



The JOURNAL of  
THE SCOTTISH  
ROCK GARDEN CLUB

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VOLUME XV Part 3  
No. 60

APRIL 1977

*Editor* R. J. MITCHELL • University Botanic Garden • St. Andrews • KY16 8RT

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## NOTICE

The ANNUAL GENERAL MEETING will be held in the McLellan Galleries, Sauchiehall Street, Glasgow, on **Saturday 5th November 1977, at 2.30 p.m.**

Members are notified that nominations are required for President and other Office-bearers, and for five Ordinary Members of the Council. Nominations *in writing*, and *seconded* by another Club member or members, must be sent to the Honorary Secretary not later than 20th August 1977, the nominator having ascertained that the nominee is willing to serve if elected.

All Executive Office-bearers retire annually, but are eligible for re-election.

The following, having served for three years as Ordinary Members, retire and are not eligible for re-election as Ordinary Members for one year:—

Mrs. I. Hall

Mrs. M. G. Holgate

D. S. Pearson, Esq.

Mrs. M. I. C. Harbord

R. J. Mitchell, Esq.

Honorary Secretary,  
Mrs. I. J. SIMPSON,  
48 St. Alban's Road,  
EDINBURGH EH9 2LU

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# Secretary's Page

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## Dates for your Diary:

Please refer to your Show Schedule for exact time and place of Shows.

*Perth:* 23 April 1977. Kinnoull School, Perth.

*Dunfermline:* 30 April 1977. Nethertown Institute, Nethertown, Dunfermline.

*Glasgow:* 7 May 1977. The new venue for this Show is at the Knightswood Community Centre, 201 Alderman Road, and the Show Secretary is now Mrs. J. Stead, to whom entries should be sent by 2 May, if possible.

*Aberdeen:* 14 May 1977. The Music Hall, Union Street, Aberdeen.

*Midlothian:* 4 June 1977. Dalkeith Community Centre, Woodburn Road, Dalkeith. This is a new venture organised by John and Christine Gosden. A (fairly short) Show Schedule can be obtained from your Group Convener or by writing to Dr. Gosden, Linsandel House, Melville Road, Eskbank, Midlothian (031-663 3221). Do please support this new Show if you can.

## Message from the President:

Although Groups based on the larger towns, and even some country ones, have interesting programmes of talks in winter and garden visits in Spring, there are areas in Scotland where there is no active Club life. Yet we do have a number of speakers who would be happy to talk to quite small gatherings of members. To arrange this does, of course, need local planning but if any member, aided by the lists in the 1976 and 1977 *Year Books*, could gather together the members in his/her neighbourhood we could arrange an occasional meeting which would be helpful and enjoyable. Please let the President know if you feel you could help.

**Year Book:** Members will find that there is a lot of useful information in the *Year Book*. For instance, details about the Seed Exchange, where to buy badges, facilities offered by the Royal Horticultural Society, etc. In particular please refer to the *Year Book* about the final dates for contributions to the Club's Publications, as these have been changed.

**Groups would warmly welcome** members from other parts of the country to Group meetings or Garden visits. Members should get in touch with the relevant Group Conveners, whose names and addresses appear in the *Year Book*.

**Illustrations for the Journal** are always needed. It has been suggested that there should be a twice-yearly COMPETITION for

(1) A black and white photograph

(2) A line drawing

In both cases the subject will be one or two specific genera and in each category there will be a prize of £1 (presented anonymously). The first competition will be of the genus *Nomocharis*, and the plant can be in the wild, in the garden or in a pot. Entries please to the Hon. Secretary by 1 September 1977. The Editor reserves the right to reproduce any entry and these would become part of a series of plant portraits.

**Library:** Over 150 loans of books have been made during the last year. The high cost of postage has virtually stopped loans to individuals but loans of between 10 and 20 books are now being made to Groups for a maximum period of six months. Groups wishing to borrow please write to David Simpson with a list of requirements and alternatives.

#### **EDINBURGH DISCUSSION WEEKEND 1977**

WOULD members please note that payment for the Discussion Weekend should be paid by 16th July. The University requires a deposit six months in advance. Early booking and payment would be appreciated.

#### **WANTED AND AVAILABLE**

**Bulb Seed** available to U.K. members for two 6½p stamps. *Alstroemeria angustifolia*, *A. sp.* BCW4997, *Allium ostrowskyanum*, *Moraea natalensis*, *Hippeastrum sp.* BCW4764, *Alophia lahue* BCW4407, *Pasithea coerulea* BCW4183. D. M. Stead, Bishop's Park, Thorntonhall, Glasgow.

**Wanted to purchase:** Three plants of *Omphalogramma vinciflorum*. Jorgen Nielson, Vestergaardvej 19 4, 2400 Copenhagen N V, Denmark.

**Wanted:** *Dicentra peregrina pusilla*, *Jankaea heldreichii*, *Kelseya uniflora*, *Phlox mesoleuca*, *Primula aureata*, *Shortia uniflora grandiflora*, *Synthesis lanuginosa*. D. T. Riley, 22 Long Meadow Lane, Natland, Kendal, Cumbria.

# Discussion Weekend 1977

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THE UNIVERSITY OF EDINBURGH

POLLOCK HALLS OF RESIDENCE

HOLYROOD PARK ROAD

EDINBURGH EH16 5AY

SATURDAY and SUNDAY, 24th and 25th SEPTEMBER 1977

## PROGRAMME

### SATURDAY:

- 12.30 p.m. Lunch
- 2.15 p.m. Address of Welcome
- 2.30 p.m. The W. C. Buchanan Memorial Lecture  
"Different Ways of Growing" Roy Elliott, v.M.H.
- 4.00 p.m. Tea
- 4.30 p.m. "Alpines in Primulaceae" John Main.
- 6.30 p.m. Dinner
- 7.45 p.m. "Out of the Hat"

### SUNDAY:

- 8.30 a.m. Breakfast
- 10.00 a.m. The Esslemont Lecture  
"Rock Plants in North Africa" Dr. Peter Davis
- 11.15 a.m. Coffee
- 11.45 a.m. "Himalayan Gentians and their Hybrids"  
Dr. James Cullen
- 1.00 p.m. Lunch
- 2.30 p.m. "Binomially Speaking" John Kelly.
- 4.00 p.m. Close of Proceedings
- 4.15 p.m. Tea and Disperse

As in 1974 and 1975 the Discussion Week-end returns to the Pollock Halls of Residence, Edinburgh. Accommodation will be single, student-type bed-sitters.

The Halls are situated in a pleasant part of Edinburgh below Arthur's Seat and are readily accessible from most quarters.

Accommodation can be booked for the duration of the Conference or for the whole week-end. Members may wish to come for the day only, in which case appropriate charges can be made.



**CHARGES, including V.A.T. and CONFERENCE FEE:**

Full board from Friday dinner till Monday breakfast ..	£24.00
Full board from Friday dinner till Sunday tea ..	19.00
Full board from Saturday lunch till Sunday tea ..	13.50

*Day Charges:*

Saturday: Lunch, tea, dinner .. .. .	6.50
Sunday: Coffee, lunch, tea .. .. .	4.50

Applications should be sent initially to the Registration Secretary: Mr. J. Harley A. Milne, 15 Merchiston Place, Edinburgh EH10 4PL, enclosing the appropriate remittance, before Saturday 16th July 1977.

An interesting and instructive programme has been arranged and there will be an opportunity to visit the Royal Botanic Garden on the Saturday morning.

Donations of plants, books, etc., would be much appreciated for the "Bring and Buy" stall.

The Autumn Show will be held in conjunction with the Conference.

A meeting of the R.H.S. Joint Rock Garden Plant Committee will be held at 12 noon on the Saturday of the Show.

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## **LEN BEER**

Members will be deeply shocked to learn of the sudden death of Len Beer at the end of March. He was the Club's travelling lecturer in 1976 and a keen and active member of the club. Our deepest sympathy goes to his wife Sheila and baby daughter Abigail.

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## **BOOK BARGAIN**

Copies of 'The Peat Garden and its Plants' by Alfred Evans may be obtained by members for £2 plus 65p postage (original price £6.50).

Apply to the Secretary.

There will however be copies on sale at the Shows in 1977.

# Growing Alpine Plants in a Frost Pocket

by JOHN B. DUFF

---

## **The W. C. Buchanan Memorial Lecture given at St. Andrews on 2nd October 1976**

IT WAS in 1963 that Mr. W. C. Buchanan died and every year since then his name has been commemorated at the Discussion Week-end.

I am probably the first person to give this Memorial Lecture who had never met Mr. Buchanan nor visited his famous garden at Bearsden. This is something I have always regretted, having heard so much about this remarkable plantsman and his wonderful collection of Alpines.

It was with diffidence and humility that I accepted the invitation and honour to speak here this afternoon; it was also with trepidation, for I realised that I would be addressing a very knowledgeable and critical audience.

Few if any gardeners are completely satisfied with their gardening conditions; either the soil is too heavy or too light, too wet or too dry, maybe their garden is too sheltered from the sun or too open to the winds. Perhaps, however, one should suspect the motives of the gardener who complains too much about these natural handicaps; he could be trying to excuse his failures or even exaggerate his successes. Having said that, my own personal grouse with nature is that our garden appears to be in a frost pocket.

But surely Alpine plants, of all plants, are frost hardy? Of course they are extremely hardy when growing in the conditions of their own choice. The high alpine cliff-hangers growing on vertical faces and unprotected by snow must experience very low temperatures and yet they survive. But it has been estimated that only 5 per cent. of alpines are cliff-hangers and the remainder grow in locations where they get covered with snow at the very onset of winter and lie snug and dry in a state of suspended animation under this blanket for six months or more. It is said that the temperature at ground level under thick snow at 10,000 ft. is no lower than freezing point.

In this country where snow is infrequent and never lies for long, our plants are unprotected and subjected to the full force of all the frost we get. Unseasonably mild weather in the early part of the year

can induce growth far too soon and the plant, having emerged from dormancy, becomes an easy victim of the next hard frost; so, under these conditions, the alpine plant is not hardy. Furthermore, it is a fact that in their eagerness for more variety, rock gardeners have introduced into their gardens some species that are only on the threshold of hardiness. Such plants may grow successfully in the warmer garden but fail completely in the colder one. Unfortunately this applies to many of the desirable dwarf shrubs which are so useful in providing height and proportion to the garden layout.

We moved from sea level to our present address at Glenfarg, which is 500 feet above sea level, in 1968, taking many plants with us.

Glenfarg village is surrounded by hills and in frosty weather cold air flows down the slopes from higher ground and builds up in the hollow, engulfing the village in a frost pocket. We could perhaps be criticised for deciding to garden in such a locality, but there were various reasons for the move, not the least being the attractiveness of the house and its outlook and the obvious potential that the garden held to be landscaped with emphasis on rock plants. The area can experience strong winds but the garden is sheltered by high hedges and by our own and neighbour's trees. The trees suffer storm damage but wind speed at ground level in our garden is not destructive. However, the same shelter deprives us of some winter sunshine when the sun is low and consequently, snow having fallen, persists on the ground far longer than in the surrounding open countryside; not for long as a dry blanket which would be beneficial to the plants but sooner or later as thawing slush by day and freezing ice by night and generally providing what must be discouraging conditions for all but the hardiest of plants. The total number of days that snow lies about our plants is remarkably consistent from year to year and amounts to between 20 and 30 days each winter, but that is based on records taken over a period of what we would regard as mild winters.

The first winter was severe and plants were lost. In a way it was fortunate that the lesson was an early one, for it was immediately obvious that the range of plants suitable for this garden was going to be restricted.

I do not want to bore you with weather statistics but after that first winter I kept a daily record of maximum and minimum temperatures and this has disclosed that early autumn and late spring frosts are normal in Glenfarg and that every year in the January-February period, readings of more than 20 degrees of frost are obtained,

although last winter was an exception. These low mid-winter temperatures are not in themselves a serious danger, for plant tissues can resist great degrees of cold if the freezing is gradual and the plant is dormant; it is the suddenness and intensity of the early autumn and late spring frosts when the plants are in soft growth that causes the most damage.

Frost can occur in Glenfarg up to the end of May and again from the beginning of September. I have read that in the West of Scotland one can expect, in the average year, a continuous frost-free period of 225 days; in the East of the country this is reduced to 150 days; during the period of my records it appears that in our garden the average is only 125 days. I refer to air frost, not ground frost.

It is not always a case of the plant being killed; there are some species which survive and grow well enough in our garden but are unsatisfactory because of frequent frost damage to young growth, buds or bloom, thus they are disappointing as flowering subjects. Rhododendrons, Cassiopes, Phyllodoces and Astilbes come into this category. All gardens in this country will suffer this sort of damage to a greater or less degree and normally gardeners have come to accept the odd bad year, but when damage happens every year one can get discouraged.

In case the impression is being given that we live in a mini-Siberia, I hasten to add that it is some consolation to find that a frost pocket is usually also a sun-trap so that what is lost in the winter is gained back in the summer when the sun is high above the horizon. My records show that not a summer passes without the mercury rising to the upper eighties and sometimes even exceeding ninety degrees fahrenheit. To complete the weather picture, rainfall is about 30 inches per annum and droughts are common in April, May and June.

Certain measures can be tried to mitigate the effect of frost. When planting doubtfully hardy subjects, cold hollows in the garden should be avoided, perfect drainage should be provided and shelter must be given against icy north and east winds and morning sunshine. Cages made of conifer branches or bracken can be placed around plants. A common form of temporary protection is a sheet of hessian nailed to four stakes and erected around the plant, to enclose three sides, leaving the south side open. Small plants can be covered with cloches or panes of glass supported on wire frames. In this way the plants are not only kept dry but the formation of rime and hoar frost on the leaves is prevented. The vulnerable crowns of deciduous plants can be covered to a good depth with cinder ash, leaf-mould, peat, straw or bracken,

the material being removed in the spring when the danger of frost is past. At dusk, if frost is anticipated, plants in bloom can be covered with polythene bags or other material, to be removed in the morning. But all these measures create extra work, especially in the larger garden, and as one gets older one wonders if the effort is worthwhile, for, despite the precautions casualties will occur.

That well-known and much respected rock gardener and author, the late Mr. E. B. Anderson, once wrote: "In my opinion, any plant which in the reader's district requires protection from frost, should be debarred from the rock garden". That blunt statement must have been made after careful thought by this experienced grower, but when I first read it I was a beginner and optimistic enough to think it was a policy of despair, but I must admit that in due course I also came to believe that discretion is the better part of valour. In the planning of our present garden we did not take long to decide that rather than challenge nature to an unequal struggle by trying to grow the status symbol plants, it would be wiser to eat humble pie and concentrate on producing a pleasing layout and to restrict the choice of plants to a selection of reputedly hardy ones which we could count on to provide colour and form throughout the year irrespective of the weather.

I am quite convinced that the best way to grow the less hardy rock plants in a frost pocket, or anywhere else for that matter, is within the protective cover of an alpine house; that is to say that if the full range of alpine plants is to be grown, an alpine house, as well as an outside garden is essential. For many years I have enjoyed alpine house work, but as that particular subject has been dealt with fully and expertly in recent years at this Discussion Week-end I refer to it only in passing.

In constructing our garden we set out to provide the various soil conditions necessary for the cultivation of as wide a variety of rock plants as possible, not by making pockets of different mixtures, as is so often suggested for the smaller garden but, as ample space was available, by devoting whole areas to particular soils. Thus we would need a rock bank, suitable for the easy, popular and colourful subjects, a peat bank for ericaceous and other plants requiring more than normal moisture, a scree bed for high alpiners demanding faultless drainage, some stone walling for plants that prefer to grow on rock faces, and finally borders and island beds where, with the aid of shrubs, a woodland atmosphere could be simulated. In all cases, even in the peat bank and borders, good drainage would be necessary. We are fortunate

that the garden is on a slope and that the basic substance is stony hill soil so that natural drainage is excellent.

I will now deal with the different sections of the garden in turn, describing some of the plants which are being successfully grown in each. (From this point onwards coloured slides were used to illustrate the talk but space here allows only a few of the plants to be mentioned.)

### ROCK BANK

The previous owner of the house, a vegetarian who lived to the age of ninety-four, had devoted the whole of the rear garden to the growing of vegetables. The front was laid out entirely in grass except for a rough rockery containing a jumble of ugly rocks set into a rather steep bank and full of undesirable subjects. It was obvious, however, that this old rockery could become our Rock Bank and my wife and I spent many hours demolishing it stone by stone and thoroughly clearing away all growth. We then employed professional help to build a low retaining wall to reduce the steepness of the slope and place a few large rocks in groups throughout the length of the bank. With rocks and labour so expensive, a simple layout was called for, the idea being to have the area full of plants with here and there a group of rocks showing. The rocks had to be large to show through the flowers. Some fresh soil, a fair amount of peat and a little bone meal dug into the bank was the only soil preparation carried out. The bank is semi-circular in shape and faces East, but one end curves round to the North and the other to the South, thus giving a choice of aspects. In planting out the bank, dwarf shrubs, dwarf conifers and some of the easier rock plants were intermixed. Plants which have done well in the rock bank despite the mainly East aspect and low winter temperatures include the following: *Adonis vernalis*, *Daphne blagayana* facing North and *D. cneorum eximea* facing South, *Dianthus alpinus*, *Eriogonum campanulatum*, *Euryops acraeus* in full sun in poor soil as it grows too lush in good soil and soon outgrows its strength and collapses; *Gentiana acaulis*, *Geranium subcaulescens*, *Papaver alpinum* which is not long-lived but masses of self-sown seedlings germinate, *Penstemon scouleri* which does not seem to suffer so badly from "die back" as some of the other Penstemons, *Saxifraga cotyledon* 'Southside Seedling', not long-lived but can be kept going by detaching side rosettes and treating as cuttings, *Saxifraga* 'Triumph' which is a compact-growing mossy type, *Scilla italica*, a modest but early fragrant and hardy plant which does not seed about and become a nuisance like

some of the breed, *Thymus serpyllum* growing on the edge of the bank and over-spilling on to the gravel path, *Tropaeolum polyphyllum* planted deeply and now erupting in various places but easily removed if found poaching on other plants' territory, and various plantings of species *Tulipa*, *Narcissus* and *Iris* which will remain undisturbed for years before being divided and replanted, requiring only an annual top dressing of bone meal in winter.

