Mrs. Porter, Marginata Linda Pope and all the Frondosas. Whether P. salisburgensis has I cannot be sure — probably not, and I'm positive P. bicolor hasn't. Allionii looks badly, but all the Auriculas look wonderful, bursting with health and buds—I hope. Some of the tiny last year seedlings of Florindae hybrids are peeking through and I think Chionantha. If I can keep everything I now have I will not have done too badly. It is just 19 degrees at the moment, 12 midnight, and will be colder before morning.

"Mexico was so delightful that the U.S.A. seemed very drab when we returned. We went to Guadalajara, which is a perfectly beautiful city, enormous Jacaranda trees in full bloom; flame, rose and red Bougainvillea, Oleanders, Azaleas, Camellias and hedges of blue — why can't I ever think of that plant? The natives all dressed up as seen in travel literature, lovely smiles; lots of darling donkeys, every form of life—human and animal — on the roads, especially, it seemed, skirting dizzy precipices up in the high mountains. Thousands of bananas, coconuts, vanilla vines in the tropics, and flowering shrubs and whole plains covered with golden-yellow Acacia in dryer areas. And, of course, vast plateaux with equally vast stands of giant Cacti. With great elegance, also terrible squalor and poverty, there seemed a sort of gayety over everything. Mexico City is very nice in spots and terrifically busy and noisy—you should witness the taxi drivers in action — but I like Guadalajara best."

With great reluctance Mrs. Regan's humorous and enchanting account of the people, sights and customs of Mexico is laid aside. If you wish to digress from Primulas long enough to make a comfortable armchair trip to Mexico this winter, write the Editor, Gresham, Oregon and it will be published in the January issue.

Collected by Dr. R. M. Bond (see Dr. Rose's account of locating it in a bog in southeastern Idaho, page 56, April, 1951) this plant is white-flowered whereas P. incana is classified as being blue. P. incana's area of distribution is given as extending from Mackenzie, Saskatchewan, and Alberta to Montana, Wyoming, Utah and Colorado. A close relative of the English P. farinosa like so many of the Eu-Farinosae group, it appears amenable to cultivation—this plant blooming twice in five months after its true spring blooming period.

With the exception of P. polyneura pictured on page 9 members of the Farinosae section were chosen to illustrate the widely different characteristics of representatives from two subsections, Eu-Farinosae (or true Farinosa) and Auriculatae. With the inclusion of the latter, which heretofore was accorded full sectional status, the Farinosae section is now not only the largest of the genus but has the most extensive distribution. Before the explorations of the last forty years or so in China, the Farinosae section was thought to have its center of population in western Asia and the Caucasus with relatively few species indigenous to the Himalayas. But with the flood of Chinese horticultural discoveries it was found that the bulk of the Farinosae section, as so many others, reside there. North American Primulas run heavily to Farinosae and the
few South American natives (P. magellanica from the Straits of Magellan and P. decipiens extending from the Falkland Islands to Argentina and Chile) are of the dominant subsection, Eu-Farinosaes.

The difference between the two subsections, Eu-Farinosaes and Auriculateae, is so apparent it is difficult for the lay eye to see any relationship whatsoever. Many of the species of Eu-Farinosaes are in very close relationship with P. farinosa itself and are easily identified by certain characteristics held in common, one being the obvious farina on leaves, flowers, or both. But the species of the farina-free Auriculateae subsection seen in gardens are quite different from one another and are certainly entirely unlike the Eu-Farinosaes group. Of the Auriculateae subsection the brilliant Primula rosea is by far the best known and probably the showiest of the entire Farinosa section although P. Clarkei will give sharp competition when it becomes more generally distributed. P. luteola, while less imposing in its clear yellow polyanthus type bloom, is a beautiful and distinct plant just beginning to get about American gardens.

—F.L.

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