

American Rock Garden Society Bulletin



LINNAEA BOREALIS — <i>Frances Kinne Roberson</i>	37
PLANT HUNTING IN MONGHOLIA — <i>Ing. Vladimir Vasak</i>	39
THE LOW ALTITUDE ERITRICHIUM — <i>Claude A. Barr</i>	48
VIEWS ON A PLASTIC ALPINE HOUSE — <i>Elizabeth Nunn</i>	50
THE ALPINE HOUSE — YES! — <i>Bob Woodward</i>	51
NOTES FROM THE NORTHWEST — <i>Dorothy Metheny</i>	54
PHYTEUMA COMOSUM - <i>Bohumil Janouch</i>	56
AMERICAN VIOLETS — A SECOND CALL — <i>Doretta Klaber</i>	58
THE PROPAGATION OF DWARF AND PYGMY CONIFERS FROM CUTTINGS — <i>Joel W. Spingarn</i>	59
GARRYA ELLIPTICA	65
OMNIUM-GATHERUM	66
BOOK REVIEW — <i>John C. Lambert</i>	68
REQUESTS BY MEMBERS	69

AMERICAN ROCK GARDEN SOCIETY BULLETIN

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No. 2

LINNAEA BOREALIS

FRANCES KINNE ROBERSON, *Seattle, Wash.*

The unassuming, almost retiring, nature of *Linnaea borealis* belies the esteem in which it has been held even from the time of Linnaeus who became enamored of it when he saw it in Lapland in the early eighteenth century. It also grew in the pine forests near his home in Uppsala and is now the official flower of the province of Smaland in which Uppsala is located. We are told that Gronovius named this plant for Linnaeus at his own request. So the man who gave modern botany a system of classification honored the Twinflower and it continues to honor him.

It accords him praise as it carpets the woodland floor with burnished green and bronze foliage, as it competes with blackberry vines and grass for a foothold on logged-over land, and as it produces the pairs of honeysuckle-like flowers which appear as tiny pink lamps guiding elfin royalty along their fairy paths.

Here in the Northwest we often see hanging masses of bronze Twinflower foliage trying to erase man-made scars where roads have been cut through the forest leaving bare soil exposed on either side. Not as amenable to sun as *Arctostaphylos uva-ursi* is for this purpose, nor as rapid in coverage as *Gaultheria shallon*, nevertheless *Linnaea borealis* creates beauty where man has left a blank.

The roots of *Linnaea borealis* often grow in damp moss or in decaying wood and present a perplexing problem for the plant hunter. It is possible to remove a section — whimsically called a sod — of plant by cutting a six inch to ten inch square, slipping a spade under it completely and removing it to a flat container for transporting to the home garden. There it may be set a trifle deeper than where it grew, pressed in firmly and covered lightly with a loose top dressing of peat moss or, better still, forest duff worked down under the leaves. Soil slightly on the acid side is considered preferable.

Cuttings are the easiest method of propagating *Linnaea borealis*. Each

*Linnaea borealis*

Dr. David Metheny

cutting should consist of a leaf stem and some of the running root-stalk either side of its base. Equal parts of sand, peat moss, and perlite have proven a good mixture for the rooting medium. Bottom heat is helpful. If made of soft wood in early to midsummer, roots should be developed in time to pot up by fall. Some protection may be needed the first winter, either under glass indoors or under open branches outdoors.

Layering is a common practice also. The runners which usually travel on or just above the surface will root if gently pegged down into a moist soil or a peat moss mixture. Bent wire is usually used for this purpose, but an alternate method is simply to weigh the runner down with a small rock. These sections will establish new plants when rooted and then severed from the parent. Of course it helps considerably if the old plant is in a good healthy condition. Success is more probable then. Nowhere do I find an actual account of propagation with seed.

Linnaea borealis is circumpolar in distribution. Charles V. Piper referred to *Linnaea americana* as a species with a range "Alaska to Newfoundland, south to Oregon, Colorado and Maryland" but subsequent botanists list only the one species, *Linnaea borealis*. The names *L. b.* var. *americana* and *L. b.* var. *longiflora*, usually considered synonymous, presumably apply to the more robust plants with brighter colored flowers found in North

America, particularly in the Northwest. The European form, in contrast, is the species itself and reputedly more difficult to grow. One catalogue lists *L. b. var. nummularia* and describes it as being easier to grow and having larger, still deeper-colored flowers.

This evergreen trailing shrub in any form responds to a moderate amount of moisture and shade. It will tolerate dense shade but the carpet it weaves is then apt to be thinner and greener. It likes to trail over a mossy rock or log. The round or ovate leaves are borne in pairs and vary from being dentate to entire. The flower stem divides at two or three inches above the creeping stem and from each of the one-inch pedicels thus formed hangs a tubular, slightly fragrant flower. Thus is created a whole realm of paired flowers and Twinflower is the natural familiar name for the Lilliputian gem—*Linnaea borealis*.

PLANT HUNTING IN MONGHOLIA

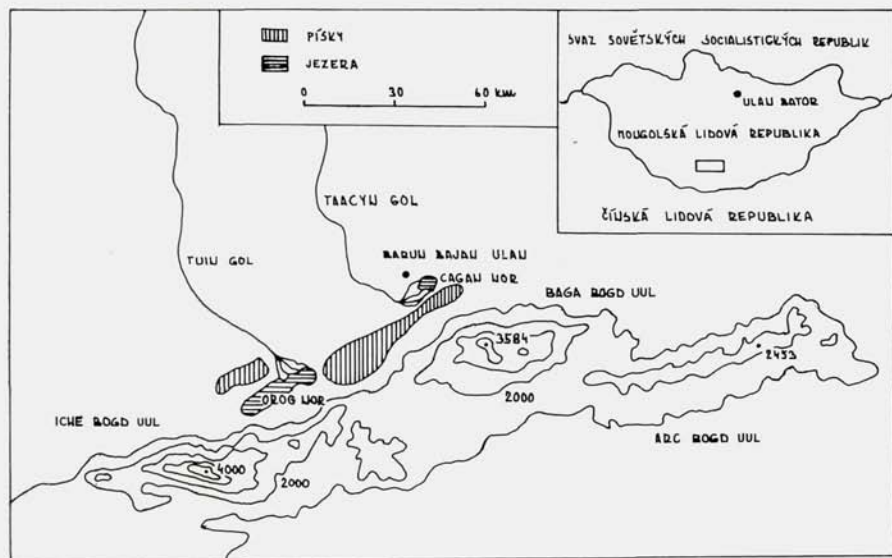
ING. VLADIMIR VASAK, *Pruhonice, Czechoslovakia*

(Editor's Note)—The author, Ing. Vladimir Vasak, of the Botanic Gardens of the Czechoslovakian Academy of Sciences, Pruhonice, Czechoslovakia, in writing of his plant explorations, uses his own language. Mr. Vaclav Plestil then translates these manuscripts into English and sends them to the Bulletin editor, who, in many instances, wishes that he could retain the exact wording of parts of the translation in order to preserve their charm and picturesqueness, but who, in the interests of more formal English, finds it necessary to make some changes. However, when the exact wording is retained, in spite of the apparent need for change or clarification, italics are used. Throughout these Vasak articles the geographical names are spelled as in the translation. As an example: Mongolia's capital is Ulaan Baator in the article. A National Geographic map shows it as Ulan Bator (Urga), and Webster's Geographical Dictionary gives the capital as Urga or Ulan Bator Khoto, the latter being the native word for "town." So, in the interests of uniformity Mr. Plestil's spelling is retained rather than some Americanized form).