#### PEAT BANK

There was an area sheltered from the South by a high hedge and sloping to the North and East which we decided to terrace with peat blocks to form a peat bank. The walls were made only one or sometimes two blocks high and the flats between were well enriched with granulated peat. Plants grown here enjoy an annual mulch of a mixture of loam, sand and peat or leaf-mould and include the following: various forms of *Andromeda polifolia*, *Cassiope* 'Edinburgh', *C.* 'Muirhead', *C.* 'George Taylor', *C. selaginoides*, *C. mertensia* var. *gracilis* and *C. lycopodioides*, *Celmisia ramulosa*, *C. hectori*, *Lilium formosanum* var. *pricei*, various evergreen *Lewisia*s, *Callunas* and *Ericas*, *Gaultherias*, *Kalmiopsis leachiana*, *Leiophyllum buxifolium*, *Phyllodoces*, *Phyllothamnus erectus* and various dwarf *Rhododendrons*. The last named suffer frequent damage from frost, especially when in flower, perhaps the least affected being *R. impeditum* and *R.* 'Chikor'. *Dimorphotheca barberiae* var. *compacta* grows on the top of the bank in nearly full sun, spreading outwards and rooting itself down, seemingly much hardier than its taller-growing relative.

#### SCREE BED

At one point in the garden where there was a sharp drop in levels, an ugly concrete retaining wall, just over thirty inches high, existed and we decided this would be a suitable place for the scree. We had a stone wall erected five feet from the concrete wall and the space between filled to make the scree and hide the concrete. The filling-in consisted of, in this order, ten inches old rockery stone, ten inches turf and soil, ten inches scree mixture, two inches gravel ( $\frac{1}{4}$  in.). The scree mixture was six parts gravel, two parts sand, one part peat, one part soil from the vegetable garden. We derive a great deal of interest and enjoyment from the scree; more so than from any other equal area of the garden. From November to March the centre part of the scree bed is covered by a glass frame ten feet by four feet.

In the selected list of plants which follows, the letters (GP) indicate those receiving glass protection.

*Anacyclus depressus* (GP), *Androsace sarmentosa* (GP), *Armeria caespitosa*, *Campanula aucheri* (GP), *Diascia cordata*, *Gentiana saxosa* (GP), *Globularia cordifolia*, *Leucogenes grandiceps*, *L. leontopodium*, *Lewisia* various, *Linum* 'Gemmel's Hybrid' (GP), *Oxalis laciniata*, *Phyteuma comosum*, *Potentilla eriocarpa*, *Pterocephalis parnassii*, *Pulsatilla vernalis* (GP) (fig. 53), *P. slavica*, *Pygmaea pulvinaris* (GP), *Raoulia buechanani* (GP), *Rhodohypoxis* 'Douglas' (GP), *Saxifraga aizoon* var. *baldensis*, *S. cochlearis* var. *minor*, *Geranium* 'Apple Blossom', *Saponaria ocymoides* var. *rubra* 'Compacta'.

I am sure the need for perfect drainage is appreciated by all serious rock gardeners but I sometimes wonder if sufficient emphasis is given to the use of a surface dressing of stone chippings or gravel. The vulnerable part of a plant is not so much the roots as the junction of the roots and the crown, i.e. just below the ground line. In wet weather the surface of the soil gets wet and clammy no matter how sandy the soil or how efficiently drainage has been carried out. This condition persists continuously in all our gardens from November to March, i.e. for five whole months the surface never becomes dry. With the recommended surface dressing of one or two inches, the stones get wet, but it is not a clammy wetness and does not have the same deadly effect on plants. The stones perform other beneficial functions; paradoxically while they prevent rot due to excessive dampness in wet weather, they also retard the loss of moisture from the soil by evaporation during dry spells. That this is the case is very evident to people who grow plants in pots. Another advantage is that self-sown seedlings are more numerous. Further, in frosty weather plants are not so liable to be thrown out of the ground. The growth of moss is also inhibited. Small alpine plants can be seen to the best advantage when growing in isolation, as they usually do in nature, and in the garden they should not be allowed to encroach upon one another. Gravel or stone chippings form the perfect setting for miniature plants and also prevent them being spoilt by mud splashes during heavy rain.

#### WALLS

The retaining walls of the Rock Bank and Scree Bed provide a home for the crevice-loving plants such as *Aethionema* 'Warley Rose', *Arenaria montana*, *Campanulas*, *Cotyledon oppositifolia*, *Erysimum*



*alpinum* 'Moonlight', *Gypsophila dubia*, various *Helianthemums*, *Iberis sempervirens* 'Little Gem', *Penstemon pinifolius* and *Phlox amoena*. One advantage of the wall is that little attention is required afterwards and it may be left untouched for years except for trimming growth and replacing losses. This replacing operation is sometimes regarded as difficult, but I find success is achieved if after the young plant's roots have been inserted, a plug of damp decayed turfy soil is tightly rammed into the crevice using a narrow lathe of wood.

#### BORDERS AND ISLAND BEDS

In planning our layout we chose to avoid the rigidity that can result from straight lines and geometrical designs, but pleasing curves are difficult to attain. We drew out our ideas on paper, to scale, and used a long rubber hose to help in drawing the curves on the ground. The rubber hose was laid on the grass as a movable line and after much pushing and pulling the hose about, we eventually arrived at a shape which looked satisfactory from all vantage points, including various windows of the house.

The border soil only required supplementing with peat and leaves and some of the larger stones removed. We believe, like many other people, that if space exists, dwarf shrubs and conifers should form the backbone of a garden laid out for the growing of rock plants, as they afford a most pleasant contrast both in form and colour and are particularly valuable in the autumn and winter scene. Other plants chosen for the border, all appreciating good deep soil and some of them requiring the shelter of the shrubs, included *Celmisia coriacea*, *Delphinium nudicaule*, *Erythronium* 'White Beauty', *Incarvillea mairei* 'Nyoto Sama', *Iris innominata*, *Cardiocrinum giganteum*, *Milium effusum* 'Aureum', *Oenothera glaber*, *Primula* 'Linda Pope', *P. pubescens* 'The General'.

I have mentioned only a selection of the plants which we grow, but I hope I have achieved what I set out to do and that was to demonstrate that those who garden in frost pockets need not feel at too great a disadvantage. They will not be able to grow some plants which they would like to grow, but I hope that our slides have shown that with the plants that will grow they should be able to enjoy to the full what every gardener wants, namely, colour, variety and interest throughout the year.

# An Account of *Primula* Section *Petiolares* in Cultivation

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## The Clark Memorial Lecture given at Edinburgh on 13th November 1976

OF THE 35 sections of *Primula*, three are classified by Wendelbo (*Aarb. Univ. Berg., mat.-natv.*, 11, 1961) in the subgenus *Craibia*, a very diverse group of some 50 Himalayan and Chinese species. These share a remarkable capsule which is orbicular and crumbles at maturity, rather than splitting into valves. In this subgenus are placed three sections. *Davidii* are Chinese plants with large hairy leaves, looking very like the European section *Primula* (*Vernales*), and none have been in cultivation. However, *P. drummondiana* appears also to belong here, and is apparently very rare. It comes from north-west Himalaya, which is still politically accessible, so may yet be introduced. It is unlikely to be hardy, as these are warm-temperate forest plants from 6000 ft. or below.

Section *Chartacea*, also from China, have rounded, papery leaves and ragged pink flowers on a long scape; they resemble section *Monocarpicae* (*Malacoides*), or *Cordifoliae* (*Rotundifolia*). Of these, only *P. lacerata* has briefly been in cultivation. The third section is called by Wendelbo *Craibia*. However, there is no reason why the type section should take the name of the subgenus, and I have pointed out (*in litt.*) that the section *Petiolares* Pax (*Bot. Jahrb.*, 10:173 (1889)) is validly published. Pax's later inclusion of non-petiolarid species (1905) does not invalidate the earlier name and diagnosis. Thus we can use the familiar name section *Petiolares* for all the species in cultivation. These have numbered 22 (out of 31 known), of which 16 survive, although many more subspecies, hybrids and varieties are grown. This is a very good record in cultivation, and emphasises the longevity of many forms, especially in cool conditions, with cold snowy winters.

Thus in Scotland (and some parts of northern England and Wales, Canada, \*New Zealand, \*Australia and Scandinavia), cultivation in a cool, north-facing site with reasonable drainage, but in a soil which never dries out, will often result in success. Petiolarids usually perform

\*Editor's Note. This would be a south-facing site in the southern hemisphere.

better planted in the open garden than in pots in the frame or Alpine House (there are exceptions). Their great advantage is a propensity for vegetative propagation, which makes them easier to grow than the 'difficult' Asiatic sections such as *Soldanelloides*, which require constant propagation by seed, which is rarely set. However, Petiolarids are exasperating plants at times. Periodic treatment with systemic insecticides should prevent the worst ravages of leaf and root aphid, and root weevil, and will lower the infection rate of cucumber virus. Strong clones, well-cultivated, will show little sign of the latter, but may infect weaker clones, which will rapidly collapse. A counsel of perfection is to burn all infected plants. Clones of long-standing seem to become weaker, probably because of virus, and propagation by seed (when set) is a useful alternative to the yearly division which is necessary, especially with subsection *Petiolares*. The latter should be undertaken during cool moist weather after flowering when root-growth is at a maximum.

However, propagation by seed has its problems. Seed is rarely set on hybrids, and even species will set little seed in the absence of both pin and thrum flowered individuals. It is necessary to sow seed when fresh and not dried out ('when green', but in fact the seeds are brown); the period of viability is very short. As a result there have been very few successful introductions by seed, and most have been from 'flown-home' rosettes, since 1930. Thus there has been a marked tendency for only one clone to be established (either pin or thrum flowered). These are replaced from seed, which is usually hybrid, due to the requirement for pin x thrum crosses for viable seed to set. These hybrids, which now predominate among cultivated strains, and are usually more vigorous than the parents, have in many cases not yet become seriously infected with virus. Thus many clones exist at present either with species names, or with cultivar names, which are garden hybrids. Hybridity can usually be detected by the infertility of the pollen when examined under the microscope, by their failure to set seed, and by their intermediate morphological characters. A crossing diagram showing the known hybrids is given (fig. 32). It will be seen that this supports the maintenance of subsections *Petiolares*, *Sonchifolia* and *Griffithii*; the only suspected inter-subsectional cross is between the latter two subsections.

The first important collections of Petiolarids were from 'British India', the north-west Himalaya, mostly by Hooker, and by Strachey and Winterbottom, and these were classified by Hooker, *Fl. Brit. Ind.* (1882) as varieties of *P. petiolaris*. Later collections from Sikkim and

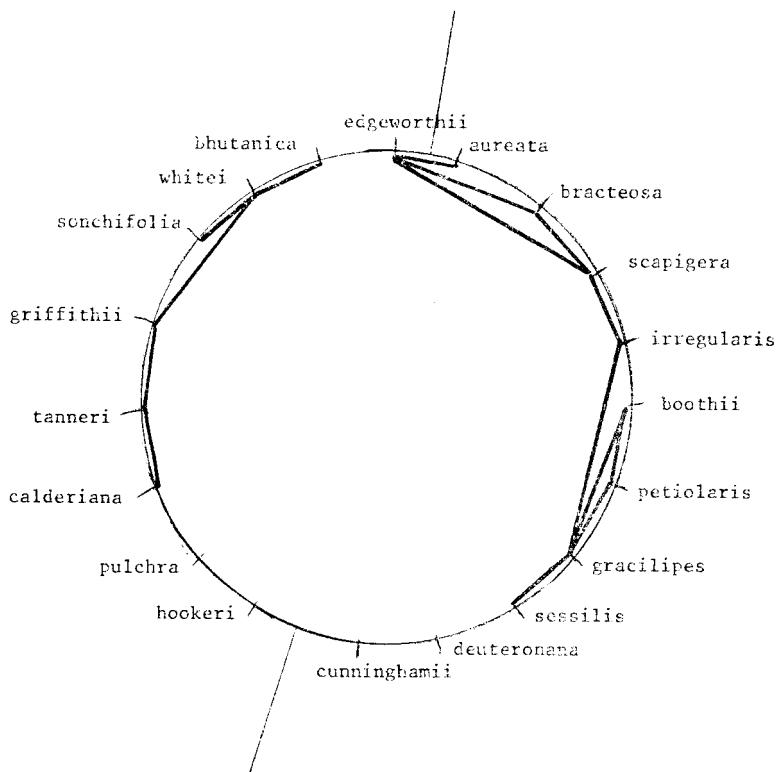


Fig. 32 Crossing diagram:

heavy lines are between species between which hybrids are known.

Bhutan by King, White and Griffith were classified by Pax (*loc. cit.*, and *Pflanzenr. Primulaceae*; 39; Watt, *J. Roy. Hort. Soc.*, 29:295; Craib and Balfour, *J. Roy. Hort. Soc.*, 39:148, 186; and Craib, *Notes Roy. Bot. Gard. Edinb.*, 6:257; 11:179.) in Pax's section *Petiolares*. French collections of the late 19th century from China added most of the *Davidii* and *Chartacea* species, which have scarcely been rediscovered, and remain largely unknown. Craib noted the common capsule type and included these with *P. petiolaris* and its allies (*loc. cit.*). Thus although *P. edgeworthii* was in cultivation, and several other species had been briefly (*P. scapigera*, *tanneri*, *taliensis*, *sonchifolia*, *calderiana*, *hookeri*) at the time of the 4th Primula Conference of the RHS in 1928, the great richness of the section in Nepal, Bhutan and Tibet was yet to be discovered. Although Farrer, Cox, Ward and Rock encountered Burmese and Chinese species in the 1910s and 1920s, none were introduced, and it was left to the great collectors Ludlow and Sherriff, and their companions Taylor, Hicks and Elliot, to establish the section

in cultivation. Between 1936 and 1951 they introduced no less than 13 species, discovering 6 new species to science; this they were able to do by breaking exciting new ground in Bhutan and south-east Tibet, and by perfecting the technique of introducing living plants by air. Had it not been for the 1939-45 war, many more of their important introductions might have survived in cultivation. Their explorations are splendidly captured in H. R. Fletcher's book, *A Quest for Flowers* (1975). Although they, and Kingdon-Ward continued to collect after the war, no new species have been discovered since the publication of Wright Smith and Fletcher's monograph, "The Genus *Primula*: Section *Petiolares*," *Trans. Roy. Soc. Edinb.*, 61:271-313 (1944), a splendid work based on fragmentary material and knowledge, which is the corner-stone of our understanding of the group.

At that time, largely through the efforts of Ludlow and Sherriff, the Bhutanese and Tibetan species, mostly in subsections *Sonchifolia* and *Griffithii*, were rather well known, but the Nepalese species, mostly in subsection *Petiolares*, were still very little known. Whereas most of the hunting grounds for the former have now become closed politically, Nepal, the 'hidden kingdom', became open in the early 1950s, and since that date there have been many introductions of little known species which are now more thoroughly understood. The major collectors have been Lowndes; Stainton, Sykes and Williams; Brough; Bowes-Lyon; Beer; and Grey-Wilson. Latterly, Nepal has fallen within the reaches of the tourist, and many introductions have been made by the sponge-bag technique, *Petiolarids* being amongst the most portable of plants. Increasingly we must expect the casual introduction of new forms, and it is to Nepal that we must look for new introductions in the immediate future. *P. hookeri*, *P. pulchra* and *P. drummondiana* await introduction from this area, while *P. irregularis*, *sessilis* and *deuteronana* are among Nepalese species that are scarcely in cultivation.

As new clones arrived in cultivation, and as skill and experience in growing these plants increased, a number of accounts of the group were published. That by D. Livingstone, *Bull. A.G.S.*, 18:210-233 is particularly good on cultivation, and there are interesting accounts of the group by Cain, *Bull. A.G.S.*, 30:223-235 and Knox-Finlay, *J. Roy. Hort. Soc.*, 91:456:461. Accounts in specialist books are generally less satisfactory, as in Clapham, *Primulas*, and Blasdale, *The Cultivated Species of Primula*. One must make an exception for A. Evans in *The Peat Garden*.

In the present account I have examined all the herbarium material

at the British Museum, where the comprehensive, beautifully collected and annotated collections of Ludlow and Sherriff reside, together with a remarkable collection of superb field photographs; Kew, where the important type material of Hooker and Ward is to be found; and Edinburgh, which has the Forrest collections, and many good duplicates. I was able to examine type material, and good series of representative collections of all the species, except some little known *Davidii*. From these, I built up a picture of each species in the field, and information on their distribution, altitude and habitat. My conclusions have, with the advantage of hindsight, and experience of the species in cultivation, differed in some cases from those of Smith and Fletcher.