1. Alpines of Baga Bogd uul

I was very happy that in August, 1966, I could visit mountains of the Gobian Altai, particularly the Baga Bogd range, as a member of the expedition whose members represented the National Museum, the Biologic Institute of the Mongolian Academy of Sciences and the Botanic Gardens of our own Science Academy. With me was another botanist, J. Sojak; an entomologist, J. Dlabola, and the zoologist was J. Dovcin. As we wished to visit and admire the many floral gems of this lovely area, we had to travel from Ulaan Baator, the main town of Mongolia, nearly 1500 km. Although our maps showed us that the direct distance was much shorter, only about 700 km, our way, going over the mountain steppes, around many salt bogs, and later climbing among hills and ranges of the Changaian Mountains, was twice as long.

In Mongolia, no plant lover or alpine gardener need have doubts as



Area of Baga Bogd uul in Mongolia

to whether or not the plants which he meets at every step are true alpine, for the larger part of this country is situated very high above sea level. The average elevation here is 1580 m.a.s. Alpines are present nearly everywhere. For example, you may see *Leontopodium campestre* (Ledeb.) Hand. Manz. growing wild in the neighborhood of houses at the edge of Ulaan Baator.

I shall not describe our way to Lake Cagan-nor (White Lake) which took us four days, although it was something quite unusual for a European. Rather, I should like to begin by telling of the next part of our journey to the mountains of the Gobiian Altai. The way was difficult. From Barun Bajan Ulan to the lower parts of the Baga Bogd uul (in Mongolian this means the Small Saint Mountains) we traveled more than 30 km over swamps, bogs; even over numerous branches of the delta of the river called Taacyu Col. Then there was over 20 km of desert, covered by moving sand, to be traversed. Because of these obstacles, we could not use our terrain car. Finally, we changed it for horses. But these horses which we borrowed were driven by Mongolian herdsmen directly to the village green. Some of them were wild, but soon became tame enough and manageable even for such "cockney riders" as we were.

The Mongolians, all being of small stature, have accordingly small harness and saddles. I had some trouble with my 178 cm in height, with the stirrups too short for me, and as a result of this ride, weighed down with my heavy rucksack containing only the most necessary gear, as I was, I acquired many ugly blisters. But, finally, we reached the foot of the mountains, whose highest peak is Manga Jamat, 3584 m high. This peak certainly attracted us. In Mongolian, the mountain's name means "Thousand Capricorns." As often happens on such expeditions there was only one day which we could devote to climbing and plant hunting.

The other botanist, J. Sojak, and I began our long climb before five

in the morning (before daylight). We carried only what was necessary for plant and seed collecting and some food. During the first few hours we kept together in one valley, but later each took his own way. At Last! I was in the magnificent and mysterious Baga Bogd Mountains quite alone. But to tell the truth, not quite alone. These mountains were full of various forms of life. At the opening of one valley I met the dauric partridge which distracted my attention by feigning lameness to save the young ones. In the upper elevations I often heard the barking-like voices of marmots from the slopes and screes above me. I remembered that the Russian name for these animals translates into "mountain dogs." Climbing far up I heard many times the ringing, sonorous voice of the bird allied to the pheasant, but by its ecology nearer to the wood grouse. It is the altaic ular (*Tetraogallus altaicus*). At elevations from 2500 to 3000 m.a.s. I watched the majestic eagles, the true airy rulers of these mountains.

Into these mountains I progressed by the complicated system of gullies, ravines, being led by boisterous creeks which from time to time disappeared under giant stones and banks. The way up was not easy, and I was sorry, many times, that I had not exercised in an elementary alpinism. But I wished very intensely to climb up to the highest top of these mountains. Anticipating the most interesting and rare plants, I climbed up over screes, grassy slopes, banks and stones, rounding waterfalls and cascades. Then after many hours of this long and tiring way, I stood on the top tower-like rock of the stately Manga Jamat, 3584 m.a.s.—an unforgettable sight! I saw from there far to the Gobian deserts, saw afar the wonderful mountains, Nemegt uul. I was full of joy because of a full bag of good and attractive plants, and what was even better, the pockets of my anorak were crammed full of packets of the rarest seeds.

What have I seen during my trip over slopes, screes, among rocks and along stony river beds? It was August 20—the most interesting day of my "botanical life." At daybreak, in the submountain zone, I met the eye-catching, grayish, densely rounded mats with tiny white flowers—*Androsace incana* Lam. The Mongholians call it in their language "dalan tobchi," i.e. "seventy buttons," and truly the flowers of this plant resemble freely scattered convex buttons. There is a second Mongholian name, "ucher nud" (translated as "eye of cow"), and it is a fitting name. This androsace does not grow in large clumps or mats; it makes colonies. The flowers on 3-5 cm high stalks are yellowish-white or creamy. It inhabits gravelly slopes, and during its blooming period it gives its characteristic color to large areas. It is widespread only in the mountains of Mongolia and neighboring areas. The only other member of the Primrose family I found at lower elevations was *Cortusa altaica* A. Los. It grew in the shady, moist bank crevices and is closely related to the well-known European *C. matthioli*, and is found from the Ural area to Baical and Mongolia.

In one dry stream bed I found several nice clumps of *Panzeria lanata* (L.) Bunge, a member of the Labiatae, another eye-catching plant, widespread in Mongolia. It has many local names, among them "galus tavag," (the duck foot), evidently from the shape of the leaves. It is a plant to 30 cm high, covered with dense, white hairs, with leaves grayish on the surface and lanate below, with big, pale whitish-yellow flowers arranged in ovate,

dense inflorescences.

Also I found the well-known *Thymus serpyllum*, and the striking, rich blue *Scutellaria grandiflora* Sims. with leathery leaves, not too large, with slightly involucrate margins. Not less interesting was the subshrub *Dracocephalum fruticosum* Steph. with top inflorescences of good blue-violet flowers and with tiny whorled leaves, each at its top with a short spin.

I venture a few words on *Allium altaicum* Pall., though it is not a true alpine, but a plant of the scree and gravel slopes, resembling very much our edible onion, even to taste. In Mongolia it is used the same way. It is quite hardy and long-lived. Sometimes it is hard labor to dig out the bulbs which weigh up to 100 grams. They are some 10-30 cm deep in the gravelly soil of the scree. I have eaten this onion often with good appetite, for I could not bring with me much food. The weight I could carry in my knapsack was naturally limited as I wanted to climb to the upper zones in search for smaller and more lovely plants. Previously bulbs of *Allium altaicum* were exported to China in large amounts and sold there in the markets. The only other plant of the Liliaceae that I found was the ubiquitous *Lloydia serotina* (L.) Rchb., which is known from all the mountains in the Northern Hemisphere. Junatov (1954) wrote that this plant is appreciated in pastures by yaks (*Bos gruniens*).

The first endemic plant of the Gobiian Altai I found in the rocky valley of a stream in the mid-zone of these mountains was *Valeriana saichanensis* Kom., not too showy in the first specimens which were past blooming and growing in shaded places close to the stream, but as I climbed higher, I kept finding it until at 3000 m.a.s. it was very pretty with an abundance of violet flowers in full sun. It is a very attractive valerian.

On dry stony slopes and screes I collected plants and seeds of *Iris tigridia* Bunge, in Mongolian called simply "bag cachildag" (small iris). It has very narrow leaves up to 10 cm long, thick, horizontal rootstocks, adpressed in crevices, and only one large purplish-violet flower. This iris inhabits the Mongolian mountains and the nearest mountains in URSS. It is a plant of early spring, flowering in the wild in April and May. I was so happy to find one plant with a retarded flower, though the seed harvest was very poor. But I collected living plants and will have to wait, hoping that they will be content with our conditions.

Of the family Compositae in the lower parts of the mountains, in sharply cut valleys were to be seen clumps of *Aster altaicus* Willd., mostly in the vicinity of marmot lairs, usually on naked ground dug out by the marmots. *Aster altaicus* is a low-growing, hairy plant with numerous pale lilac petals around yellow centers. In the Gobiian Altai it is a rare plant, although it grows in abundance in the hills and mountains of the Mongolian north. Farther up the mountain, I saw the more prevalent alpine, *Aster alpinus* L. ssp. *minor* (Ledeb.) Novopokr., in Mongolian called "chonin nud," (sheep's eye). In Baga Bogd Mts. it is sparsely to be seen, but in bloom it is very decorative.

Another well-known plant present in these mountains is the variable *Saussurea alpina* (L.) DC., with rich, violet-purple flowers and leaves white-haired on the lower face. It grows in similar places as asters. There, too, I have met *Artemisia frigida* Willd., a subshrub 10-40 cm high at lower elevations, but in the high localities it is only 5 cm high, a compressed tuft of

intensely silver leaves, finely cut. This artemisia is one of the most highly utile pasture plants in Mongolia. The mountain forms are very attractive.

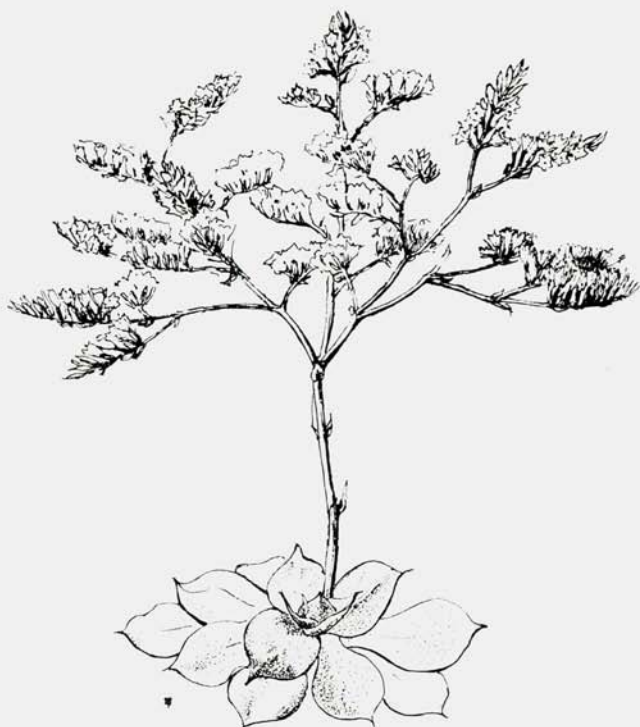
A very decorative alpine plant for our rock gardens could be *Scorzonera capito* Maxim., in Mongolian "churgan tchiche," (lamb's tongue). It is a typical plant of the Gobian Altai. Mostly it grows on stony and gravelly hillsides and is the main component of food for the capricorns, together with *Stipa* sp. and *Allium polyrhizium* Turcz. From the rosette of leaves which are depressed to the ground, on a stalk only a few cm high, there is one shining, yellow, large composite flower; the true miniature sun. One plant, very well adapted to life in arid conditions is *Haplophyllum dauricum* (L.) G. Don, a member of the family Rutaceae. It is a small, vivid green plant only 10-20 cm high, with tiny yellow flowers. The base of the plant usually becomes woody with age.

In ravines, on the way up the mountain, I found yellow-flowered *Aconitum barbatum* Pers., essence of which with sugar the Mongholians use as a poison for flies. In medicine it is used to clear up open wounds. At best it is not a very attractive plant, but useful. Another member of the Ranunculaceae is *Ranunculus pulchellus* C. A. M., growing in solitude with solitary bright yellow flowers. This nice buttercup is only up to 20 cm high and grows in moist places. It is widespread in high mountains of Central Asia, Mongolia, and China.

I met only one specimen of that nice and miniature Pasque flower, *Pulsatilla bungeana* C. A. M., which is only 2-5 cm high with attractive blue-violet flowers. It grows in Altai and Mongolia. During the journey to Baga Bogd Mts. I saw many flowering plants of this species on hillsides near the regional center, Arbaj-cher in the Changai Mountains. Besides this, I collected one other Pasque flower, probably *Pulsatilla ambigua* (Turcz.) Juz., but it had already ripened and its correct determination will be possible later when we can compare raised plants with the herbarized specimens.

The family Plumbaginaceae is represented in the lower zones of Baga Bogd by a most showy plant, *Goniolimon speciosum* (L.) Boiss., in Mongolian called "temen chel," (camel's tongue) because of the characteristic shape of the leaf. The plant is usually 20-30 cm high at flowering time, with very decorative, flat rosettes of grayish, silvery leaves, thick and leathery, and with richly branched inflorescences containing plenty of small, pale violet flowers with rosy, dry, pellucid calyx. Even this plant likes places near marmot lairs.