I have also been able to examine almost all the clones in cultivation, with the kind help of many people who grow these plants so well, especially in Scotland, and to draw conclusions as to their identity and status in cultivation. Observation on seed-set, and microscopic examination of pollen fertility and chromosome number has aided these studies, and in particular the detection of hybridity. Scanning electron microscopy has shown the pollen to be uniform in the group (of the Farinosa-type, Spanowsky, *Feddes Rep.*, 65:149), but there is considerable variation in the nature of the farinipotent gland, which is also found in several efarinose species, and investigations into this, and chemotaxonomic problems, still continue. It is hoped that these studies will provide evidence as to the relationships of the group within *Primula*, and whether the nature of the capsule is sufficiently strong to unite such divergent groups as sections *Davidii* and *Chartacea*, which may have other affinities. However, the likelihood is that section *Petiolares* have evolved from Nivalid-like plants, subsection *Griffithii* being primitive to the group. **The scale in illustrations is of 5 mm.**

#### A KEY TO PRIMULA SECTION PETIOLARES PRESENTLY IN CULTIVATION

1. Evergreen; resting buds and persistent bud-scales absent; scapes at flowering very short or 0; leaf margins never entire or crenate-denticulate, usually erose-dentate; flowers pink, rose, magenta or yellow . . . . . 2
1. Deciduous; overwintering by resting buds at or just above soil surface, bud-scales persistent at flowering time; scapes usually visible at flowering time, sometimes very short or 0, often long, exceeding leaves; leaf-margins entire, crenate or erose-dentate; flowers yellow, white, blue, purple or carmine, never pink . . . 22
2. Flowers yellow or cream; farina on leaves very heavy . . . 3

2. Flowers pink, rose or magenta; leaves rarely heavily farinose, although farina often present .. .. . 5
3. Petiole usually reddish; eye to flower yellow-orange, large, diffuse, extending to  $\frac{1}{2}$  petal; petals with few, obtuse divisions *aureata*
3. Petiole not reddish; yellow-orange eye small, discrete, about  $\frac{1}{4}$  petal; petals lacerated with many acute divisions .. .. . 4
4. Bud-scales absent; petals overlapping; leaves not markedly dimorphic .. .. . *aureata* subsp. *fimbriata*
4. Bud-scales present; petals not overlapping; leaves markedly dimorphic at fruiting .. .. . *edgeworthii* 'alba'
5. Whole plant usually lacking farina .. .. . 6
5. Farina present (except sometimes in wet weather), at least on buds and sepals .. .. . 13
6. Petals with an acuminate apex, often 4; pedicels very short; leaf-blade  $\pm$  orbicular .. .. . *sessilis*
6. Petals dentate, or if  $\pm$  entire, not with an acuminate apex, never 4; pedicels often longer; leaf-blade rarely orbicular .. .. . 7
7. Corolla tube very pale with darker streaks outside, hairy within below the annulus; yellow eye to flower lacking distinct white border; petals ascending, narrow .. .. . *deuteronana*
7. Corolla tube not streaked outside, glabrous, or annulus only hairy within; yellow eye to flower usually with a white border, petal limbs usually spreading, usually broader .. .. . 8
8. Leaves sessile and prostrate at flowering; flowers sessile, or pedicel not exceeding 10 mm; petals ascending, short, rounded, flower not exceeding 20 mm diam. .. .. . 9
8. Leaves with a distinct petiole at flowering; pedicel usually exceeding 10 mm; petals usually spreading, dentate; flower exceeding 20 mm diam. .. .. . 10
9. Flowers magenta; buds and sepals purple, or  $\pm$  so; petals  $\pm$  entire .. .. . *petiolaris* x *boothii*
9. Flowers pink; buds and sepals green; petals  $\pm$  dentate *petiolaris*
10. Sepals acuminate, entire; corolla tube twice length of calyx, narrow, cylindrical, abruptly expanded at stamens .. .. . 11
10. Sepals lanceolate, sometimes dentate; corolla tube not exceeding  $1\frac{1}{2}$   $\times$  length of calyx, broader,  $\pm$  campanulate, not abruptly expanded .. .. . 12
11. Flowers deep rose-pink, with a narrow, distinct white border to the yellow eye; pedicels 15-20 mm .. .. .  
*scapigera* x *bracteosa* x 'scapeosa'

11. Flowers pale lilac-pink, with a broad, diffuse border to the yellow eye; pedicels 25-50 mm .. .. . *scapigera*
12. Sepals  $\pm$  dentate at apex, green; yellow eye to flower lacking white border .. .. . *scapigera* x *irregularis* 'Rankin 131'
12. Sepals entire, reddish; yellow eye to flower with broad, indistinct white border .. .. . *boothii*
13. Leaves at flowering long, 6-12 cm, lanceolate, lacking a distinct petiole, mid-rib reddish, at least proximally; flowers 25-35 mm diam.; pedicels exceeding 25 mm; scape sometimes detectable at flowering, conspicuous at fruiting .. .. . 14
13. Leaves rarely exceeding 6 cm at flowering, often with a distinct petiole, mid-rib rarely reddish; flowers rarely exceeding 25 mm diam., or pedicels 25 mm in length; scape rarely detectable at flowering or fruiting .. .. . 15
14. Calyx stiff, campanulate; petals clear pink, deeply and regularly dentate .. .. . *irregularis*
14. Calyx not stiff, urn-shaped; petals lilac, weakly dentate *bracteosa*
15. Leaves grey-green, heavily farinose; corolla exannulate, petals not overlapping .. .. . *edgeworthii*
15. Leaves green, sometimes weakly farinose; corolla annulate, petals overlapping .. .. . 16
16. Pedicels 0-10 mm; flowers not exceeding 20 mm diam., petals ascending, rounded, scarcely dentate; leaves sessile and prostrate at flowering .. .. . *petiolaris* x *gracilipes*
16. Pedicels exceeding 10 mm; flowers exceeding 15 mm diam.; petals spreading, dentate, or if scarcely so, not rounded; leaves usually ascending and petiolate at flowering .. .. . 17
17. Calyx reddish, sepals narrow; flowers magenta .. .. .  
*gracilipes* x *boothii* 'Sandy'
17. Calyx green, sepals broader; flowers pink .. .. . 18
18. Sepals dentate, or  $\pm$  so; petals deeply and regularly 3-5 dentate 19
18. Sepals entire; petals weakly and irregularly acuminate dentate, or entire .. .. . 20
19. Leaf-blade oval, heavily rugose; flowers pink-mauve, with white border to yellow eye .. .. . *gracilipes* x *irregularis* 'Stonor No 1'
19. Leaf-blade lanceolate, scarcely rugose; flowers lilac, lacking white border to yellow eye .. .. . *scapigera* x *irregularis* 'Rankin 131'
20. Calyx not exceeding 7 mm; petals acuminate, entire or dentate  
*gracilipes* x *sessilis*
20. Calyx 7-10 mm; petals obtuse, dentate .. .. . 21



21. Sepals obtuse, or shortly acute; leaves rugose; flowers pink . . .  
*gracilipes*
21. Sepals acuminate; leaves scarcely rugose; flowers rose . . .  
*scapigera* x *bracteosa* x 'scapeosa'
22. Resting bud with spreading scales, rosette-like; mouth of corolla tube wide, lacking a constricting annulus; petals not overlapping  
*edgeworthii*
22. Resting bud with adpressed scales, not rosette-like; mouth of corolla tube constricted by an annulus, often of contrasting colour; petals usually overlapping . . . . . 23
23. Leaves erose, or irregularly acute-dentate; scapes at flowering absent, or short, rarely exceeding pedicels; flowers blue, usually exceeding 25 mm diam. . . . . 24
23. Leaves entire, or finely crenate; scapes conspicuous, exceeding pedicel at flowering; flowers deep blue, purple, carmine, yellow or white . . . . . 30
24. Flowers deep blue, with an orange, stellate eye, lacking a white border; petals entire . . . . . *sonchifolia*
24. Flowers pale blue, eye yellow with a broad white zone; petals crenate, dentate or emarginate, rarely entire . . . . . 25
25. Sepals deltoid, entire, acute . . . . . 26
25. Sepals truncate, dentate, obtuse . . . . . 28
26. Flowers 28-32 mm diam., yellow eye 7-8 mm diam.; summer leaves triangular, petiolate; resting buds narrow . . . *bhutanica*
26. Flowers 20-35 mm diam., yellow eye 5-7 mm diam.; summer leaves lanceolate, not petiolate; resting buds broader . . . . . 27
27. Flowers mauve-blue; calyx cylindrical, sepals lanceolate; leaves acute . . . . . *whitei* x *griffithii*
27. Flowers sky-blue; calyx campanulate, sepals ovate; leaves obtuse or rounded . . . . . *whitei* x *bhutanica*
28. Leaves at flowering c10 cm, valvate, giving a plate-like appearance to rosette; calyx 10-11 mm; flowers  $\pm$  purplish-blue . . .  
*whitei* x *sonchifolia* 'Soup-Plate'
28. Leaves at flowering c 5 cm, on several planes; calyx 7-10 mm; flowers pure sky-blue to mauve . . . . . 29
29. Petals entire, or slightly crenate; calyx 7-8 mm, all sepals markedly dentate . . . . . *whitei*
29. Petals crenate, often markedly so; calyx 8-10 mm, some sepals  $\pm$  entire . . . . . *whitei* x *bhutanica*

(Note: it appears that extensive hybridisation has occurred between *Pp. whitei* and *bhutanica* in a few gardens where they self-sow; the majority of plants now in cultivation seem now to be hybrid, with poor pollen and seed fertility. *P. bhutanica* still remains distinct (see lead 25), but the boundaries between hybrids and *P. whitei* have become obscure, perhaps due to backcrossing. However, plants matching wild-collected material of *P. whitei* can still be found in cultivation).

- 30. Resting buds above ground, large; leaves acute; flowers deep blue with a narrow golden annulus .. .. . *griffithii*
- 30. Resting buds at or below ground, small; leaves rounded, obtuse or subacute; flowers very variable, but never deep blue .. 31
- 31. Leaf-blades subacute, deltoid, cuneate at base; flowers mauve, pale purple, or white with slate-blue blotches .. .. 32
- 31. Leaf-blades obtuse or rounded, lanceolate to ovate, truncate, or not constricted at base; flowers purple, carmine, yellow or white .. .. . 33
- 32. Flowers mauve or pale purple .. .. . *griffithii* x *tanneri*
- 32. Flowers white with slate-blue blotches .. .. . *griffithii* x *tanneri* var. *alba* 'Fan-tail'
- 33. Roots orange; leaf-blades crenulate, truncate at base, petiolate; plant lacking farina even on calyx; calyx 8-10 mm .. 34
- 33. Roots blackish; leaf-blades entire or  $\pm$  so, lanceolate, not petiolate; plant with farina usually apparent, at least on calyx; calyx 6-8 mm .. .. . 35
- 34. Flowers yellow .. .. . *tanneri* ssp. *nepalensis*
- 34. Flowers purple .. .. . *tanneri* ssp. *tsariensis*
- 34. Flowers white .. .. . *tanneri* ssp. *tsariensis* var. *alba*
- 35. Flowers yellow, sweetly scented to some .. .. . *calderiana* ssp. *strumosa*
- 35. Flowers carmine; unpleasantly scented to some .. .. . *calderiana* ssp. *calderiana*
- 35. Flowers white, unpleasantly scented .. .. . *calderiana* ssp. *calderiana* var. *alba*

(Note: plants with a wide variety of hues, ranging from deep purple, through mauve, magenta, crimson, pink, apricot, orange, yellow, cream and white are found in mixed populations in the field. These seem to arise from hybridisation both between and within the *calderiana* and *tanneri* complexes. Presumed hybrids are also intermediate in characters of calyx, leaf, etc., are vigorous, and can have somewhat sterile pollen. Similar hybrid swarms

have arisen in a few gardens, and the parentage of many plants can only be guesswork. However, it seems that all the possible crosses between and within the *calderiana* and *tanneri* complexes may occur in cultivation).

**Primula Subgenus Craibia** Wendelbo, *Aarb. Univ. Berg., mat.-natv.*, 11:36 (1961).

Capsule orbicular, dehiscing by crumbling at maturity.

**Section Petiolares** Pax, *Bot. Jahrb.*, 10:173 (1889)

(section *Craibia* Wendelbo, *Aarb. Univ. Berg., mat.-natv.*, 11:36 (1961) )

(subsections *Petiolaris-Sonchifolia* and *Griffithii* Smith and Fletcher, *Trans. Roy. Soc. Edinb.*, 61:274 (1944) )

Leaves lacking multicellular hairs and thin, orbicular leaf-blades: mostly Himalayan.

**Subsection Petiolares** A. J. Richards *STAT. NOV.*

(Groups *Vera*, *Scapigera* Smith and Fletcher *loc. cit.*)

Evergreen; leaves erose-denticulate; scapes at flowering very short or 0; flowers pink, rose, magenta or yellow,  $\pm$  annulate.

**P. petiolaris** Wall. in Roxb., *Fl. Ind.*, 2:22 (1824)

Whole plant lacking farina. Leaves at flowering green, oblong spatulate, short, to 5 cm, crowded in a tight, crisped rosette, later elongating to spatulate with a distinct petiole. Flowers sessile, or nearly so, pink, subcampanulate with ascending, short, rounded petals, not more than 20mm diameter. Eye yellow, with thin distinct white border, corolla mouth wide. Nepal, Kumaon, Sikkim (fig. 33), 6,500-12,500 ft. First introduced in the mid 1950s, perhaps by Stainton, Sykes and Williams (1954) and Lowndes (1950), certainly by Brough (1955) and Bowes-Lyon (1962). Latterly introduced several times by Beer and others. Now fairly widespread in cultivation, usually as *P. "gracilipes minor."* In cultivation seed rarely (ever?) set, plants all (?) pin,  $2n=22$ . Seems vigorous, requiring regular division. No fig. known.

This is a widely misunderstood species, as the original type material is very untypical, being collected in the summer state. It was thus thought to have long narrow petioles and blue flowers (all flowers in this group dry blue). However, the distinctive calyx (fig. 34) and lack of farina can be clearly seen on the type material, and now that the Nepalese flora is known it has been frequently collected and is well understood.

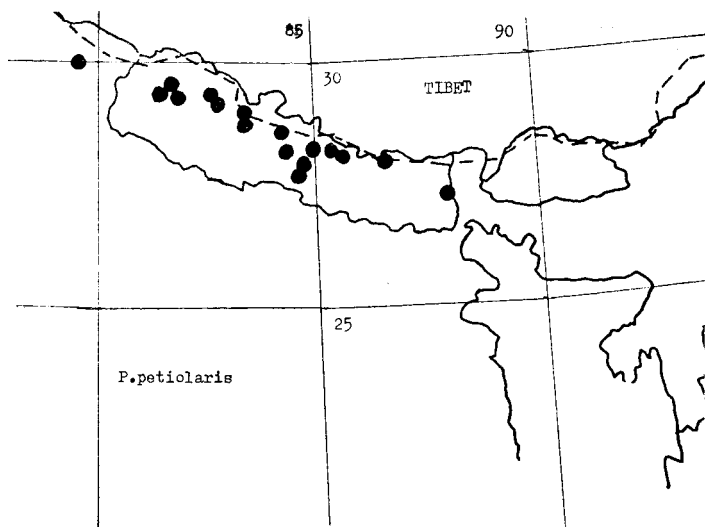


Fig. 33

***P. petiolaris* x *gracilipes***

Very similar to the above, but with sepals (and sometimes young leaves) farinose; fertility low; floral characters intermediate (fig. 34). Origin unknown; now widespread and very vigorous in cultivation, usually known as *gracilipes* or *gracilipes minor*. Seed rarely (ever?) set. Plants all (?) pin.

***P. petiolaris* x *boothii***

Very similar to *P. petiolaris*, but with dark green leaves with red mid-ribs and magenta flowers; buds and sepals purple; pollen fertility low;  $2n=21$ , showing *P. boothii* parentage. Origin, apparently collected in the field on the Sikkim/Bhutan border (rather further east than present known range of *P. petiolaris*), L & S 19856. No fig. known. Now fairly widespread and vigorous in cultivation, usually known as *P. petiolaris*.

***P. gracilipes* Craib, *Notes Roy. Bot. Gard. Edinb.*, 6:252 (1917)**

Leaves at flowering green, sometimes pink on mid-rib, farinose on young leaves, to 6 cm, spatulate, weakly petiolate. Pedicels 1-3 cm. Sepals acute, farinose (fig. 34), calyx to 7 mm. Petals horizontal,

weakly and irregularly toothed, corolla 20-30 mm diameter, pink. Eye yellow with a rather indistinct white border. Central Nepal to south-east Tibet (fig. 35), 6,500-13,500 ft. Subsp. **sulphurea** (Hook f.) A. J. Richards *STAT. ET COMB. NOV* (*P. petiolaris* Wall. var. *sulphurea* Hook. f., *Fl. Brit. India*, 3:493 (1882); *P. sulphurea* Craib, *J. Roy. Hort. Soc.*, 39:186 (1913)) with leaves thickly yellow-farinose underneath, from Kumaon, is not in cultivation and has only been collected once.

Apparently in cultivation in 1886 (*Bot. Mag.*, t.7079B). Reintroduced in 1936 by Ludlow and Sherriff (L & S 1167) as flown-home plants from Bhutan. Probably several subsequent introductions. Now

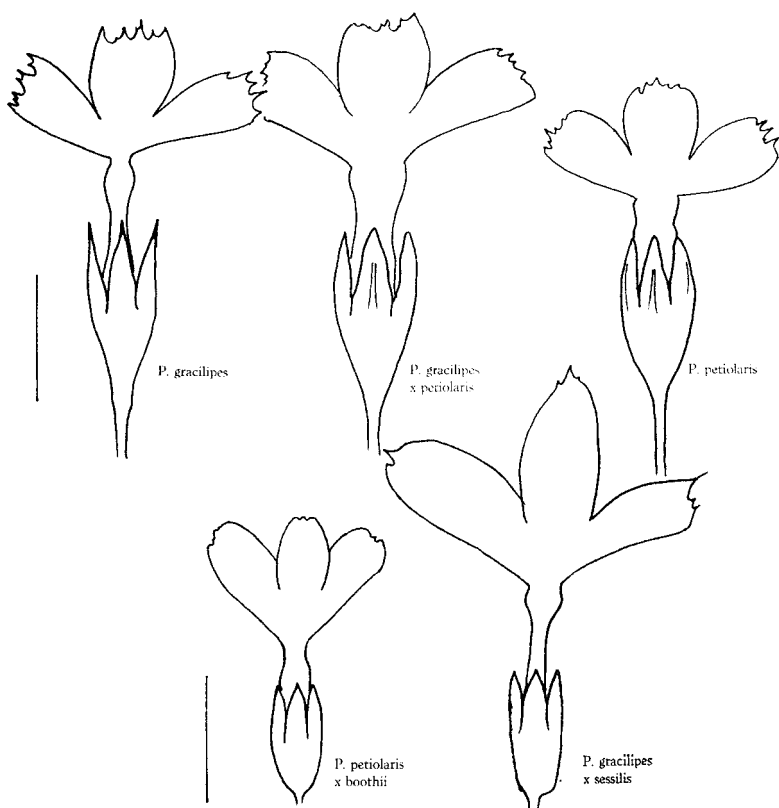


Fig. 34 *P. petiolaris*, *P. gracilipes* and hybrids

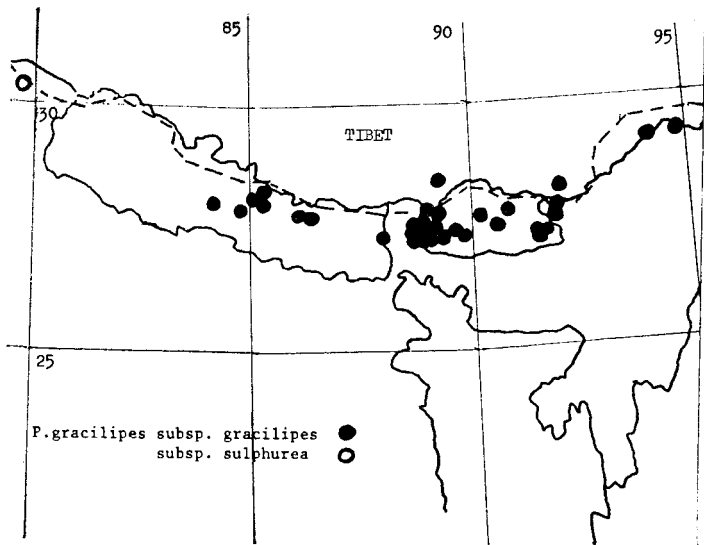


Fig. 35

fairly widespread in cultivation, but many plants so-called are hybrids. Seed set fairly regularly, and plants very variable.  $2n=22$ , pollen fertile. Vigorous, requiring regular division, and seems to grow well even in parts of southern England. Figs.: *Bull. A.G.S.*, 8:110; 18; 223; 29:44, *J. Roy. Hort. Soc.*, 91:470; Hay & Synge, *R.H.S. Dict. Gard. Pl.*: 20; *Gard. Illustr.*, 63:282.

#### ***P. gracilipes* x *sessilis***

Differs from *P. gracilipes* mostly by the acuminate (although rarely entire) petals, which are sometimes 4 and the shorter sepals (fig. 34); pollen rather sterile. Scarce in cultivation, although offered s.n. *P. cunninghamii* which is a very distinct Sikkimese autumn-flowering species having small crowded flowers with emarginate petals and has never (?) been in cultivation. Apparently rather weak and a poor doer like *P. sessilis*. Origin unknown, possibly at Edrom. Fig. *J. Roy. Hort. Soc.*, 91:470.