Two kinds of dianthus were collected, both not previously noted from Baga Bogd. Even though both are very distinct and eye-catching plants, not only in flower, but even in seed and quite impossible to overlook, it must have been that the valleys in which I collected these two plants had not previously been visited by other botanists. The first is *Dianthus versicolor* Fisch., 20-30 cm high, making dense clumps with carmine-purple flowers of a very intensive color. Seeds of this species, as well as those of the other, had been damaged by insects and because of this it was difficult to find a place where the seeds were healthy. This dianthus is known in the Gobian Altai only from the range called Iche Bogd. The second, *Dianthus superbus* L. var. *rubicundus* with bright purple flowers, is an inhabitant of eastern Asia. In the Gobian Altai it had not been previously found—the nearest known

*Goniolimon speciosum*

Vaclav Plestil

locality was the Mongholian Altai. With these dianthus was growing *Chamaenerion latifolium* (L.) Th. Fr. var. *glabrescens* Hausskn., which inhabits stream sides in alpine zones in nearly all mountains of the Northern Hemisphere. These plants were flowering in only a few places, but these flowering groups caught my eye from a long distance away by their shining purple—truly royal.

Not previously discovered in Baga Bogd is the lovely alpine *Campanula silenifolia* Fisch. It grows to 20 cm high and its flowers are relatively large and of a rich, deep blue. In moister places I found only two saxifrages. The first was the known *Saxifraga hirculus* L., and the second was a miniature (only 2-5 cm high). Its identity has not yet been determined.

Gentianaceae is only a poor family in this area. I collected only the azure-blue stars of *Lomatogonium carinthiacum* (Wulfen) A. Br., and two still not determined gentians, one of which is a very nice plant. Even *L. carinthiacum* is one of those plants which has not been previously found in Gobian Altai.

Now I would like to write a few words about my most beloved Pea family. I am working with plants of this family in our Botanical Gardens at Pruhonice. One of the very nice representatives of this family in the lower elevations of Baga Bogd is *Astragalus miniatus* Bunge. It is small, to 10 cm high and is grayish-green with intensely pink flowers. I also saw several plants of *Hedysarum alpinum* L., a plant noted from the Gobian Altai. On mountain meadows I found specimens in fruit of *Astragalus adsurgens* Pall. This plant

is widely spread over North Asia and North America. Of this plant I have written in a previously published article.

A showy and interesting alpine is *Astragalus laguroides* Pall., a stemless astragalus with dense clusters of merry violet flowers. The calyxes at the time of ripening become inflated, as in *A. lagurus* (even this species has been discussed in our *Bulletin*). Calyxes in this species are bristly, and after collecting the seeds of it I had my hands full of these small bristles. Very itchy!

Quite unusual, like a sea urchin, is the habit of *Oxytropis tragacanthoides* Fisch. It is a shrublet, forming tiny cushions only rarely seen in flower. Due to the unsuitable semi-desert conditions it does not waste its energy in blooming.

When I reached the top of the mountain I mentioned that I had reached the desired top of Manga Jamat, but I was mistaken; was disappointed to find that I was on one of the numerous high peaks of about 3000 m and that Manga Jamat's top was still far from me. It was about noon and I kept following ridges where I hoped to find new and rare plants. I was repaid, for I found a very fine silvery *Eritrichium rupestre* (Pall.) Bunge. It is allied to our myosotis, with pale blue or nearly white flowers and was 5-10 cm high. What could be a very nice alpine is *Chamaerhodos altaica* (Laxm.) Bunge, which for its cushion-like dense mats has been named "jagan botul." Botul, in Mongolian means "the pile." This plant is a 5 cm high half-shrub with bright rose flowers, and I am sorry that I did not see it in bloom. I hope that we will be able to raise it from seeds. It is interesting to note that this plant is the main component of food in the Gobian Altai of tarbagans (they are a kind of marmot). Sparsely on the slopes was growing also our lovely alpine *Orostachys spinosa* (L.) C. A. M. (Syn. *Umbilicus spinosus* DC.), in Mongolian called "julit ubs." Before flowering this plant is very similar to some of the sempervivums, but the elongated inflorescence is yellow and quite apart and is 20-30 cm high and cylindrical in form.

Only at one place, at an altitude of about 3000 m.a.s., have I found a colony of a very interesting plant, *Trifolium eximium* Steph. It is a very low (5 cm) plant with large pinkish flowers. Many specimens of this tiny plant covered large areas on rocks. *Collecting this plant I felt myself firstly very tired—it gave me not forgotten, that I am not in a lowland; in this moment I mentioned, that I'll be not able to visit the highest top. But over a few minutes all this tire came out and I followed both in walking and collecting.*

Highly situated on slopes were bright green, cushion-like clumps of *Oxytropis trichophysa* Bunge, which because of its aromatic glandulose leaves has been named "umchi tadgshi" (umchi means smelling). But for me it was sweet-scented, possibly because this was my first sight of it. This high alpine has rich purple-violet flowers, and even the inflated fruits are decorative, situated on scapes on the dense, hemispherical clumps, 10-20 cm high. On the heights it is most often sterile, but it is still a showy plant even without flowers.

On more sheer places I saw, without flowers, clear red clumps of *Rhodiola quadrifida* (Pall.) Fisch. et Mey. Often I climbed up for some especially nice specimen in the hope that it would be blooming, but no flowering plant was found. When I dug some specimens for the herbarium, I found very strong, branched black roots, going deep into the crevice.

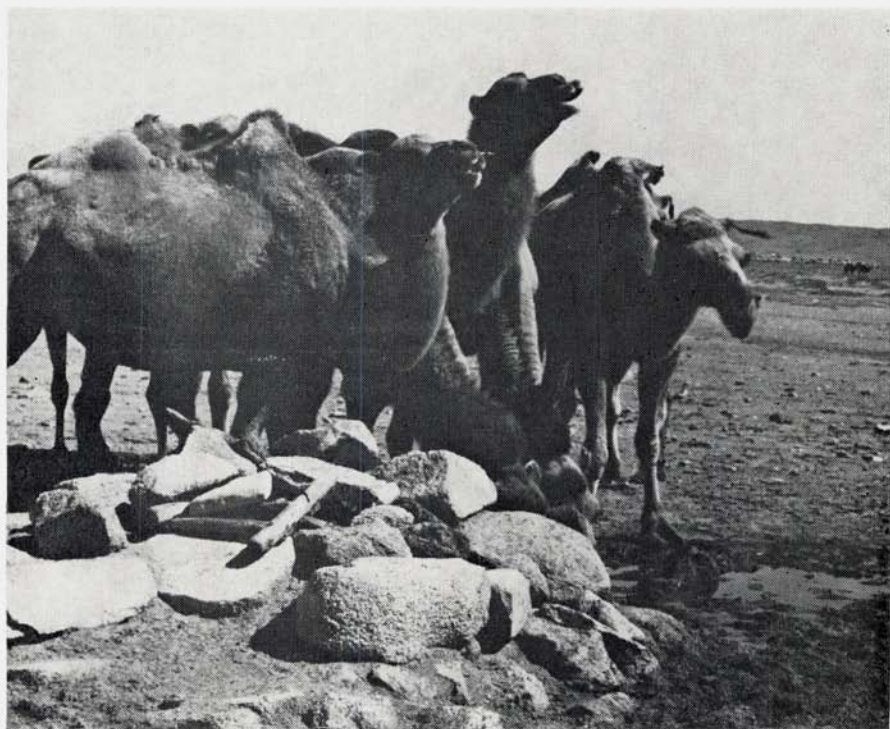
Leontopodium campestre (Ledeb.) Hand. Mazz. I found in several

sheltered places in this sea of stones. In higher elevations it is just as nice as the better known *L. alpinum* Cass, the symbol of all alpine plants. The Mongholians call their leontopodium "uul ubs" (tinder grass). The leaves from the base of the inflorescence with their wool were used previously to make fire.