***P. gracilipes* x *boothii* 'Sandy'**

Differs from *P. boothii* chiefly by heavily farinose leaves, faint white margin to substantial yellow eye, and *gracilipes*-type petal shape (fig. 36); pollen very sterile, does not set seed.  $2n=21$ . Several similar but slightly varying seedlings were grown by A. Duguid at Edrom from *P. gracilipes* pin plants grown in the vicinity of *P. boothii* thrums. Not a strong doer, and only one plant survived the summer of 1976 at Edrom. No fig. known. This hybrid has been collected in the field by Dhwoj 0457 in 1931 (Jala Pokhri, Nepal), BM.

***P. gracilipes* x *irregularis* 'Stonor No. 1'**

Differs from *P. gracilipes* through the stiff, waxy, strongly and regularly dentate petals, and the stiff campanulate, dentate sepals (fig. 36). A much smaller plant than the other parent, and not scapose. Pollen rather sterile, seed not set. Origin unknown, ? Northern Ireland. Now very scarce in cultivation (did it survive 1976?). No fig. known.

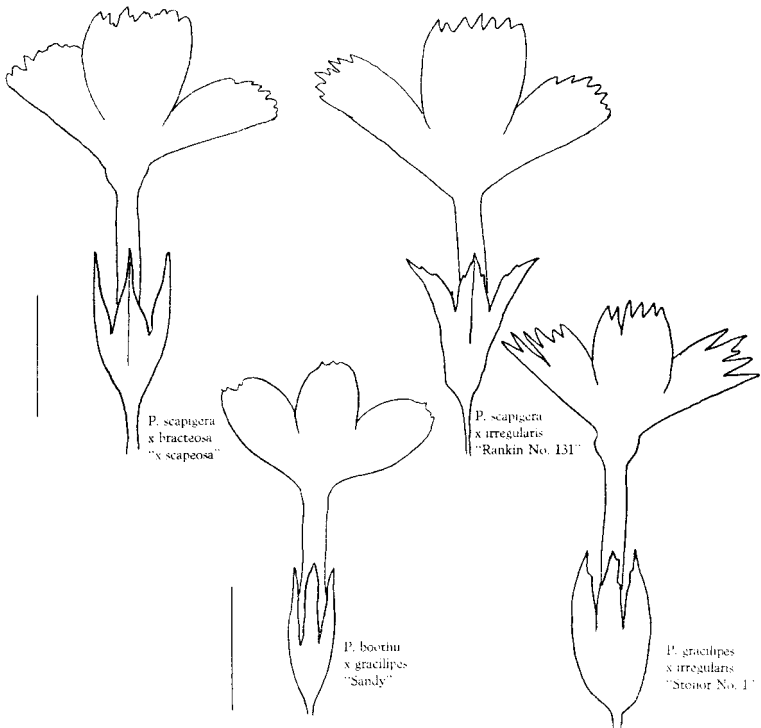


Fig. 36 Some hybrids in subsection *Petiolaris*

***P. sessilis*** Royle ex Craib, *Notes Roy. Bot. Gard. Edinb.*, 6:256 (1917) Leaves at flowering dark green, short, to 5 cm, blade orbicular, with a short but very marked petiole. Pedicels very short or flowers sessile; sepals short, very narrow, sometimes  $\pm$  farinose, keeled, calyx narrowly cylindrical. Flowers to 25 mm diameter, (fig. 37), pale lilac-pink with a small (to 5 mm) orange-yellow eye with a thin white margin; petals  $\pm$  horizontal, narrow, acuminate, entire, often 4. Flowers produced singly over a long period.

North-west Himalaya, Gharwal, United Provinces, Punjab, Kashmir, north-west Nepal (fig. 38), scarce. 9000-11,500 ft. First introduced Lowndes 1932; later Snell 1973. The first introduction was of an initially vigorous clone with red-veined 'beetroot-like' leaves, which however never (?) set seed. A poor white form (? origin) was also known. This stock became weaker in the 1950s and has now virtually died out (? virus). A few plants of the 1973 introduction, which is a poor and weak strain, still survive.  $2n=22$ , pollen fertile. Figs. *Bull. A.G.S.*, 3:205, 18:224; *Gard. Chron.*, 107:103; *Gard. Illus.*, 63:295.

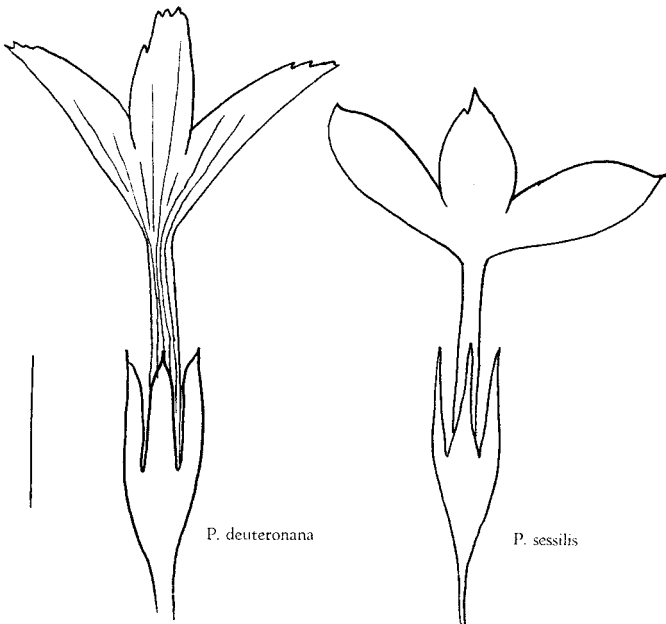


Fig. 37 *P. deuteronana* and *P. sessilis*



***P. deuteronana*** Craib, *Notes Roy. Bot. Gard. Edinb.*, 6:251 (1917)

Leaves at flowering dark green, short, to 5 cm, oblong-spathulate, mid-rib sometimes pinkish. Pedicels 0-3 cm; sepals narrow, acuminate, calyx 8 mm, cylindrical, occasionally farinose (some farina occasionally on young leaves also) (fig. 37). Corolla pale lilac, paler outside, with purple streaks, 25 mm diameter, eye deep yellow, lacking or with a very indistinct white border, tube hairy inside; petals narrow to base, acute,  $\pm$  irregularly dentate, ascending. Flowers produced singly.

Central Nepal to Sikkim, 10,000-14,500 ft. (fig. 38). Introduced Lowndes, 1954; Mrs. Brough, 1956. A slow-growing and rather difficult plant of which only a few plants survive. Pollen fertile, seed never (?) set. No figs. known.

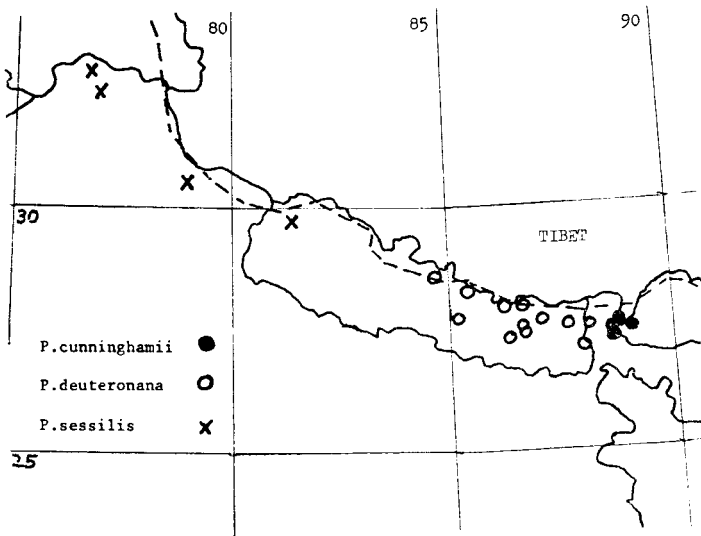


Fig. 38

***P. boothii*** Craib, *Notes Roy. Bot. Gard. Edinb.*, 6:249 (1917)

Plant lacking farina. Leaves at flowering dark green, with red veins. Frequently has purple backs to the leaves, blade ovate to orbicular, with a marked red petiole, to 6 cm. Pedicels red, to 3 cm, on a very short scape which elongates in fruit. Calyx 10 cm, red, angled, cylindrical, narrowing at apex, sepals narrow,  $\pm$  obtuse (fig. 40). Corolla purple, magenta or lilac, eye with orange spots in throat, and a very

broad, white zone, often half of petal, to 28 mm diameter, mouth of tube rather broad; petals rather narrow,  $\pm$  horizontal, irregularly dentate, and often  $\pm$  emarginate.

East Nepal to south-east Tibet and Assam (fig. 39), 7000-11,500 ft.,

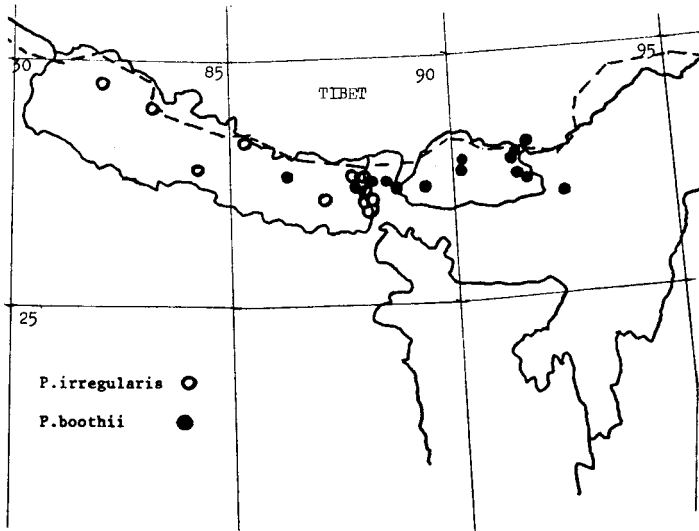


Fig. 39

mossy banks above water among trees, locally abundant. First introduced, probably in 1938, by Ludlow and Sherriff, and probably more than once subsequently, although several of their introductions under this name proved to be *P. gracilipes*. There have been several recent introductions, e.g. Thompson 1973, Brogden 1975, and Beer, and also probably in the 1950s (Bowes-Lyon and Brough). There are several markedly different clones now in cultivation. It seems quite a vigorous species, and can be propagated well from leaf-cuttings or division, but is very susceptible to virus. At the moment it is quite widespread.  $2n=20$  (the only species with this number, by which the hybrids  $2n=21$  can be detected), pollen fertile, seed sets rarely. Figs. *Bull. A.G.S.*, 8:110, 18:218, 30:227 (as *irregularis*).

*P. scapigera* Craib, *Notes Roy. Bot. Gard. Edinb.*, 6:254 (1917)

Plant without farina. Leaves at flowering pale green, rather smooth,

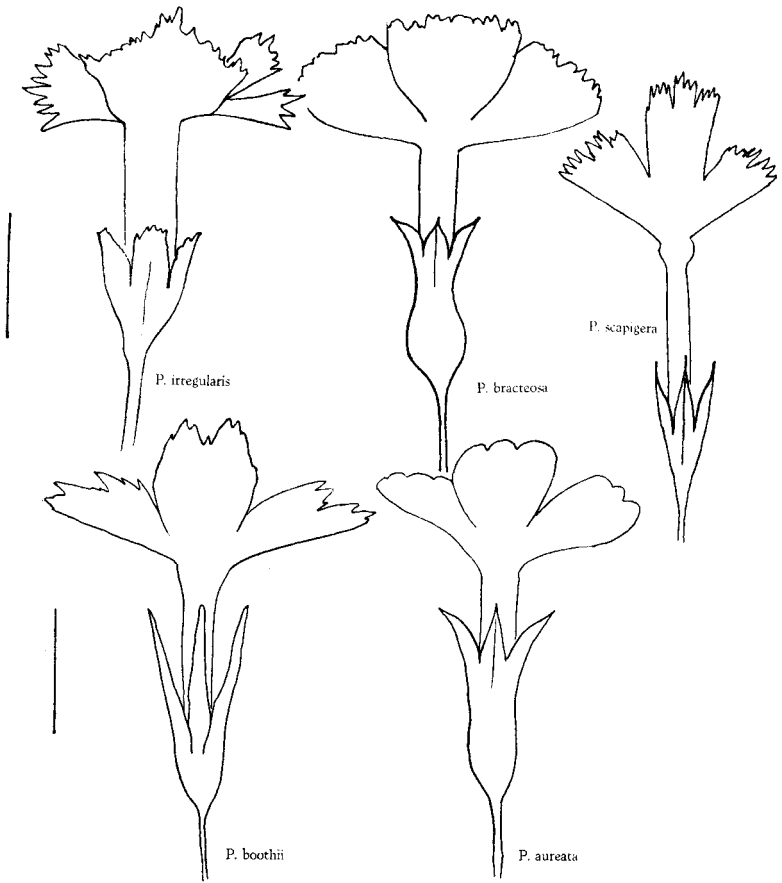


Fig. 40 Larger species (scapose in fruit); subsection *Petiolares*

numerous, to 6 cm, spatulate. Pedicels long, rather narrow, to 5 cm, borne on a very short scape which elongates in fruit. Calyx to 10 mm, narrowly cylindrical-campanulate, with long-acuminate sepals (fig. 40). Corolla tube long, narrow, twice length of calyx, abruptly expanded at stamens, very pale outside, corolla lilac-pink, eye orange with a diffuse white border, mouth wide, large, to 33 mm diameter; petals long, rather narrow, deeply and irregularly dentate, horizontal.

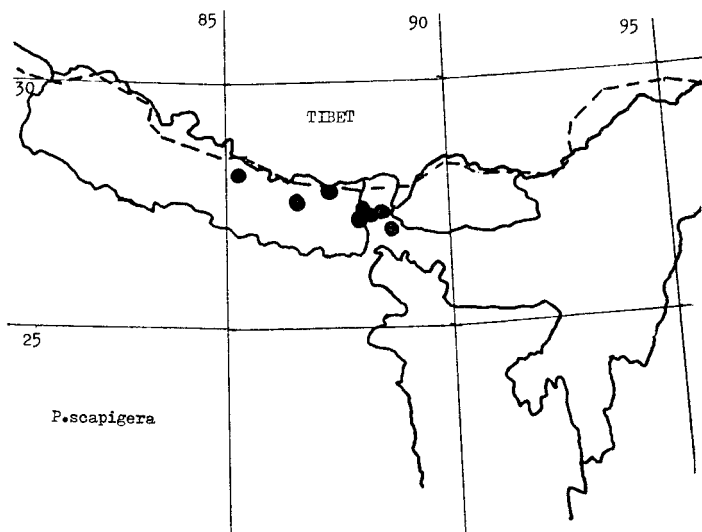


Fig. 41

Central Nepal to Sikkim, apparently uncommon (fig. 41), 8500-11,000 ft. First introduced from the Singalelah Range in 1876, shown at the RHS by Foster, and figured by Elwes in *Garden* (1889):253. Re-introduced in 1934 (source?). Originally widespread in cultivation and readily propagated by leaf cuttings (it produces new rosettes slowly), but decimated by virus in the 1950s. Originally thought lost, but a few plants remain: these seem to do better planted vertically. Pollen sterile, but apparently not hybrid, and formerly seed-fertile.  $2n=22$ . Remaining plants thrum. A white plant occurred among some seedlings of Mrs. C. B. Saunders, but did not persist. Fig. *Bull. A.G.S.*, 5:128; 9:318; Griffith, *Collins Guide to Alpines*:241 (s.n. *gracilipes*); *Gard. Chron.*, 97:155; 99:204; *Gard. Illustr.*, 63:296.

***P. scapigera* x *bracteosa* x 'scapeosa'.**

Similar to the above, but with shorter pedicels (to 2 cm), deep rose pink flowers with shorter, more rounded, less cut petals, and shorter, less acuminate sepals (fig. 36); the white zone to the yellow eye is much narrower and more discrete. Originated from seed grown from intentional crosses on to *P. bracteosa* by R. B. Cooke, about 1948. A handsome, vigorous clone, fast-growing and strong. All (?) plants seem

to have virus, and so should be separated from other primulas, but good cultivation can overcome the misshapen flowers with pale streaks, and deformed leaves so typical of this infection. Very widespread and common in cultivation, often grown in masses. Pollen rather sterile; seed sometimes set, when the leaf-like scape bud typical of *P. bracteosa* may occur, and offer another means of propagation; however, requires regular division, and propagated easily from leaf-cuttings.  $2n=22$ . Flowers all thrum. Fig. *Bull. A.G.S.*, 15:139.

***P. scapigera* x *edgeworthii* 'Pandora'**

I have not seen this hybrid, which is variously described as looking like *edgeworthii* with magenta flowers, and like a strong *scapigera* with large mauve flowers with long ragged petals so typical of the latter. The photograph (*Bull. A.G.S.*, 12:79) certainly resembles *P. scapigera* in many ways: the foliage is farinose, however. This was a strong and widespread plant originally raised by Mrs. C. B. Saunders before 1940, but had been thought to have died out completely (virus?). However, by asking all former customers in 1976, A. Duguid managed to trace one survivor.

***P. scapigera* x *irregularis* 'Rankin 131'**

Rather close to *P. scapigera*, but with darker, almost bluish leaves which can be somewhat farinose, shorter pedicels, and lilac flowers which lack a white border to the yellow eye, and which have shorter, less ragged petals. The sepals (fig. 36) are intermediate, showing the teeth of the latter parent. Pollen rather sterile, seed not set. Pin. Origin unknown, ? Northern Ireland. Increasing in cultivation, and apparently quite hearty. Somewhat resembles 'Sandy'. No fig. known.

***P. irregularis* Craib, *Notes Roy. Bot. Gard. Edinb.*, 6:253 (1917)**

Leaves at flowering long, to 15 cm, dull green with a pinkish mid-rib, oblanceolate, young leaves often farinose. Pedicels to 7 cm, farinose, borne on a very short scape which elongates in fruit. Calyx to 12 mm, stiff, campanulate, farinose; sepals broad, subobtusate, irregularly dentate (fig. 40). Corolla tube broad, twice length of calyx, corolla clear pink, to 35 mm diameter, with a stellate, greenish eye and a narrow distinct white border; petals stiff, waxy, deeply and regularly dentate. West Nepal to west Sikkim, apparently local and scattered (fig. 39), 9000-11,000 ft. In cultivation by 1962, ? source, apparently first grown in Northern Ireland. Scarce. Reintroduced in 1973 by B. Thompson from Innukkhola, Nepal, together with a much smaller plant from about 13,000 ft., originally named *P. thompsonii* ined., but

which is now thought to be a high altitude form of *P. irregularis*. This introduction was very vigorous for the first year, and flowered continuously for 4 months. It rapidly lost vigour, and is now almost gone. Pollen fertile, seed not so far set.  $2n=22$ . No fig. known. This plant has been known as 'Stonor No. 3'.