A showy plant there was *Papaver saichanense** Grubov, a miniature of *P. nudicaule* L., which grows to the north of this country. The big yellow flowers on very thin stems nicely contrast with the green of grasses and the gray of rocks. But, in culture, seedlings of *P. nudicaule* and *P. saichanense* are of equal size, and I fear that in our lowland conditions we will lose the desirable dwarf habit of the latter.

There were unusually dense mats of *Stellaria petraea* Bunge, which is an interesting pasture plant of the yaks. One poisonous plant there is *Pedicularis flava* Pall., an attractive and distinct yellow-flowered plant, 10-15 cm high. On Baga Bogd I saw only a small number of these plants, but in the mountains of Gurban Saichan it is one of the most common plants.

Not far below the top of Manga Jamat I saw the deep valley cut in the massif, with meadows where the dominant plant was *Cobresia bellardii* (Akk.) Delg. This plant grew up to 3400 m.a.s. Down at the bottom of the valley I saw two marquees of possibly the lone inhabitants of these areas which are three times larger than our High Tatras. In the saddle below the



Many camels live in the Gobian Desert. The author photographed this group drinking mineral water, comparable with the world's best.

Vladimir Vasak

top I found one of the rarest plants I collected in Mongolia. It was *Potentilla pamirica* Wolf, and before this was known only from one locality in Pamir. A second potentilla, a natural hybrid between *P. nivea* and *P. sericea*, 5-7 cm high, was quite attractive with silvery, decorative leaves.

The finest alpine (I'd say the "Queen of all alpenes of Boga Bogd") was *Pyrethrum pulchrum* Ledeb., the last and nicest specimen of which I collected below the disintegrating top towers of Manga Jamat. It had been necessary for me to leave the paths of the capricorns (*Capra sibirica*) in order to collect this plant for near the paths all of these pyrethrums had been eaten. This plant is up to 20 cm high and it inhabits the highest areas in Mongolia, northwest China and Altai in USSR. The flowers are large with nearly black centers and with radial petals elegantly bending down. In high alpine zones where there are wide fields clothed only in stones, on which not even lichens grow, the presence of these pyrethrums creates a very unusual and pleasant impression. However, I do not have seeds of this beautiful plant as they had not yet ripened. But I look forward to 1968 when possibly I will see and collect seeds of it in the Altai. This, for the moment, ends my comments on the nicest plants I have met on Boga Bogd.

The return (I collected seeds even on the way down) was not long. Sometimes I was afraid, moving over rocks and banks, jumping from stone to stone in the stream beds, and when I came to scree and gravel fields I ran, but at 8 P.M. came dusk and I was forced to spend the night alone, *in quite unknown mountains, without any furnishings for camping, hungry, but very happy that I have seen and climbed the top of mountains, and that I have met with so many such interesting plants in such a little known part of nature.*

On the next day, after a night spent alone with only fire from the dry branches of the endemic *Populus pilosa* Rehder, I went to the two marquees I had seen, arriving there before noon. I could not wish for anything more than to return to these still mysterious "Small Saint Mountains," Boga Bogd uul, which are small only when compared with the neighboring "Great Saint Mountains" (Iche Bogd uul), up to 4000 m.a.s. which are covered on top with glaciers. I should like to spend there, not only one day, but a week at the least. This is my dream and with it I will end my story of this place which, for alpine gardeners, is the Promised Land.

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* There is later information that the *Papaver* collected on Boga Bogd uul is not identical with the typical *P. saichanense* collected more to the southwest in the Gunan Saichan Mts. Recent research shows that these two plants have not the same chromosome count and that even the chemical character of the flower color is different. Only herbarized plants have been studied, but next year it is hoped that flowering plants from seeds collected at both localities may be studied and the question definitely settled. It is possible that the specimen from Boga Bogd uul will represent a new species.

THE LOW ALTITUDE ERITRICHIUM

CLAUDE A. BARR, *Smithwick, South Dakota*

The environs of Choteau, in northwestern Montana, are high plains, Great Plains, by all definitions. The town's altitude is 3,800 feet and the 5,000 foot contour is thirty miles yet farther west in the foothills leading to the continental divide. Invited to meet Margaret and Loring Williams and Charles Thurman there on June 16, and having arrived early, I explored the neighboring hills until midafternoon, finding numbers of familiar and to-be-expected Great Plains species. The Williamses upon arrival had at once gone off up the river. They were soon back, their excitement and enthusiasm such that I had to be taken immediately to see the drawing card of this meeting place. I had been left entirely in the dark as to the reason for these confirmed mountain lovers setting a rendezvous on the prairies.

A few miles along, we stopped to see a fine white, needle-leaved phlox and many blue violets close by the stream bank, then continued on the straight, gravel-surfaced road that led diagonally up the valley flat. "Look for small blue flowers at the edge of the ditch," they said. And soon they appeared, then more and more. This, I was informed, was *Eritrichium howardii*. We got out of the car. The small tufts and mats covered, even smothered with that bluest of blues, were everywhere about, apparently acres and acres of them. The impact was absolutely stunning; it was not only the sight of uncounted thousands of the plants, but also the realization that well documented records placed eritrichiums as inhabitants of remote high mountains.

Had not Farrer, in *The English Rock Garden*, dubbed a very similar species, King of the Alps? Farrer, moreover, referred to *E. howardii* as of the alps of Colorado and Wyoming, while all to be learned from Rydberg was that it belonged to Montana, Wyoming, and Washington, "on dry hills." Montana authorities confine the habitat within their state to three counties on the plains, two of them farther out, and to lower levels of the mountains to the west, east of the continental divide. Mrs. Williams had brought mimeographed sheets containing the latest information. *E. howardii* is distinguished from other Americans of the genus, now grouped under the name *E. nanum*, by characteristics of the seeds and the habiliment of silvery hairs that mostly hide the leaf surfaces, and by the absence of an apical tuft of hairs. The given habitat reads, in part, "dry, open, often rocky places, often on limestone, from the foothills to high elevations in the mountains, west central and southwest Montana, and to the Big Horn Mountains of Wyoming; reported, doubtless through confused labeling, from the Washington Cascades."