***P. bracteosa*** Craib, *Notes Roy. Bot. Gard. Edinb.*, 6:250 (1917)

Leaves at flowering long, to 10 cm, dull green with a pinkish mid-rib, oblanceolate, young leaves often farinose. Pedicels to 4 cm, borne on a very short scape, which elongates at fruiting, and if fruit is set, usually develops an apical bud with leaf-like bract, which readily roots; this is not formed in the absence of fruit. Calyx 10 mm, urn-shaped (fig. 40), farinose; sepals acuminate, entire. Corolla lilac, with a greenish stellate eye and a distinct border of medium width. Petals not stiff, rounded, weakly and irregularly dentate. East Nepal to west Assam, mostly Bhutanese (fig. 42), 8000-11,000 ft. First discovered in Bhutan by Griffith in 1845, but not introduced until 1937 by Ludlow and Sherriff (L & S 3162). The first introduction is of a free-flowering and fairly vigorous plant which was distributed (among others) by Dr. Molly Sanderson of Ballymoney, R. B. Cooke, and Major Knox-Finlay. A second, post-war introduction ('Stonor No. 2') is a poor-flowering plant and has nearly disappeared. Good beds remain of the former in a few places, although *P. x 'scapeosa'* often goes under this name. Pollen fertile, seed rarely set, but readily propagated by leaf cuttings, rather slow division, or (when it fruits) by rooting the scape-buds. Does not seem to suffer from virus, but I find it very prone to root aphid. Figs. *Bull. A.G.S.*, 9:330; 18:223; *Gard. Illustr.*, 63:283; *Notes Roy. Bot. Gard. Edinb.*, 18, t239.

***P. bracteosa x edgeworthii x 'bractworthii'***

Like its sister hybrid 'Pandora', this was also raised by Mrs. C. B. Saunders, and after a strong and promising start, when many plants were readily raised by leaf cuttings, and strong crowns had 30 flowers open together, this seems to have entirely disappeared, and I have not seen it. From the illustration (*Bull. A.G.S.*, 18:232) and description it had heavily farinose leaves and calyces at flowering, and looked superficially very like *P. edgeworthii*, but with much larger (to 35 mm diameter) flowers of a virulent magenta. It seemed to differ from 'Pandora' in bigger flowers with broader petals which were much less cut and ragged, and by heavily farinose *edgeworthii*-type leaves. The cause of its demise is not known, probably virus, but according to one grower possibly sheer distaste!

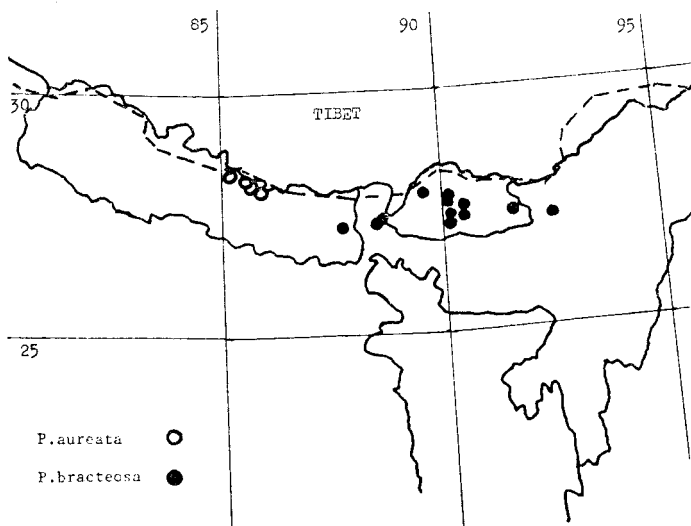


Fig. 42

***P. aureata*** Fletcher, *Gard. Illus.*, 63:283 (1941)

Leaves at flowering to 7 cm, oblanceolate, green, usually heavily farinose, with a red mid-rib. Pedicels to 3 cm, reddish, borne on a very short scape which elongates at fruiting (rare). Calyx to 10 mm, cylindrical below, sepals spreading (fig. 40), sepals acute, heavily farinose. Corolla yellow, with a very broad orange eye which spreads as the flower ages, lacking a white border, to 32 mm diameter; petals rather broad, shortly crenate.

This remarkable plant was first discovered as a stray seedling among a pan of *Swertia purpurea* seed sent from the Lloyd Botanical Garden, Darjeeling, to the Royal Botanic Garden, Edinburgh, in 1935 (flowered 1939), and was thought to come from Sikkim. However, latterly it has been found to be restricted (?) to a small area of central Nepal (fig. 42), 10,000-14,500 ft., wet grassy slopes above the tree-line. It was re-collected in 1962 by S. Bowes-Lyon. In cultivation it is most successfully grown as an alpine-house plant, but can be grown outside vertically, or under cloches, but is susceptible to damp. It is pollen fertile, and sets seed occasionally. It can be propagated by division (slow), or leaf-cuttings. Fig. *Bull. A.G.S.*, 9:331; 15:220; 25:67; 43:305; *Bot. Mag.*,

NS 176, I, t.488; A. Evans, *The Peat Garden: XIIId*. It was originally called *P. edgeworthii* 'Chrysops'.

There is also a mysterious plant in cultivation under the name of *P. aureata* forma. This differs in the smaller leaves, and rapid rate of crown formation (to the extent of weakening the plant): the leaves are more highly cut. The flowers are smaller (to 25 mm diameter), cream, with a smaller, orange-yellow eye, and the petals are highly cut; fimbriate. This is less susceptible to damp and does better outside, but is not such a spectacular plant. Its origin is unknown. D. Livingstone received it in 1949 under the name *P. edgeworthii alba*, but recognised that it was closer to *P. aureata*. It is seed and pollen fertile, which is not suggestive of hybridity, but has been observed to throw scape buds in the fashion of *P. bracteosa*, which is. The mystery was at least partially solved in 1976 by R. Gibbons, who observed true *P. aureata* at Langtang, Nepal, and *P. aureata* forma, in large invariable colonies in a different area (Gosainkund). It is thus apparently a good taxon, and can probably be recognised as a subspecies which I am naming. ***P. aureata* Fletcher subspecies *fimbriata* A. J. Richards in sched.**

Fig. *Bull. A.G.S.*, 18:210.

#### ***P. aureata* x *edgeworthii***

This hybrid has bud-scales and thus presumably resting buds in the manner of *P. edgeworthii*; the foliage otherwise more resembles *P. aureata*. The plant and flower are very large (flowers to 35 mm diameter) and apparently vigorous. The flowers are yellow, with lavender margins. The pollen is sterile. This magnificent plant was collected by S. Bowes-Lyon (? locality) in Nepal in 1962, and was grown for a short time at Kew. Fig. *Bot. Mag.*, NS 176, III, t.511.

#### **Subsection *Edgeworthii* A. J. Richards *STAT. NOV.***

(Group *Edgeworthii* Smith and Fletcher, *Trans. Roy. Soc. Edinb.*, 61:274 (1944)).

Forming an open resting bud; leaves scarcely dentate at flowering; scapes at flowering very short; flowers exannulate.

#### ***P. edgeworthii* Pax, *Pflanzenr.*, *Primulaceae*:41**

Leaves at flowering to 5cm, spatulate, greyish-green, scarcely dentate, farinose, becoming much larger after flowering, dentate, not farinose, with an orbicular blade and long narrow colourless petiole; bud scales oblong, to 2 cm, whitish green. Pedicels to 2 cm, farinose, borne on a very short scape which elongates in fruit. Calyx broadly cylindrical, farinose, to 10 mm; sepals rather broad, obtuse, or acuminate. Corolla



tube scarcely exceeding calyx, broad, with a wide mouth, lacking an annulus; corolla to 30 mm diameter, blue, lilac, pink or white, with an orange-yellow eye and a variable white border; petals not overlapping, almost entire, to long-dentate. North-west Himalaya to central Nepal, locally common, mostly in wet woods near water (fig. 43), 6500-11,000 ft. Being the commonest *Primula* in this group to be found in 'British India', this species was known very early, being collected by Blinkworth in Kumaon in 1824. It has been subject to a number of names, including *P. pulverulenta* Edgeworth, *P. winteri* Wats., *P. nana* Wall. and *P. saxicola* Craib. Of these *P. petiolaris* var. *edgeworthii* Hook. f., *Fl. Brit. Ind.*, 3:493 (1882) is the prior valid epithet. Part of the confusion has stemmed from the marked dimorphism in leaf shape at different times of year; summer-leaved plants look very different and were originally called *P. winteri*. Smith and Fletcher, *loc. cit.*:290, provide a very full account of the synonymy. It was first introduced into cultivation by Winter from Kumaon in 1887 (flowered 1889) by seed, and was the first species to be permanently established. At the time of the 4th *Primula* Conference of the RHS (1928) it was the only species in cultivation. It has since been

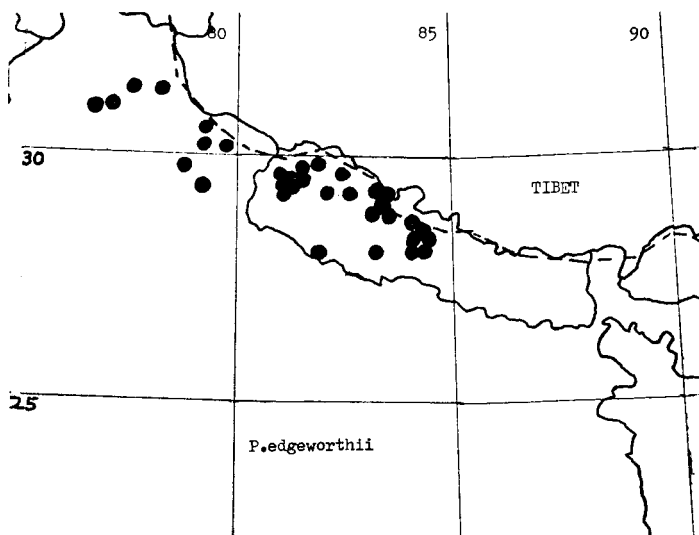


Fig. 43

introduced on a number of occasions, most recently by Thompson (1973). The original type was lilac-flowered; at some stage prior to 1940 a very fine, large-flowered white variety arose, or was introduced. This is still widespread. A rather small-flowered strain with flowers of a good blue is now widespread, and seems to have been disseminated principally by Jack Drake. A good pink form was introduced by Thompson in 1973. All forms do quite well outside, but perhaps look better when grown under glass as the farina is better preserved. Pollen is fertile, and seed regularly set, perhaps because pin and thrum forms are both widespread.  $2n=22$ . It is usually the earliest to flower in cultivation, frequently in January or even earlier. It is said to need a temperature of less than  $50^{\circ}\text{F}$ . to initiate flowering, and to be susceptible to red spider under glass. Outside it is better cloched, being rather susceptible to damp, and also to root aphid and weevil. It is the most widespread outside the British Isles, in Canada, Australia and New Zealand. Figs. *Bull. A.G.S.*, 2:34; 3:41; 9:330, 29:87, *R.H.S.*, 4th *Primula Conference Report*:24; *J.R.H.S.*, 37, fig. 75; 39:184; 54, figs. 3, 18; 58, fig. 85; 91:470, R. Farrer, *ERG* II:204; Hay & Syngé, *R.H.S. Dict. Gard. Pl.*:19; *Bot. Mag.* t.9064; *Gard. Illustr.*, 63:295; *Gard. Chron.*, 49:130; 55:238; 68:310; 89:44; 91:179; 94:486; 99: fig. 102; 103:235; 104 *supp.*:55; 107:230.

**Subsection *Sonchifolia*** A. J. Richards *STAT. NOV.*

(Group *Sonchifolia* Smith and Fletcher, *Trans. Roy. Soc. Edinb.*, 61:274 (1944)).

Resting buds closed, egg-shaped, large, above soil surface; leaves dentate at flowering; scapes at flowering very short to 5 cm, flowers annulate, blue.

**P. *whitei*** W. W. Sm., *Rec. Bot. Surv. Ind.*, 4:268 (1911).

Leaves at flowering to 6 cm, dentate, oblanceolate, bluish-green, with white veins, somewhat farinose; later elongating (fig. 44) to narrowly lanceolate. Pedicels to 2.5 cm, borne on a very short scape which lengthens in fruit. Calyx stiff, campanulate, farinose, 7 mm, sepals truncate, irregularly dentate (fig. 45). Corolla tube short, scarcely exceeding calyx, broad, whitish outside; corolla to 28 mm diameter,  $\pm$  cup-shaped, blue to mauve, with an off-yellow eye, 5-7 mm diameter, and a white border of varying width, often very wide; petals  $\pm$  entire to very shortly and broadly crenate. West and central Bhutan, 10,000-14,000 ft. (fig. 46). First discovered on the Pile La by Sir Claud White in 1905. Introduced between 1936 and 1939 on more than one occasion

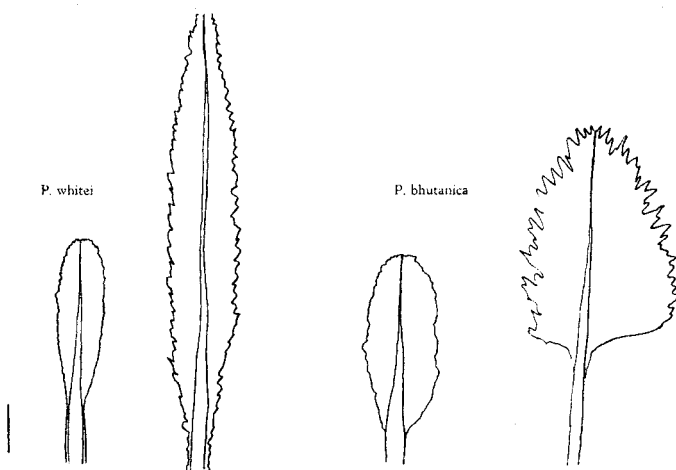


Fig. 44 Leaf differences between *P. whitei* and *P. bhutanica*

by Ludlow and Sherriff (L & S, 3053, 3100, 3229, 18676). Has become widespread in cultivation, but latterly scarce, and is weak and a poor doer, with the poorest flowers in this group. Pollen usually fertile, sets seed and can self-seed when suited. Does best when frozen with substantial snow cover (e.g. Ascreavie, Hartside). In damp areas probably better with cloches, or planted vertically. Flowers early, usually February. Fig. *J.S.R.G.C.*, 10:152.

***P. whitei* x *bhutanica***

Differs from *P. whitei* by the intermediate leaf characters, the longer calyx (to 10 mm) with  $\pm$  acute, scarcely dentate sepals, and the more dissected petals (fig. 45). Pollen sterile, seed rarely set,  $2n=22$ . Flowers are more frequently a clear sky-blue, and can exceed 30 mm diameter. A vigorous, handsome clone (or more than one?, but all are pin-flowered), by far the most widespread and attractive of the group. Probably arose at Ascreavie, where both parents self-sow. Despite slow increase, requires regular division and will grow well in the open garden. Figs. *Bull. A.G.S.* 18:217; 37:326; A. Evans, *The Peat Garden: XIIc*.

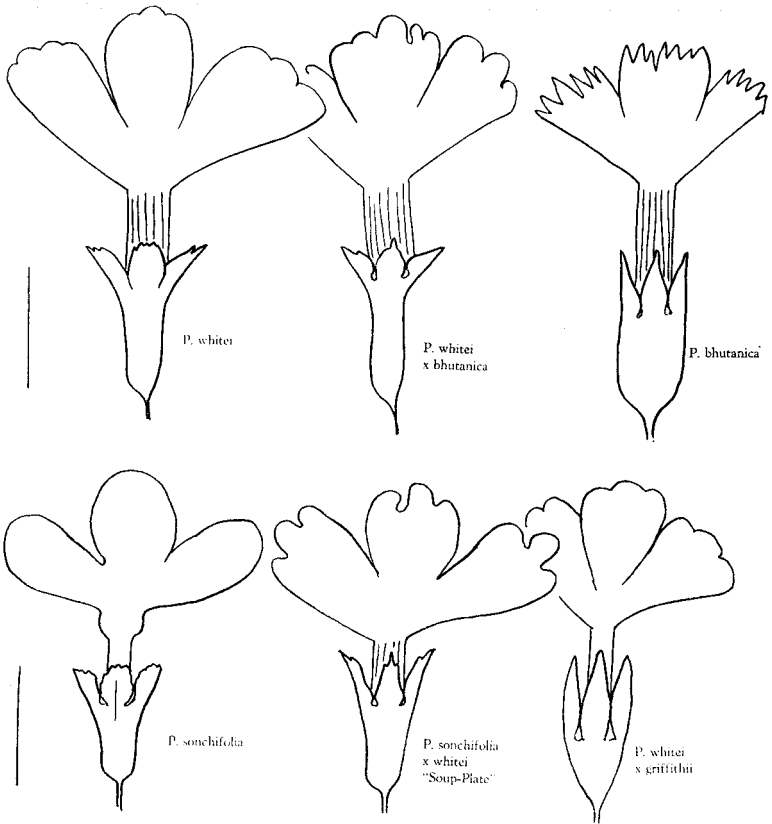


Fig. 45 Species and hybrids; subsection *Sonchifolia*

***P. whitei* x *sonchifolia* 'Soup-plate'**

Differs from *P. whitei* by the much longer leaves (to 10 cm at flowering), which are valvate (all at the same level), forming a characteristic 'ruff', or plate-like structure. The resting buds are very large and farinose, slightly open at the apex, scarcely separable from *P. sonchifolia* and quite unlike the tight oval mahogany buds of *P. whitei*. The calyx is longer (to 11 mm) and shows characters of *P. sonchifolia* (fig. 45), and the flowers have a purplish tinge, being borne together in great quantity (up to 30 open together per rosette). A spectacular, but rather coarse plant which almost certainly arose at Ascreavie, where both parents self-sow. There is probably only one every vigorous and

invariable clone, which is pin-flowered. It is pollen- and seed-sterile, but has a good rate of vegetative increase, and several large patches are established. That at the Royal Botanic Garden, Edinburgh, is covered by glass in winter, but this does not seem necessary in some other gardens. No fig. known.

***P. whitei* x *griffithii***

Differs from *P. whitei* by the acute leaves, cylindrical calyx with long acute sepals (fig. 45) and the rather cup-shaped mauve corolla, constricted at the mouth with a marked annulus. There are a few plants of this at Ascreavie, where both presumptive parents self-sow. It appears to be a rather weak clone, and is pollen- and seed-sterile. Although it resembles *P. whitei* much more than the other parent, leaf and calyx characters strongly suggest that it is a hybrid between subsections *Sonchifolia* and *Griffithii*, the only one known: this is the most likely parentage, but other parents are possible. It flowers about one month later than *P. whitei*. No fig. known.