The Thurmans, Charles and son, Ben, arrived late at night. Next day we all went back, and drove for miles without a break in the unbounded carpet of blue. One could look up and down the valley, and at one place across where the river was half a mile from the road, and see blue color until it faded in the distance. The others had visited here the year before, after all bloom was gone. Charlie, well known to have a really green thumb—and

obviously aching to acquire a blue one—had taken plants home then and had them growing. Again, he helped himself to a generous lot, hoping to learn to flower them, a goal not attained with any of the alpine kinds. In its native adaptation to lower altitudes and to Great Plains seasonal schedules, *E. howardii* represents a break from the intractable high alpine and offers a reasonable hope for domestication.

Such concentrated wealth of plants of a single species can surely have few parallels among the ornamental flowering plants of the world. Here would be a place for the American Rock Garden Society, or any plant or garden group, or the Department of National Parks, to set up a reserve, or monument, where *E. howardii* might be safeguarded for all time, with a guard always on duty.

On second thought, nature has performed the remarkable task of planting, caring for, and protecting, and, so far, has required no assistance. On reflection, it can be conceived that the site and its extent are unique, that the dry moraine footing is ideally fitted to this forget-me-not, and that plant competitors, and plant pests and predators have been, and will probably continue to be, held in abeyance. No error is made in spotlighting the locality, for the plant is not marketable. Indeed, one hunts for a place to get a pick between the stones to bring out a plant with undisturbed roots, essential for transplanting, according to Thurman.

How many centuries has *E. howardii* used in pre-empting this home site and in adapting to changing temperatures and lessening moisture? Well, as many as needed since glacial times. This valley was well within reach of the continental ice sheets, but possibly the area was occupied always by the ice of mountain glaciers. The remarkable uniformity and smoothness of the terrain has the aspect of a river flood plain, but it is hard to see how a river, or for that matter a glacier, could have spread so uniform a mixture of coarse and fine gravel and sand and silt, with a very few small boulders, to such a depth, as seen along the road ditches. There are no fences. The ground is too rocky for farming, there is almost no pasturage, the sparse bits of grass and other vegetation under present climatic limits do not invite grazing and trampling, and do not endanger the flowers. All that seems wrong is that, as Farrer suggests, "the flowers . . . at present, after all, unvisited by man, have to sit content in the admiration of marmots." Read Farrer: he has more than five pages of extravagant enthusiasm for eritrichiums.

When all had thrilled to the show to saturation capacity, we left with due regrets late in the afternoon, and went down to Missoula to visit Frank and Louise Rose, and to see *Lewisia rediviva* in that always marvelous pink, approaching maximum bloom on Waterworks Hill.

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GENTIAN GARDENERS TAKE NOTICE—If you do not already have the book, *Gentians For Your Garden*, by Doretta Klaber, and would like to have it to add to your library, send \$1.00 to Publisher's Central Bureau, 33-20 Hunter's Point Ave., Long Island City, N. Y. 11101.

THE ALPINE HOUSE — A SYMPOSIUM

(Editor's Note)—The series of articles on alpine houses, under this symposium heading is reprinted, in part, with permission, from the October, 1967, newsletter of the Alpine Garden Club of British Columbia. When permission was asked for the reprinting of this article in our own *Bulletin*, Editor Jim MacPhail's answer was so gracious that ARGS members everywhere should be allowed to bask in the warmth of his words. He wrote, "I am delighted that you are interested in reprinting the symposium on alpine houses. You are most welcome to reprint not only this article, but any other material from future issues which you may consider to be suitable for the *ARGS Bulletin*. Please feel at liberty to adapt the article in any way you see fit."

VIEWS ON A PLASTIC ALPINE HOUSE

ELIZABETH NUNN

Last autumn Ray built me a plastic alpine house of which I am immensely proud. I have no knowledge of correct management as yet but this is a great way to learn without having invested a terrific sum of money. This house is made of a double layer of two-mill polyethylene over a framework of 2×2's strengthened by diagonal guy wires to withstand stresses of wind and snow. It cost us under \$50.00 (actually, having some things on hand already, etc.—it was quite a bit less—but \$50.00 would be what the true start-from-scratch cost would have been). We put down a brick floor to ensure good drainage, and there is a ventilator fairly high in the end wall opposite the door. Ray made the pitch of the roof quite steep as we do have a fair amount of snow some winters. There is a potting bench at the end under the ventilator, and a metal tray on a bench down one side on which I kept the potted things and was able to water them from below in the recommended way. Ray gave me a thermometer which records the highest and lowest temperatures and I found this was useful especially during the cold season, although last winter was scarcely rated as cold—the lowest temperature being 27 degrees above. I nipped out and put newspapers over things if it seemed as if it were going to be really cold at night. I don't know whether this is the correct thing to do but I didn't want to take any chances. I had a wonderful showing of bulbs last year, and various other plants that I did know should be protected from the rain were very happy under shelter.

One big disadvantage that has come to light just recently is that the extremely hot sun this summer has burned the plastic across the ridgepole so severely that it has disintegrated and will have to be replaced. Ray feels that the ridgepole itself should be rounded off to remove the sharp edges and that a double or triple layer of plastic should be put along the pole to ensure maximum protection where there is obviously the most wear.

A side item greatly in the plastic house's favor is that we decided that the original place that we put it was not the best and so with the help of six

big boys we moved it to a new location in less than five minutes. It still is on a well-drained base—this time cement. It will be interesting to see how things work out during a more severe winter (perhaps it might happen this year, although we can wish not) as I don't think that last year was really a fair test of average winter conditions. I am planning to try sowing seed this autumn and Ray has offered to put in the Gro-Lux lamps. There is plenty of room for another bench to use for seed propagation. If any reader is interested in trying a plastic house, Ray has the basic plans and will be glad to share them, and you are welcome to see the finished house as per the Nunn version.

THE ALPINE HOUSE — YES!

BOB WOODWARD

Ever since I painfully but surely learned to distinguish a primula from a petunia, I had wanted an alpine house. My desire was based on certain convictions, most of which I still hold: 1. Many alpiners require winter protection, not so much from frost, but from the well-known Vancouver slop and from biting winds in the late winter. 2. I am one of those gardeners whose interest lies more in the individual plant rather than in landscaping effects. This is a matter of personal taste, and plants can best be studied at eye level, in their individual pots, in the alpine house. 3. Certain plants in the height of their bloom soon become rain-besplattered outside and one cannot enjoy them so long nor so well. 4. The few degrees of warmth gained from the glass protection often prevents bud blast and such sundry curses which late frosts bestow on us. 5. The conniving and contriving required to obtain particularly rare plants, such as *Kelseya uniflora*, demands that they receive a little more special treatment until or if they can be propagated. Thus, the alpine house is used for the detention of hostages—sometimes, alas!, unwisely as the plant would have thrived much better left to its own devices. I could enumerate other reasons but these were the primary ones. Also, I still want the alpine house as an adjunct to, rather than a replacement for the garden.

Thus, the motivations. There were many false starts. We thought first of the tiny, prefabricated greenhouses (hot houses would be more accurate) available commercially for what seems outlandish prices. This was soon abandoned. Next we thought of building from scratch a house of conventional size with the much-touted low slung roof and the latest gadgetry in ventilators. This was abandoned mostly because of mental, physical, and economic torpidity! Finally we decided—why not convert part of the dilapidated greenhouse into an alpine house? We chose the south-facing side to prevent the plants from becoming unnaturally drawn; we did not remove the grapevine already growing there—useful for summer shade. We reglazed almost the entire alpine house section of the greenhouse but not the remaining section—useful for allowing the free movement of air, particularly in the humid days of fall and winter; for ventilation, in addition to the existing roof ventilators. We simply inserted removable panes of glass along the whole south wall; the staging was built about three feet from ground level, not in the conventional rectangular pattern, but in a manner which allowed much more bench space in

the limited area (even so, our house, measuring approximately 11 feet by 20 feet, already seems inadequate despite the fact that it accommodates over 500 pots). A slat shelf was fitted underneath the staging for shade lovers, recently repotted items, wee treasures which have lost their look of "treasurableness"! Shading was provided by tall deciduous trees to the west, by removable bamboo blinds, and by a screen of taller and slightly tender plants such as *Pieris forrestii*, *Correa magnifica*, *Phyllostachys nigra*. Everything was repainted, fumigated, the benches filled with sand for plunging, other touch-up features—we were in the alpine house business.

How has all this worked out? On the whole, very satisfactorily, but this is not to say there haven't been problems. Some of them are worth discussing, for the unwary. The mild winter last year did not really test the borderline hardy plants. I am still against heat in the alpine house, mostly I confess because it does not seem to be quite playing the game. Many alpine house owners state unconditionally that enough heat to exclude frost is a *sine qua non* of owning an alpine house. The dangers of overwatering in the winter cannot be stressed too much. This year we shall probably not plunge such plants as *Phacelia sericea*, *Eriogonum ovalifolium*, even maybe the Aretian androsaces. Some bulbs, such as calochortus, might also appreciate this treatment. But what happens in a hard frost to unplunged pots is the problem. Certain plants—orphanidesias, epigaeas, and *Moneses uniflora*—need shade much earlier in the spring than we had expected. The seeringly hot summer burned some plants with a reputation as sun-lovers. For instance, lewisias and douglasias require more shade than suspected. Eternal vigilance, constant warfare are the catchwords as far as bugs, mites, damp off, mildew, and even



Mrs. Iva Angerman and Bob Woodward admire the plants in the alpine house

slugs are concerned. Liberal use of aldrin in the plunge sand, the use of Cygon 2E against aphids, and the absolute necessity of drenching with slug killer any plant brought from the cold frames before it is allowed into the hallowed halls of the alpine house, are some of the bitterly learned lessons. Some plants such as most of the dianthus, some campanulas, zauschnerias, and some of the Asiatic gentians do not take kindly at all to pot culture. They are the wanderers and four walls definitely do a prison make as far as they are concerned. Ericaceous plants will look back immediately their fine feeder roots touch the sides of a dry pot.

But there have been many compensations for the few problem-children. *Kabschia saxifrages* love the winter and summer protection provided they are placed in a bench with filtered shade (here our trusty grapevine). Dangerous as it is to tempt fate about such items as *eritrichiums*, *jankaeas*, *dionysias*, and other intractables, so far they seem more than happy. Certain easily grown but stingily flowering plants such as *Caltha leptosepala*, *Silene acaulis* show their appreciation for the extra coddling by flowering with an almost gala abandon. By including everything from ferns, shrubs, bulbs, cushion plants, tufa plantings, miniature gardens as part of the furnishings, the morning alpine house tour is almost sure to bring some pleasant surprise. Even so, the mad enthusiasm to include anything and everything in your alpine house collection requires careful reconsideration after the first fine careless rapture!

I think it is useful to record some of the requisites of alpine house maintenance. Most watering can be done by hosing the plunge medium. But all plants which resent water on their foliage—for example, *Primula allionii*, androsaces, *Draba mollissima* and *D. polytricha*, should be grouped in one area. Cassiopes, phyllodoce, schizocodons, and the like should be removed from the house for the summer, even though you think you have given them ample shade. I am not sure the same is true for *pyxidantheras* and *Corydalis cashmeriana*, as the experts would have it. Plants that require summer drought—most bulbs, certain violas, cyclamen, lewisias, *Silene hookeri*—are also best removed to a special dry cold frame. Repotting is a constant concern but sometimes it is difficult to determine the opportune moment—I am hesitant to repot in the dread days of high summer. Also, there is the dilemma about feeding alpinists—how? what? when? or even if? We are still very much at the trial and error basis here. Probably one is perpetually so. For instance, it seems likely that a plant of rock crevices in nature such as *Boykinia jamesii* needs heavy feeding, whereas *Potentilla nitida*, also of rock crevices, requires no feeding at all if it is to flower. So where are you?

I cannot extol the virtues and pleasures of an alpine house enough, but I think one should be aware of the constant shuffling, between garden, cold frame, potting shed, dryout bed, alpine house, lath-house that is required. When there is more than one gardener in the family an aura of hysterical confusion sometimes ensues. A small incident, which occurred just this morning, illustrates the point. I had decided to place a pot of trilliums in the garden. While planting I had removed pieces from the garden of *Campanula rapunculoides* (that monstrous weed in the guise of respectability), and placed them in an empty pot so I could later burn them. Another of the household gardeners—who shall remain nameless—on their peregrinations

found the pot and decided there had been an accident, so a loving mix was created and each piece of the vile weed positioned carefully in the pot, the label—*Trillium rivale*—polished up a bit, and the whole thing put in the recovery bed. Luckily—Oh so!—the gaffe was discovered before we had decided to enter our beautiful pot of "*Trillium rivale*" in the spring show.

But don't let any of this deter you. If you love plants, you'll love an alpine house. You will have to mull carefully the problems of size, ventilation, shade, to plunge or not to plunge—but when you do come up with the right formula, you have a source of the highest pleasure 365 days of the year.