***P. bhutanica*** Fletcher, *Gard. Illus.*, 63:312 (with fig.).

Differs from *P. whitei* by the narrower resting buds, which are more acute, the broader leaves at flowering, which become very dentate and triangular with a marked narrow petiole in the summer (fig. 44), and the faster rate of vegetative spread, with more, smaller rosettes. The calyx is cylindrical, with acute, subdeltoid sepals, which are entire (fig. 45). The flowers are larger (to 32 mm diameter), ice-blue, with a broader yellow eye (7-8 mm diameter). The petals are very variable, from almost entire to markedly dentate or fimbriate.

East Bhutan, west Assam and south-east Tibet, does not overlap with *P. whitei* (fig. 46), 10,000-13,000 ft. High level coniferous forest. First introduced by Kingdon-Ward from Assam in 1935 (KW 11478), then by Ludlow and Sherriff (L & S 1166) in 1936 from Bhutan. Introduced subsequently by the latter on more than one occasion (L & S 2864, L S & E 12021). It was thought that the cutting of the petals was the important character distinguishing *P. bhutanica* from *P. whitei*, and thus the later discovery of a population showing all types of petal dissection (L & S 12299 from the Tong Kyuk Dzong) led Ludlow & Sherriff, and later Fletcher to believe the two species conspecific. However, the population can be seen (BM) to be uniform in other respects, and examination of the type gathering (1166) also shows a variety of petal dissection, which seems to be characteristic of the species. *P. bhutanica* and *P. whitei* are distinct in so many characters, and behave so differently in cultivation and come from different areas, that they

must be maintained as good species, although closely related. Most plants in cultivation are now hybrid, but pure *P. bhutanica* has persisted better than *P. whitei* and is still fairly widespread. It is pollen fertile and frequently sets seed.  $2n=22$ . Figs. *A.G.S. Bull.*, 25:68; *J. Roy. Hort. Soc.*, 91:470. Hay & Syngé, *RHS Dict. Gard. Pls.*:21 (s.n. *whytei* sic.); Clapham, *Primulas*: 82.

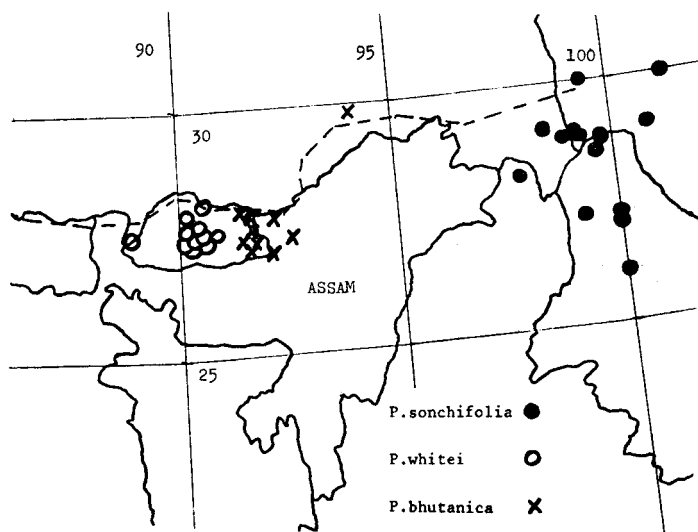


Fig. 46

***P. sonchifolia*** Franch., *Bull. Soc. Bot. Fr.*, 32:266 (1885)

Leaves at flowering to 7 cm, ovate, crenate, farinose, grey or blue-green, shiny-rugose, with a broad white petiole, later elongating to 20 cm, becoming coarsely dentate and lanceolate; resting buds very large, heavily farinose, slightly open and crinkled at the apex, sometimes flowering from the bud. Pedicels, 1 cm thick, borne on an obsolete scape at first, which lengthens during flowering, and becomes very long at fruit. Calyx (fig. 45), short, to 7 mm, campanulate, stiff, very dark and farinose, with suborbicular, almost leaf-like, dentate sepals. Corolla tube short and wide, expanded at stamens. Corolla to 30 mm diameter, ice-blue, blue, mauve or violet, with a stellate deep orange eye which lacks a white border, markedly annulate, the mouth being almost closed; petals entire, rounded.

North Burma, south-east Tibet, Yunnan, Szechuan, 11,500-14,000 ft. (fig. 46). High level alpine grassland on steep slopes; flowering as the snow melts. First discovered by Père Delavay in 1884 at Tali, Yunnan, and later by Farrer and Cox on the Irrawaddy/Salween divide in north Burma in 1919 ('Farrer's ice-blue Primrose'). It seems to have greatly impressed the discoverers and strenuous efforts were made to introduce it. An attempt in 1926 (Kingdon-Ward?) was only briefly successful, but the Governor of Burma, Sir Charles Innes, arranged for seed in thermos flasks (1929) and resting buds in bamboo tubes (1930) to be shipped home refrigerated. This introduction was successful and T. Hay of the London Royal Parks was able to grow and distribute the plant. These seem to have been the only successful introductions from an area which is now inaccessible. In some Highland gardens, the plant does very well and has self-sown in great masses, which are very variable in colour; lavender and even white forms have appeared; the original ice-blue is now rather scarce and perhaps should be selected. Pollen fertile, sets seed regularly and germinates well. Very difficult in northern England, where summer rotting (heat?) seems to be the main trouble: susceptible to root weevil. The resting bud may become rootless, and should be anchored. Figs. *Bot. Mag.* (1936) t.9527; *Bull. A.G.S.*, 2:54; 18:231: 28:21; *J. Roy. Hort. Soc.*, 54:23; 91:470; Clapham, *Primulas*: 84; *Gard. Chron.*, 47:58; 89:168; *Gard. Illustr.*, 63:275.

**Subsection Griffithii** Smith and Fletcher, *Trans. Roy. Soc. Edinb.*, 61:274 (1944).

Resting buds usually small, narrow, closed, at or below soil-surface; leaves entire or crenate at flowering; scapes at flowering long, usually equalling leaves; flowers strongly annulate, of many colours.

***P. griffithii*** (Watt) Pax, *Bot. Jahrb.*, 10:213 (1889)

Leaves at flowering to 10 cm, lanceolate, acuminate (fig. 47), dark green, farinose, later elongating to 20-30 cm, becoming more triangular, and petiolate, margin finely crenulate-dentate; resting bud at soil surface, rather large, acute, reddish, farinose. Pedicels about 4 cm, farinose, borne on a scape which elongates during flowering, finally to 10-20 cm, often increasing to 30 cm in fruit, when it may form apical buds with leaf-like bracts (as in *P. bracteosa*). Calyx campanulate, short, to 7 mm, dark or blackish, with short obtuse or apiculate sepals (fig. 48). Corolla tube short,  $1\frac{1}{2}$  times length of calyx, broad, nearly closed at the mouth with a crimped narrow golden annulus; corolla to 25 mm diameter, royal blue to deep violet-blue; petals rounded, overlapping, emarginate.

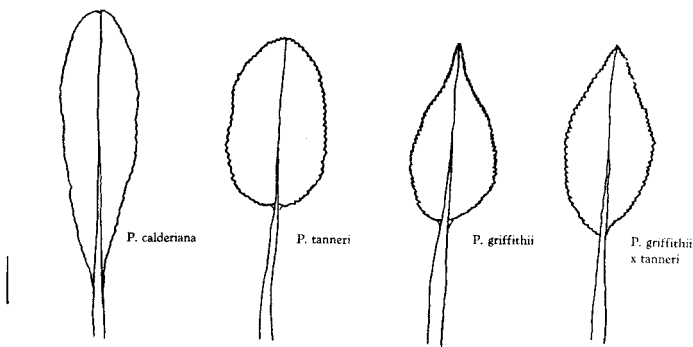


Fig. 47 Spring leaves; subsection *Griffithii*

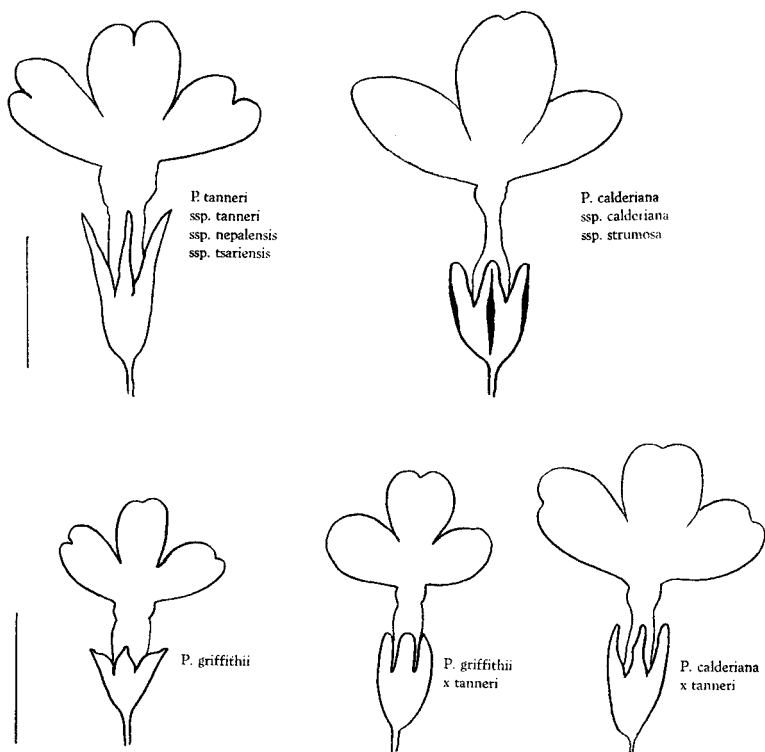


Fig. 48 Species and hybrids; subsection *Griffithii*



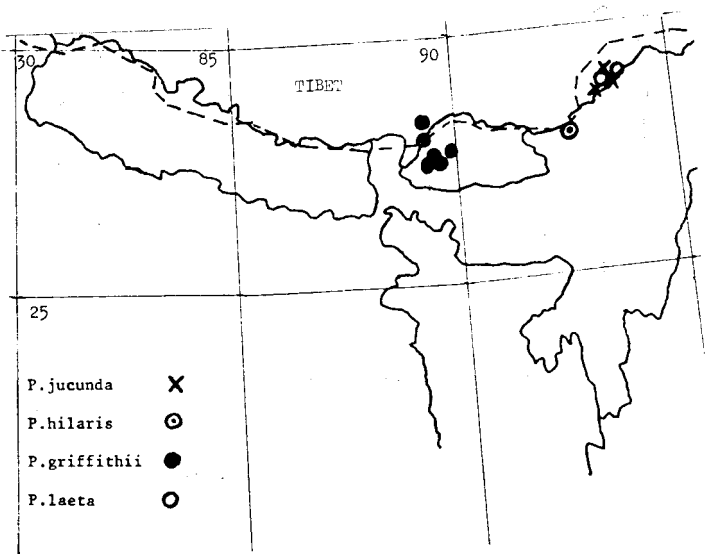


Fig. 49

West Bhutan and south Tibet (Chumbi), 11,500-13,000 ft., among dwarf *Rhododendrons* (fig. 49). First discovered by Griffith in 1837-8, and described by Watt as a variety of the Nivalid *P. obtusifolia*, which in common with this subsection it superficially resembles. Introduced by Ludlow and Sherriff in 1949 (L S & H 19610) as dormant buds flown home. Since then it has persisted and slowly increased in a few gardens, with most at Kilbryde and Keillour. When suited it is very long-lived, but slow to increase. Pollen fertile, rarely fruits, but abundant seed set at Kilbryde in 1975, and many seedlings and some scape-bud propagation thus obtained. Figs. *Bot. Mag.*, NS, t.263; *Bull. A.G.S.*, 21:303.

#### ***P. griffithii* x *tanneri***

Differs from *P. griffithii* through small resting buds at or below ground level, leaves shortly acute, or even subrounded (fig. 47), calyx subovate, not campanulate, with obtuse sepals, to 8 mm (fig. 48), flower mauve, pale purple, royal purple ('Royalty') or white with blue blotches ('Fan-Tail'); more resembling *P. tanneri*; whole plant scarcely farinose. These hybrids were mostly (all?) raised by Jack Drake, probably in the 1950s, and mostly resemble *P. tanneri* more than *P. griffithii*; however, the former has a different shaped calyx and leaves (figs. 47, 48) and

usually different coloured flowers. It is likely that *P. tanneri* subsp. *tsariensis* is responsible for all these hybrids, with var. *porrecta* as the parent of 'Royalty', and var. *alba* as the parent of 'Fan-tail'. They are pollen and seed-fertile,  $2n=22$ . These hybrids are widespread and quite vigorous plants, usually easier to grow than the parents, although they have a slow rate of increase; they are very variable from seed. They flower late (mid-May) and some strains are poor flowering.

***P. tanneri*** King, *J. As. Soc. Bengal*, 55:227, fig. (1886)

Plant lacking farina. Roots orange; resting buds small, greenish, at or below ground. Leaves (fig. 47) to 15 cm at flowering, elongating to 25 cm later, blade dark green, rugose, shiny, crenulate, ovate, obtuse at apex, truncate at junction with long narrow petiole. Scapes almost obsolete at first, as flowers emerge with first leaves, later to 20 cm, greenish, purplish to blackish, pedicels 1-2 cm. Calyx 9-10 mm, cylindrical to weakly campanulate (fig. 48), sepals rather long, narrow, obtuse, unicoloured, equalling corolla-tube. Corolla  $\pm$  undulate, with overlapping petals which are rounded and emarginate, to 25 mm diameter, tube narrowed at mouth by a crimped yellow annulus, lacking white border. Flowers yellow, subsp. *nepalensis* (Smith) Richards, *STAT. ET COMB. NOV.* (*P. nepalensis* Smith, *Notes Roy. Bot. Gard. Edinb.*, 16:228 (1931); *P. strumosa* Balf. f. and Cooper, var. *perlata* Smith and Fletcher, *Trans. Roy. Soc. Edinb.*, 61:305 (1944)).

Flowers purple, subsp. *tsariensis* (Smith) Richards *STAT. ET COMB. NOV.* (*P. tsariensis* Smith, *Notes Roy. Bot. Gard. Edinb.*, 19:211 (1937)). This is scarcely separable from *P. tanneri* subsp. *tanneri*, which has smaller flowers (to 20 mm diameter), a more slender habit, flowers of a pale washy purple, and does not appear to flower from the opening resting bud. Flowers white, subsp. *tsariensis* var. *alba* A. J. Richards (ined.). A fine large bright purple form, subsp. *tsariensis* var. *porrecta* Smith, *Notes Roy. Bot. Gard. Edinb.*, 19:213 (1937) has also been described; this merely seems to be a very good form of this variable species, scarcely warranting recognition.

Examination of a large number of herbarium sheets, especially the fine and well annotated Ludlow and Sherriff gatherings, many of which are accompanied by superb photographs, show that *P. tanneri*, *P. nepalensis* and *P. tsariensis* are very closely related, the latter two differing only in flower colour. It is well-known in section *Petiolares* that species can have yellow or purple flowers (*P. hookeri* Watt, including *P. vernicosa* Ward; *P. chionota* Smith). This also happens in other sections (e.g. *P. alpicola*). It seems that these colour forms are

of incidental importance in a very variable group; some wild populations are polymorphic for both colours, and crosses between them have a wide range of hues: these also occur in the garden. It was decided to retain subspecific rank, as the yellow forms (subsp. *nepalensis*) are distinctly more westerly than the purple (subsp. *tsariensis*) (fig. 50). (See also *P. calderiana*). *P. tanneri* seems no more distinct than *P. strumosa* var. *perlata*, or *P. tsariensis* var. *porrecta*, indeed, it cannot be separated from poor *P. tsariensis*. Thus it has been included in the group, and as it has the prior name, regretfully, the familiar epithets *nepalensis* and *tsariensis* are both reduced to subspecific status.

The species covers almost the entire Himalayan range: subsp. *nepalensis* from west Nepal to east Bhutan; subsp. *tanneri* in Sikkim, Chumbi and west Bhutan, and subsp. *tsariensis* from central Bhutan to south-east Tibet (fig. 50). 8000-16,000 ft., high sloping wet meadows amongst melting snow, often in huge populations. *P. tanneri* subsp. *tanneri* has been briefly in cultivation twice (1910, 1942) but has not persisted. Subsp. *tsariensis* was first introduced by Kingdon-Ward in 1935 from Tsari, the 'Valley of Flowers', south-east Tibet. It was subsequently introduced by Ludlow and Sherriff (1937-8, L & S 3367),

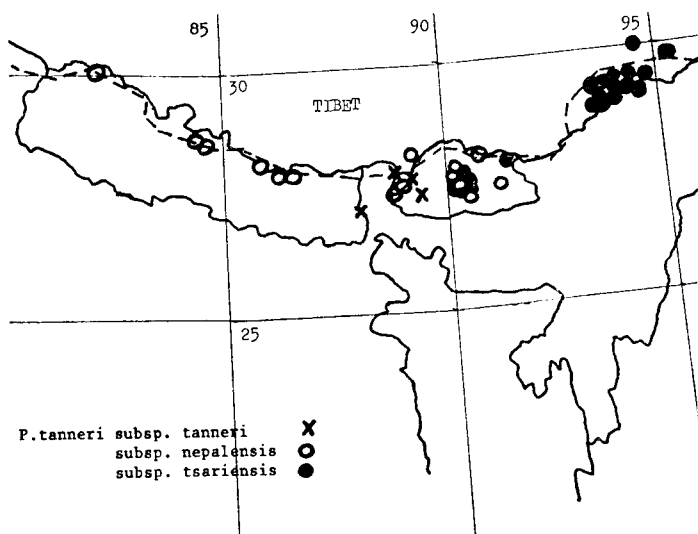


Fig. 50

and again, probably 1949 (L & S 17140). It persists well in Scottish gardens, but very little elsewhere, and most plants are now hybrid with *P. griffithii* or *P. calderiana*. It is pollen- and seed-fertile, and self-sows in a few Highland gardens. Var. *porrecta* is a magnificent plant, probably introduced in 1938 by Ludlow and Sherriff (L & S 3673). There was a large planting of this at Keillour. It still persists in a few Scottish gardens. Var. *alba* is a rather weak plant, which has nearly died out: it was introduced in 1949 by Ludlow and Sherriff (L & S 19835). Subsp. *nepalensis* still survives in several gardens, notably Keillour, Royal Botanic Garden, Edinburgh, and Kilbryde. It is not a strong grower, and seems not to set seed in cultivation, although it is pollen-fertile. It was introduced by Ludlow and Sherriff in 1949 (L & S 21015). Figs., subsp. *tsariensis*, *Bull. A.G.S.*, 7:233; 21:209; 9:324; *Gard. Illust.*, 63:311; *J. Roy. Hort. Soc.*, 91:470; A. Evans, *The Peat Garden*, 46; Fletcher, *A Quest for Flowers*, 96.

***P. tanneri* x *calderiana***

Intermediate between the parents in leaf-shape and calyx (fig. 48), somewhat farinose; pollen rather sterile, seed not usually set; flowers of a wide range of colours including deep purple, mauve, magenta, crimson, apricot, orange, yellow, cream and white.  $2n=22$ . Although intentional crosses between these species complexes have been made (for instance by R. B. Cooke), hybrid swarms have arisen spontaneously with flowers of many colours, within and between both species complexes in some Scottish gardens in which the parents self-sow. Similar swarms were found in the wild by Ludlow and Sherriff (Fletcher 1975). Fig. *Bull. A.G.S.*, 30:64.

***P. calderiana* Balf. f. and Cooper, *Notes Roy. Bot. Gard. Edinb.*, 9:7 (1915)**

Plant farinose, at least on resting bud and scales, and calyx. Roots blackish; resting buds small, greenish, at or below ground. Leaves (fig. 47) to 18 cm at flowering, elongating still further later, blade dark green,  $\pm$  entire, matt, narrowly oblanceolate not distinctly petiolate. Scape elongating to 20 cm at flowering, greenish, pedicels 1-3 cm. Calyx 6-8 mm, campanulate, sepals very short, obtuse, pale and farinose at margin, dark at centre. Corolla scarcely undulate, to 28 mm diameter, petals only slightly overlapping, rounded, entire, or somewhat emarginate (hybrids?), tube narrowed at mouth by orange annulus, lacking white border. Flowers purple, magenta or crimson, with a disagreeable 'fishy' smell, subsp. *calderiana*; yellow, sweet scented, subsp. *strumosa* (Balf. f. and Cooper) Richards *STAT. ET*

COMB. NOV. (*P. strumosa* Balf. f. and Cooper, *Notes Roy. Bot. Gard. Edinb.*, 9:201 (1916)); flowers white, sometimes slightly tinged purple, disagreeably scented, subsp. *calderiana* var. *alba* (Smith) Smith and Fletcher, *Trans. Roy. Soc. Edinb.*, 61:300 (1944).

*P. calderiana*, in common with *P. griffithii*, was first confused with the Nivalid *P. obtusifolia*, and shares a very Nivalid-like aspect. *P. roylei* is the prior epithet, but as Smith and Fletcher show, the type material for this is heterotypic, including true *P. obtusifolia*, and so the later epithet *P. calderiana* must be used. *P. gammieana* King ex Balf. f. is a later synonym.

The situation here is very similar to that in *P. tanneri* in that a yellow western form and a purple or red eastern form cannot be separated as far as I can tell, except on flower colour, and in this case, scent, although I am unable to detect the smell of *P. calderiana*. However, this may reflect human rather than plant genetics. Thus I have decided to lump them as one species with two subspecies, *P. calderiana* being the prior name. The species covers almost the entire Himalayan range, subsp. *strumosa* from west Nepal to south Tibet adjoining east Bhutan, and subsp. *calderiana* from east Nepal to extreme south-east Tibet. Both subspecies 10,000-15,500 ft., but with subsp. *strumosa* mostly 10,000-12,000 ft. and subsp. *calderiana* mostly from 12,000-15,000 ft. Subsp. *calderiana* was briefly in cultivation in 1887, and reintroduced by Ludlow and Sherriff in 1937 (L & S 1754, including white types). It was subsequently reintroduced on several occasions by these collectors, and by Lowndes (L. 1452) in 1950. Recently it has been collected by Beer. It is widespread but scarce in cultivation, where it is pollen-fertile, but rarely sets seed and is not very vigorous. It is variable in colour; there is a very fine cherry-red form. Subsp. *strumosa* was first introduced in 1949 (L & S 19768), and later by Stainton, Sykes and Williams (SSW 3609) in 1954, and more recently by Beer and others. It is pollen-fertile, and regularly sets seed. In some gardens it is permanent and quite vigorous, although does not self-sow with the abandon of *P. tanneri* subsp. *tsariensis*. Hybrids between *P. calderiana* subsp. *calderiana* and subsp. *strumosa* have been found in the field (LSH 19000, LSH 20625) and occur in cultivation. They are variable in colour, from white to purple, including yellows and oranges, and are 100% pollen-fertile. Hybrids with members of *P. tanneri* agg. (LSH 19000) show only about 50% pollen-fertility. A white *calderiana* hybrid ('Wai-Tung') is very strong, and received an AM in 1964. There is as yet no firm evidence for hybrids of *P. calderiana* subsp.

*strumosa* x *griffithii*, which have been claimed; however, these may well occur, but would be separable with difficulty from *P. griffithii* x *tanneri*. Figs., subsp. *calderiana*. *Bull. A.G.S.*, 8:112; 12:36; 43:306; *New Fl. and Silva*, 8:90; *Gard. Illus.*, 63:284; Fletcher, *A Quest for Flowers*: 98. Subsp. *strumosa*, *Gard. Illus.*, 63:311; *J.S.R.G.C.*, 13:292; S. Clay, *Present Day Rock Garden*: 512.

#### ADDENDUM

The following species have been in cultivation, but now seem to be extinct.

*P. hookeri* Watt. (including *P. vernicosa* Ward). A very dwarf high altitude species (10,000-14,500 ft.), widespread from central Nepal to Yunnan and Szechwan: flowers sessile in resting buds, very small, yellow or violet, petals emarginate. This has been in cultivation in 1916, 1938 (Ward), 1949 (L & S 21214) and 1961 (?Lowndes). It appears to be ungrowable. Fig., *Bull. A.G.S.*, 7:234; *Gard. Illust.*, 63:311.

*P. chiogenes* Fletcher. A very beautiful golden yellow relative of *P. sonchifolia* from Tibet was introduced from the type locality by the discoverers (Ludlow, Sherriff and Taylor 3983) and was grown at Edinburgh and Keillour for a short time. It was extinct by 1955. Fig., *Gard. Illust.*, 63:295; Fletcher, *A Quest for Plants*: 172.

*P. pulchra* Watt. (including *P. chamaethauma* Smith and *P. chamaedoron* Smith), a very dwarf high altitude species from Nepal to north Burma, with very large rich blue-purple flowers, allied to *P. sonchifolia*. Introduced under synonyms by Ludlow and Sherriff (L & S 1924, 2373 and others?) from south Tibet in 1936, and again by Mrs. Brough in 1955-6. Grown at Keillour and Edinburgh for some years, but now extinct (by 1965). Fig. *Bull. A.G.S.*, 7:229; *Gard. Illust.*, 63:284.

*P. hilaris* Smith. Similar to *P. calderiana* subsp. *strumosa* but with very large golden flowers and leaf-like sepals. Introduced from the only known site on the Koshing La, where it grows with *P. pulchra*, in 1938 (L & S 2370). Rapidly became extinct.

*P. taliensis*. A species with small, pinkish flowers and *Cortusoides*-like leaves with brown hairs, of uncertain affinity, possibly section *Davidii*, which has been twice introduced from north Burma, in 1934, when it was briefly grown by Hay at the Royal Parks, London, and in 1954 (KW 21564) when it grew briefly at Wisley.

*P. lacerata* has very ragged pink flowers borne on a slender scape, and membranous leaves with orbicular blade, suggestive of section *Mono-*

*carpicæ (malacoides)*. It comes from sub-tropical wet forests in Yunnan and south-east Tibet, from where it was introduced in 1938 (LST 3649). Although vigorous and free flowering at first, and propagating by apical scape buds as in *P. bracteosa*, it had been lost by 1955. Fig. *RHS Primula Conference Rep.*, 4:21 (1928) (as *P. sonchifolia*); *Bull. A.G.S.*, 7:230; *Gard. Illus.*, 63:296; Fletcher, *A Quest for Plants*, 165.

## Primula Exchange

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I GROW about a dozen Petiolaris primulas, species and hybrids, and regularly obtain seed from *Pp. edgeworthii*, *edgeworthii* var. *alba* and *whitei*. I am sure there are members who would like to obtain seed of these plants and who might also have seed of others in the Section, e.g. *aureata*, *griffithii*, *strumosa* that would be of interest to myself and others. For instance, I have never seen *aureata* offered for sale and have so far failed to acquire it.

It is almost certainly useless to offer such seed to the Seed Exchange as its viability is notoriously short. I should be very glad if any members interested in a do-it-ourselves seed (and perhaps plant) exchange of Section Petiolaris would write to me. It should be possible to arrange a rapid exchange of seed immediately after harvesting, say from June to August.

Dr. DENIS HARDY, 3 Carnegie Crescent, Aberdeen

### *Ed. Note:*

Petiolarid Primulas have a very short viability and the best results occur when the seeds are sown "green". Seeds of these species received from the Club Seed Exchange should germinate but with greatly reduced germination.

This venture has the blessing of the President and the Manager of the Angus Group's Seed Exchange.

## Book Review

*Asiatic Primulas*, by Roy Green. Published by the Alpine Garden Society. 163 pp. Price £3.00 plus 30p postage and packing.

In the last few years members of the S.R.G.C. have been expressing the view that there was a need for an up-to-date book on the genus *Primula*, one of the largest, most varied and beautiful of the genera which grace our gardens and alpine houses. This need is now met in part by this book, the first hardback publication by the A.G.S. In part, because Mr. Green deals only with the mainstream of Asiatic *Primulas*, excluding those of the Caucasus and western Asia whose affinities are said to tend to be with the European species and those which have their origin in other parts of the world. However, lovers of primulas of whatever geographic origin will rejoice to know that the Alpine Garden Society has announced its intention to publish a companion volume in which those species of the Caucasus and western Asia omitted from the book under review, together with European and American species, will be described.

The book is subtitled "A Gardener's Guide" and this function it fulfils admirably but, in addition, to enable the amateur botanist to identify those Asiatic *Primulas* he comes across, simplified analytical keys, based largely on Smith and Fletcher's monumental monograph on the genus *Primula*, are provided.

Descriptions are given of 125 species which are either in cultivation or have been in the past and may be reintroduced by present-day collectors, or by obtaining seed from Indian seedsmen. The keys and the descriptions are reinforced by 24 line drawings and 29 half-tone plates. The line drawings are very good, that of the rare and difficult *P. wattii* being particularly fine. A few of the photographs are a trifle disappointing but, at the other end of the scale, some are excellent. It is surprising to find that a species such as *P. denticulata*, which must be known to most gardeners, is pictured both by a line drawing and a photograph. *Pp. edgeworthii* and *reinii* are also illustrated by line drawings and photographs and one must question whether it would not have been better to give only one illustration of each and to include two other species. Is the plant featured on plate X correctly named? It is shown as *P. griffithii* but the "bud" from which the leaves and flowers have emerged suggests *P. sonchifolia*.

There is a good chapter on propagation by seed and by vegetative means. The latter includes leaf cuttings of certain stated species and one hybrid, to which could be added *P. boothii* and *P. 'Pandora'*. This method of increase has been considerably exploited by Mr. R. S. Masterton and Mr. Alex. Duguid, among others, and is a good means of increasing stock fairly quickly. Raising plants from root cuttings is also well described, but one doubts the statement that "most primulas can also be propagated by means of root cuttings". Certainly *Pp. denticulata* and the very rare *wallastonii* can and this reviewer has wondered for some time now whether some of the Petiolarid *Primulas* such as *Pp. edgeworthii*, *whitei*, *gracilipes* and *x scapeosa* might not also be increased in this way. The reason for thinking this has been prompted by finding small seedling-like growths near to the crowns of these plants and above thickish surface roots. Seedlings can be discounted as no seeds were allowed to fall on the pots and, indeed, neither *Pp. gracilipes* nor *x scapeosa* obliges with seed. Perhaps Mr. Green has started something here. Who will prove him right or wrong?

There is also an excellent chapter on general cultivation divided into treatment during winter and in the period spring to autumn. There is, too, much useful guidance on the cultivation of selected species and sections. The plant descriptions also include information as to distribution and habitat in the wild and the latter can often be some guide to successful cultivation.

Mr. Green is to be congratulated on his book, painstakingly put together from his own experience and from much research. He and the Alpine Garden Society deserve bumper sales. It is recommended to those who already grow primulas and to those who don't know this lovely genus but should.

It is obtainable from The Alpine Garden Society, c/o D. K. Haselgrove, 278/280 Hoe Street, Walthamstow, London E17 9PL, price £3.30 by post.

D. L.



# Fritillaria michaelovskyi

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*Fritillaria michaelovskyi* was described by Fomine and this record appeared in Index Kewensis Supplement 3, which covers the years 1901 - 1905.

Mathew states that the plant was first introduced in 1914 from the Kars district of Turkey but died out soon afterwards. It was not seen again until 1965 when Margaret Briggs found it growing "in an alpine meadow near to pines" at 6000 ft. on Sarikamis Pass, south-west of Kars in N.E. Turkey. It was reintroduced under the number MT 4299. The plant illustrated (fig. 51) is from this collection and grown by Harold Esslemont.

Further collections by Albury, Cheese and Watson in 1966 introduced further plants which have proved more amenable to cultivation and the form ACW 1628 shown by Albury was given a Preliminary Commendation in 1969.

The geographical range of this species appears to be Eastern Turkey: from Kars, Van, Hikkari and Erzurum provinces; and from adjacent Russian Armenia.

*Fritillaria michaelovskyi* belongs to the taxonomically difficult *Fritillaria kurdica* complex which is part of the "Graeca" Group of the subsection Trichostylae of Boissier.

It is, however, quite a distinct species with yellow-edged, bluish-purple bells carried on 6 in. stems. Plants are only grown in the alpine house because it is still a comparatively rare but most desirable plant.

R. J. MITCHELL

## ERRATUM

The Editors apologise for the error involving *Fritillaria tubiformis* and *F. michaelovskyi* in the last *Journal*. The illustration was *Fritillaria tubiformis*, a fine photograph by Henry Taylor, whose article on "*A Tour through the Maritime Alps*" appears in the current *Journal*. *Fritillaria michaelovskyi*, which was supposed to have been illustrated, appears with a further note above.



Fig. 51 *Fritillaria michaelovskyi*

Photo—H. Esslemont

Fig. 52 *Ranunculus parnassifolius*

Photo—H. Taylor



# A Tour Through the Maritime Alps

by HENRY TAYLOR

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JUST A stone's throw off the new French auto-route from the Channel you find rare connoisseurs' alpines and warm sunshine only half a day's journey from the Mediterranean beach (St. Tropez and all that). Villages perch ridiculously on hair-raising cliffs which go straight up without horizontal bits, no gentle Swiss-alp cow meadows here.

The wonderful variety of the plants is explained by the many different types of rock all jumbled together in this region. Geologists reckon that Italy was formerly part of North Africa that split away and got pushed across the Mediterranean, rammed into Europe and forced up the semi-circle of the Alps. At the point of impact in the Maritimes, shells and limestone chiselled from the sea floor can be found 8000 ft. above sea level scattered among granite and other rocks.

For the plant life, Farrer's 'Among the Hills' is a wonderful inspiration if you omit the last chapter on Rocca Longa—just a parcel of fiction. Heavier reading is Emile Burnat's 'Flore des Alpes Maritime' in seven volumes and incomplete; it appears that he only got halfway through the plant families when time ran out.

Our technique is to camp in the mountains at the end of June, and early in July. My wife and children locate the finest *Primula* or *Eritrichium*—yes, *Eritrichium*, build a cairn of stones beside it and climb on. The photographer toils behind faintly cursing the frolic wind, carrying a hefty bag of camera tripods and the other small bits which are left behind each time to provide healthy exercise in retracing steps and searching.

Start at Mt. Ventoux just off the autoroute East of Orange. A tarmac road goes right over the top of the 6000 ft. mountain. Beside masses of *Androsace alpina* in the summit scree there are the striking blue-grey leaves and golden flowers of *Crepis pygmaea*. *Papaver radicum* seeds along the roadside gravel. Further down within the tree zone, perhaps around 5000 ft., we found the large white orchid *Cephalanthera damasonium*, also *Aquilegia alpina* with its clear blue flowers looking larger in the wild than in cultivation.

In the Col de la Sine further East there are hundreds of *Lilium pomponium*, each plant carrying two to five sealing wax-red flowers. Farrer, writing about this lily 60 years ago, worried about its extinction due to an English bulb firm sending a squad of men into the Maritimes

to dig up all available bulbs. Fortunately *pomponium* still flourishes in plenty. Beside the lily in this limestone region, we saw *Iris chamaeiris*, only 6 inches tall with deep velvety purple flowers.

Next, to a woodland glade on the Pic de l'Aigle where *Fritillaria tubiformis* (fig. 13 in September 1976 *Journal*) was a most exciting find. Its broad pinky-chestnut bells are much showier than the taller green flowers of *Fritillaria involucrata* seen in the Tende valley. Back to the Pic de l'Aigle where the *Saxifraga* is the short broad-leaved form of *S. callosa*, formerly known as *lingulata lantoscana*, whereas the limestone cliffs of Tende have the finer long-leaved *lingulata bellardii*. On the Pic de l'Aigle we found a very churned up patch of grassland, perhaps wild boar digging for the bulbs of a miniature yellow daffodil tentatively named *Narcissus minor*. Beware the green-eyed flies, they burrow through dark coloured socks and bite ferociously.

On the approach to Mt. Demant discerning campers lay in stores at the friendly old perched village of Breuil, and avoid the brash ski resort of Valberg. *Campanula allionii* clings to the steep scree of Mt. Demant, forming compact show exhibits. Round solid domes of flowers, you would swear H . . . . E . . . . had plunged them straight from his alpine house. Here we came across a very pretty snow-white form of *Ononis cenisia* and a tiny prostrate Bladder Campion with blue-grey leaves matching the colour of the scree. We grit the teeth and prepare for a thirsty twelve hour hike to find *Ranunculus parnassifolius* on the rounded 8000 ft. summit (fig. 52). But the hike is worth the effort; part way down Demant, at approx. 5900 ft., a stream gushes from a cave and the steep bank is covered by thousands of the most gorgeous shell-pink *Allium narcissiflorum*. You might consider a man must be rather peculiar to get excited about an *Allium*, but this is no chive. On elegantly curving six inch stalks there are large showy flowers of gleaming pale pink, quite distinct from the plum-purple *narcissiflorum* of the bulb catalogues. High on the mountain *Berardia subacaulis* has promising silver woolly rosettes centred with a spikey bud, which sadly opens to a dull yellow thistle flower. The white buttercup of this limestone region is *Ranunculus seguieri*, like a smaller rather flattened version of *Ranunculus glacialis*.

Strengthened by the health giving spa water of St. Martin Vesubie, full of calcium, magnesium, iron, etc., we motored to Madonna de Fenestre and climbed the path to the col. Growing on red granite on the southern side of the 'window', *Primula marginata*. Why is the first specimen so inaccessible to the photographer? Subsequently in

the Maritimes we found *marginata* at ground level and under trees and growing on limestone. On the other side of the 'window' the bright pink hummocks are *Thlaspi limosellifolium* now classified as just a long-leaved form of *rotundifolium*. Perhaps in herbarium specimens the brighter pink flowers of *limosellifolium* are not noticed. One of the choice plants of the Fenestre granite boulders is *Phyteuma hemisphericum*, only three inches tall with bright blue flowers and short thin leaves. Round the foot of these boulders Parsley fern flourishes. There are of course all the commoner alpine plants like *Primula viscosa*, *Soldanella montana*, Crocus and Gentians. I wish these were common on our Scottish mountains.

Finally, the 'Valley of the Witch', the most delectable spot in all the Maritimes; we camped carefully under a Rowan. Again, common or garden alpine plants like *Liliums martagon* and *bulbiferum*, but the extras here are very special. On the shady south side *Eritrichium nanum* in brilliant blue bunches tempts photographers onto horrible crumbly cliffs. (A Wratten 82A filter helps to record the true colour.) Cracks in the granite on the northern side contain Farrer's revered 'Ancient King', *Saxifraga florulenta*. In early July lots of rosettes were just starting to send up flower spikes. This of course started the most tremendous search. Normally timid folk shot up vertical cliffs in every direction and were rewarded by one white flower. Some books state purple to be the usual colour, yet John Duff's plant was also white when it flowered this year (exceptionally rare for *florulenta* to flower in cultivation). Farrer must have the last word on the 'Ancient King': 'There are not so very many people living who have set eyes on *Sax. florulenta* among its native cliffs. Its haunts are very high, very remote, tedious and difficult to attain. The cracks and cliffs where it dwells are not smooth places where the inexperienced will be glad to tread. . . . My companion who had suffered tremors and descended the side of the cliff so gingerly, now went skipping and leaping heedlessly onto pinnacles and across gulfs that might have made a goat sick in its stomach. The fact remains that on a mountain among the plants you want, terrors vanish clean out of mind'. The spiral leaf formation is one of the characters which leads botanists to consider that *Sax. florulenta* is a remnant of the ancestral type from which other Saxifrages are derived. Little thin ribbons of *Sax. retusa* grow in the cracks beside *florulenta*. On the Barre at the end of our valley *Viola nummularifolia*, another exceedingly rare endemic, sends up from the scree tiny round leaves and neat blue flowers. *Saxifraga pedemontana*, the finest of the Mossies,

grows against the dark cliff with large showy white flowers over thick fleshy leaves. All around the Alps *Chrysanthemum alpinum* can be found, but guess where there is the most marvellous form with flowers which as they age, gradually suffuse all over in warm pink. A clue to the spot is Gravures Rupestris, not some exotic plant but rock engravings dating way back to 15,000 B.C. Curious figures and symbols formed by a series of small holes in a smooth red granite cliff away in a remote valley. Forget mist and sudden icy hailstorms and enjoy *Tulipa australis*, elegant and refined with a warm reddish tinge to the outer yellow segments. *Australis* in this case refers to the south; it does not hail from Australia. We found *Dianthus neglectus* in dwarf stemless forms and large frilly petalled forms. Another good plant is *Ranunculus pyrenaicus*, many with big solid semi-double flowers, not the usual pale thin thing. This Maritime Alp form is sometimes classed as sub-species *plantagineus*. Very few flowers were borne on the yellowish incurving rosettes of *Jovibarba allionii*, whereas the snowy silver *Sempervivum arachnoideum* was covered in rose red flowers. *Dryas octopetala* made a neat surround to limestone outcrops.

The 'Valley of the Witch' is the place, do not be tempted into the Cairos. To penetrate this jungle we had to wade along the river and make short sorties up either bank. There are few plants of consequence, and if the fish farm guard dog doesn't get you, the giant brambles will.

## St. Andrews Discussion Weekend Show 1976

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THE AUTUMN SHOWS appear to be getting better and better as the years progress. Certainly at St. Andrews the remark by the Chairman of the Joint Rock Garden Plant Committee that it was one of the best he had seen for many years, does great credit to those who exhibited so many first class plants. Despite the worst September weather for many years, the standard of flowering plants was excellent.

D. F. Mowle from Lancaster won the East Lothian Trophy for 3 Rock Plants with *Cyclamen cilicium*, *Origanum amanum* and Wada's form of *Saxifraga fortunei*. A close runner-up was Mr. and Mrs. Henry Taylor with *Cyclamen purpurescens*, *Sarcocapnos crassifolia* and *Primula ellizae*. There were three very good plants in the new, rare

and difficult class, which was won by an old favourite—*Haastia pulvinaris* shown by Harold Esslemont. Eric Watson, Newcastle, exhibited *Gentiana depressa*, a plant reintroduced by Dr. George Smith from Nepal. This plant attracted much interest and had squat campanulate pale blue flowers. The Bronze form of *Celmisia coriacea* shown by Margaret and Henry Taylor was third in this class.

Autumn colour was very much in evidence and two plants were outstanding. A 6 in. pan of *Shortia ilicifolia* var. *soldanelloides* shown by David Livingstone won the autumn colour class in Section I, while *Sorbus reducta*, resplendent in autumn colour and covered in berries, won the dwarf shrub class for Mr. and Mrs. Chambers in Section II.

The silver foliage class attracted a good entry and the prize-winning plants were *Senecio leucophyllus* shown by Mr. and Mrs. H. Taylor; *Raoulia x loganii* exhibited by Harold Esslemont; and a 10 in. pot of *Celmisia sessiliflora* 'Mt. Potts Form' beautifully grown by Malcolm Adair.

*Sagina boydii* exhibited as a cushion plant by Mr. and Mrs. H. Taylor was of considerable interest. It is not a common plant and is rarely seen on the show bench. It was named after Dr. Boyd, who found it in the early years of this century.

*Raoulia eximia* was shown by several members. Most of them were good-sized plants.

Dwarf conifers are very popular with exhibitors and it was good to see so many fine plants. *Juniperus echiniformis* and *Cupressus macrocarpa* 'Pygmaea' shown by Jack Brownless winning the two pans dwarf conifer class but with stiff opposition from Mrs. Joan Stead with *Chamaecyparis obtusa* 'Nana Lutea' and *Cryptomeria japonica* 'Spiralis'. The single dwarf conifer class attracted six entries. Of these *Chamaecyparis obtusa* 'Hypnoides', *Cryptomeria japonica* 'Knaptonensis' and *Microcachrys tetragona* exhibited by David Livingstone, Mrs. Betty Ivey and Mrs. Kathleen Hall respectively were awarded prizes.

The rarely seen dwarf shrub *Trochocarpa thymifolia* from Tasmania, belonging to the Epacridaceae and shown by David Livingstone won its class, with a beautiful plant of *Ilex crenata* var. *mariesii* grown by Mrs. Joan Stead and the lovely flowered *Grevillea alpina* exhibited by Mr. and Mrs. H. Taylor gaining the second and third prizes.

The fern classes, too, attracted a good entry and it was good to see a fine collection of many species. *Asplenium trichomanes* 'Cristata' in a 6 in. pan and shown by Jack Brownless won this class with *Chiel-*

*anthus gracillima* and *Pityrogramma triangularis* exhibited by Henry Taylor and Mike Stone respectively.

Cyclamen were prominent in the Show as one would expect and the standard of cultivation was exceedingly good. The Forrest Medal was awarded to *Cyclamen rolfsianum*, a superb plant in a 10 in. pot and with over 30 flowers. Members south of the border will be pleased to learn that this is one of the late Mrs. Saunders' plants and being grown exceedingly well by Jack Crosland. A Certificate of Merit was given to *Cyclamen cilicium* var. *alpinum* grown by Mrs. Betty Cormack. This too was well flowered and did great credit to the grower. In Section II *Cyclamen hederifolium* won a Certificate of Merit for Arthur Holman from Milnthorpe in Cumbria. This was a magnificent plant covered in flowers and grown in a 12 in. pot.

Mike Stone won the Peel Trophy for three Gentians with *Gentiana farreri* seedling, *Gentiana sino ornata* 'Autumn Frolic' and *Gentiana stragulata*. *Gentiana sino ornata* gained the other awards in the single pan class.

The classes of Rock Plants not eligible for Classes 9 to 24 brought out some interesting plants. *Pratia angulata* and *Cyananthus microphylla* exhibited by Mr. and Mrs. Taylor was placed first in the 2 pan class while Mrs. Joan Stead produced *Arenaria norvegica* and *Rupicapnos africana*. In the single pan class *Viola yakusimanum*, *V. hederacea* and *Chaenorhinum glareosum* were exhibited.

*Chaenorhinum glareosum* is a Spanish high alpine plant closely related to the genus *Linaria*, with pinky-lilac-coloured flowers.

The Logan Home Trophy for the miniature garden was won by Henry and Margaret Taylor with a beautifully constructed trough. (See Autumn 1976 *Journal* for details of construction). They also won the Mary Bowe Trophy for most points in Section I.

The Wellstanlaw Cup was awarded to Mrs. Isobel Simpson for an arrangement of flowers cut from the Rock Garden with Gentians, heather, berberis, Juniper, *Shortia* and *Ruta*.

Section II always seems to be poorly supported, although there were some fine plants shown. The *Cyclamen hederifolium* and *Sorbus reducta* have already been mentioned but the best plant in this section was a magnificent plant of *Calluna vulgaris* 'H. E. Beale' grown in a 12 in. pot and in perfect condition. It was a worthy winner of the East Lothian Cup for Mr. and Mrs. J. Chambers.

Mrs. Jean Wyllie did well in this section and, having gained the desired number of points, was awarded the Club Bronze Medal.



I would like to record the thanks of the Weekend Discussion Committee for the most generous support for the plant stall with books and plants. My special thanks to Mrs. Margaret Taylor for donating a superb miniature garden, constructed and planted by her for the raffle. And to my Committee for all their help, a special thanks.

R. J. MITCHELL

## Angus Group's Seed Exchange

WE ARE, at this date, more than half way through the orders for seed and have managed to give members a fair selection of 'first choice' numbers. Whether the later orders will be as well accommodated remains to be seen as although we had more varieties in the list the quantities of seed were less. We have had a few complaints from members who packet the seed about the amount of dirty seed they have had to deal with. Having cleaned their own contributions, it must be very trying to be given about 250 varieties to packet and find a lot of them require cleaning! One or two elderly contributors have notified us of difficulties due to failing eyesight. We are delighted to help them, but others might have some consideration for the packeters. We do like to send our members seed and not rubbish.

Perhaps some more home members would like to collect seed of spring-flowering bulbs. They are in great demand from overseas members. The snowdrop seed we had this year vanished like snow off a dyke, as did Cyclamen, rarer varieties of Narcissus and Crocus, *Iris histrioides*, etc. We had many orders for Douglasias and Cassiopes and very little seed to satisfy them, and of course Androsaces, Primulas, Fritillarias, Pleiones and Gentians are always very popular.

The exchange is getting larger every year and so will require more contributors. Ripe seed is not difficult to separate from husks. New members who would like to contribute might find a reprint, from the September 1975 *Journal*, on cleaning seed helpful. It can be obtained by applying to me.

On behalf of the Rock Garden Club I would like to thank the members who help the exchange in any way. I know from letters I receive that their work is much appreciated. We are also indebted to Mr. Evans of Edinburgh Royal Botanic Garden and Mr. Mitchell of St. Andrews University Botanic Garden for advice and assistance.

JOYCE HALLEY

# Plant Portrait—*Daphne jasminea*

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IN THE literature of daphnes, *Daphne petraea* has rather stolen the limelight to the disadvantage of other attractive species.

*Daphne jasminea* (fig. 54), a native of Greece, is one of them. Its historic site is on the cliffs below Delphi, where it emerges from cracks in the rocks and proves as difficult to dislodge as its relative from the Cima Tombea.

When on tour in the Peloponnese in 1973, Ken Aslet's eagle eye discovered it growing on rocks on a promontory near Perachora. Doubtless it can be found elsewhere as it is a plant easily missed when not in flower.

Reginald Farrer evidently approved of it when he wrote "*Daphne jasminea*, in the rocks of Parnassus and Euboea, claims twinship with *Daphne petraea*. For it makes the same minute and prostrate mat of twisting brittle branches set with very tiny oval spoon-shaped leaves, setting tight to the depressed compacted shoots, and of a blue-grey tone that beautifully enhances the beauty of the two or three waxen trumpets in which each of these shoots terminates—delicate sweet tubes of pink outside and four-pointed stars of white as they open—blossoming with equal zeal in spring and again in autumn."

Most daphnes in the wild seek lime and my method of cultivation of *D. jasminea* is as follows.

The potting mixture is composed of half soft tufa lumps and half gritty ericaceous soil with a little bone meal added and the surface of the pot is finished off with a platform of hard tufa round the neck of the plant.

The small twigs are very brittle and as all daphnes resent root disturbance, I generally break the old pot when potting on. As it is a true crevice plant, I like to keep the potting tight and only pot on every second or third year.

Growth is much more rapid than with *Daphne petraea* and a good plant can be built up in about five years.

Propagation is by cuttings of half ripened wood, or grafts can be made on *D. mezereum* stock. Personally, I prefer plants on their own roots.

This daphne would not be hardy out of doors in Scotland; to date however it has survived happily in an unheated alpine house.

H. ESSELMONT

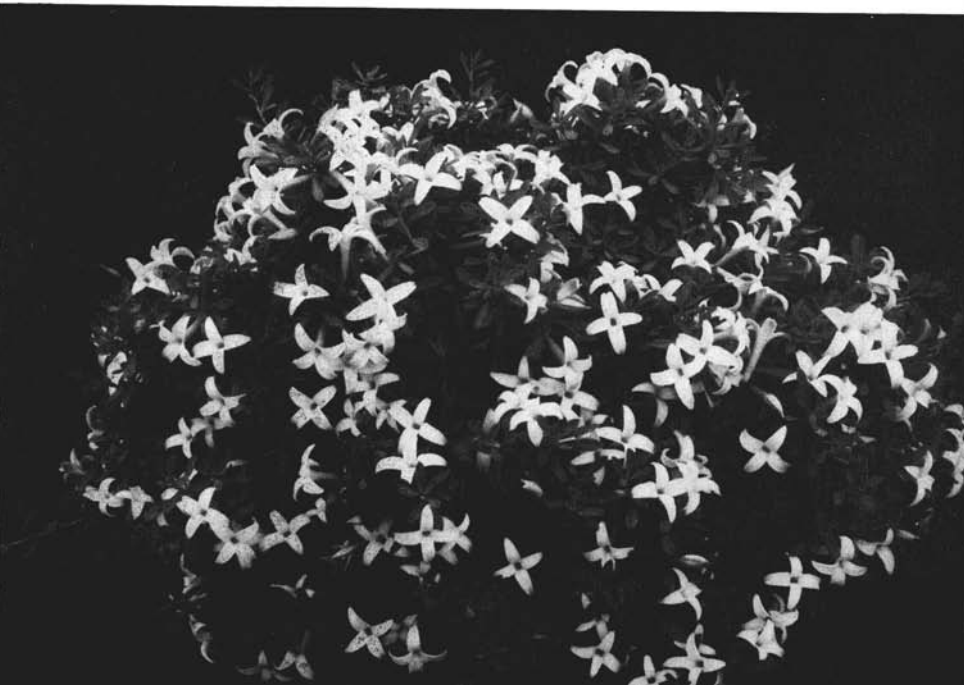


Fig. 53 *Pulsatilla vernalis*

Photo—H. Esslemont

Fig. 54 *Daphne jasminea*

Photo—H. Esslemont



# Three Fuchsias for the Rock Garden

by BRIAN HALLIWELL

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*Fuchsia magellanica* extends southwards along the coastal strip of Chile to Tierra del Fuego. It is the commonest species grown out-of-doors throughout Britain, being the hardiest, and will grow in all but the coldest gardens. It is particularly abundant near to the sea where it is often planted as hedges. Usually it is one of the tall upright forms that is grown with varying colours and size of flowers and foliage (it always seems that the size of the flowers are too small in proportion to the other aerial parts of the plants). Less commonly known is a procumbent form *Fuchsia magellanica prostrata* which is well suited to the rock garden. Like all Fuchsias it needs a moist soil which does not dry out, prefers light shade and needs to be planted high where it can fall over a rock to allow the form and beauty of its flowers to be appreciated. Flowers are of a typical fuchsia colouring with outward-spreading red sepals and downward-pointing petals of bluish purple; in this form the size of flowers seems to be more in proportion to the rest of the plant. It is easy to propagate from cuttings of soft growth taken in early autumn; non-flowering shoots root best, produced when a few shoots are cut back a few weeks before the cuttings are to be taken. Hardwood cuttings taken during the winter will root with reasonable ease and have the advantage of not requiring special facilities for propagation.

Another hardy Fuchsia is *F. pumila*, often classed amongst the forms of *F. magellanica* but considered by some authorities to be a hybrid. This is a true dwarf and rarely exceeds 9 ins. (228 mm) and all parts seem perfectly proportioned. Its typically coloured flowers are produced as are all others from summer until the arrival of cold weather. Propagation is also by soft cuttings taken in early autumn.

*Fuchsia procumbens* is a species in its own right and comes from the North Island of New Zealand. This species has prostrate wiry stems and, unusual for a Fuchsia, alternate heart-shaped leaves. Flowers which are erect have no petals and the sepals are reflexed. Colouring is rather subtle and of many shades, yellowish or orange splashed with

red, purple and green. Whilst the flowers are unusual, curious and certainly have appeal, the real beauty in this plant is in its fruits. These are quite large for the size of the plant, being about  $\frac{3}{4}$  in. (20 mm), pink at first but deepening in colour as they ripen. Fruit is retained long after the leaves have been shed and continue to keep their colour until frosts cause them to turn brown and mushy.

The plant is reasonably hardy out of doors in Britain in all but the coldest gardens. It succeeds best in an acid, sandy soil with some organic matter that does not dry out during the summer. It grows and flowers most freely in light shade, although in the hot dry summer of 1976 it survived the drought admirably, but flowering has been sparse and there has been no fruit set. It is invariably short-lived, so annual propagation is advisable. When fruit is set, seed provides an easy means of increase, although cuttings taken during the summer are not difficult to root. This plant is often grown in pans to provide a display in the closing months of the year in the alpine house, for the fruits are retained for a long time if not frosted.

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## **AG 33: SWITZERLAND—KANDERSTEG**

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Until the building of the Loetschberg railway, Kandersteg was the only link between the Oberland and the Rhone Valley, over the Gemmi Pass. The hotel where we stay is a little away from the main village and is situated in meadows and forests where, as in the higher reaches (there are two cable cars) are to be found some of the most interesting flora in this part of Switzerland. Views are dramatic and are dominated by the great glaciers that descend from the Blumlisalp. Mr Michael Upward leads the tour.

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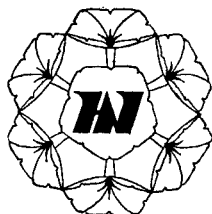
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