NOTES FROM THE NORTHWEST

DOROTHY METHENY, *Seattle, Wash.*

JANUARY—TIME FOR READING—This heading promptly induces a vision of seed exchange lists, nursery catalogues, books about 'how to,' and such; but this month our members, Richard Brown, Mrs. Joseph Jezik, and Mrs. Ralsey Peterson, provided us with another sort of stimulation when they presented short reports on three botanical explorers who combed the Pacific Northwest for its plant riches. These men were only three of the many intrepid and knowledgeable explorers who have ranged to the far corners of the earth during the last two centuries to bring us its choicest plant material. Their personalities and careers have been as various as the plant material they collected.

Archibald Menzies, born in 1754 near Aberfeldy, Perthshire, Scotland, and educated to be a physician, had his first experience of North America when as a young university graduate he sailed as surgeon in the navy to a station at Halifax, Nova Scotia. He used his free time there to study the local flora and collect what was interesting to him. He was no sooner back in England from this tour of duty than he secured a post as naturalist with a private enterprise expedition to the North Pacific. Part of his gleanings from this voyage were seized by the Spanish, who were then in control of Nootka, on what later became Vancouver Island, British Columbia. But Menzies had the last word when he sailed with Captain Vancouver on the voyage to repair the fortunes of the English in the North Pacific. On this voyage he kept a journal, as required by his instructions, recording his observations of flora, fauna, soil, water character, waterways, minerals, furs, and fish—with especial attention being given to the life cycle of the sea otter.

Fortunately, the commander of the ship was instructed to give every assistance to the naturalist, and Menzies was enabled to send back to Britain from this 1792 visit a fabulous collection. Much of his material lay undescribed by those responsible, for many years, and he was thus not credited as extensively as he should have been. After the three trips abroad, he settled down to the practice of medicine in London. In 1839, Menzies invited Asa Gray to dinner and regaled the young American with tales of the voyage with Captain Vancouver. Gray wrote of Menzies as "a pleasant and kind-hearted old man." Forty-eight years later, Gray, now himself the pleasant old man, repeated those tales of Menzies' to the young botanists of Kew.

Thomas Nuttall was born in England in 1786 and started life as an apprentice printer. At the age of twenty-one he migrated to the United States and once there occupied his spare time in observing the new plants around him. When he needed help in identifying his finds, fortunate circumstances led him to Professor Benjamin Barton, at the University of Pennsylvania, and Barton, recognizing the spark of the real botanist in the young man, ended by employing him as assistant (replacing Pursh) at a salary of \$8.00 a month.

By 1834, Nuttall was Curator of the Botanic Garden at Harvard, but he preferred the lonely life and left for an overland collecting trip. Asa Gray said of him, "no botanist ever covered such extensive territory." He finally returned to England to take up an inheritance, and became interested in rhododendrons. His death, at the age of 73, was attributed to strain resulting from over-exertion at opening a case of plants. This reminds us of Beverly Nichols' grandfather, who was said to have died of a clump of *Iris stylosa* (*I. unguicularis*), which he left a sick bed to visit in mid-winter, and then relapsed into pneumonia.

If Menzies was happy in all sorts of situations and Nuttall was happy only alone in the wild, William Suksdorf seems to have lived through a long series of frustrations and disappointments. Born in Germany in 1850, he moved as a boy with his family to Iowa. He attended Grinnell College there, and then the family moved on westward and settled on the Washington side of the Columbia River where it cuts through the Cascade Mountains. He gradually spent less time helping on the family farm and more and more in collecting. He sent many of his collections to Asa Gray, at Harvard, and in 1886 was invited by Gray to go to Harvard on a scholarship. Unfortunately, Gray died early in 1888. Sereno Watson, who succeeded to Gray's duties, was difficult to get on with, and Suksdorf soon left to return West, bitter about his treatment at Watson's hands. In spite of having lived most of his life in this country, he never really became at home with the English language, and so published many of his own plant finds in German. He collected throughout Washington and finally, when he was 70, he was given facilities at the State College at Pullman (now Washington State University) for labeling his species. In 1930, this institution gave the octogenarian an M.A. degree. When he died two years later, he left about 30,000 specimens to the college.

This report was brought up to date when Carl S. English, Jr. mentioned that he and Mrs. English were students at Pullman while Suksdorf was still living, and visited the old man at his unpretentious home down by the Columbia. Jean Witt (Mrs. Joseph A.) added that she had written her Master's thesis on Suksdorf material, some of which has still not been studied.

Much of the source material for the biographies of these plant explorers lies in the journals of learned societies, or even personal records housed in herbarium libraries; but there are a number of books on the subject which may be in your public library. Recommended are:

McKelvey, Susan D., *Botanical Exploration of the Trans-Mississippi West 1790-1850*. Arnold Arboretum of Harvard University, 1955. 1144 pp.

Townsend, John K., *Narrative of a Journey across the Rocky Moun-*

tains to the Columbia River, in *Early Western Travels 1748-1846*. Vol. XXI. R. G. Thwaites, ed. Clark Co., Cleveland, 1905.

Also, consult the Botanical Exploration category in your public library's catalogue.

PHYTEUMA COMOSUM

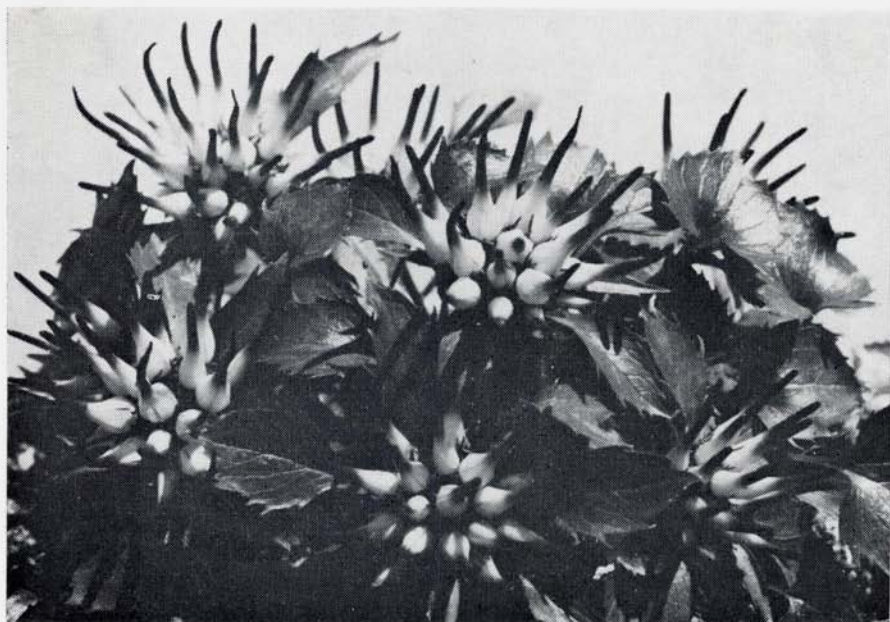
BOHUMIL JANOUC, *Czechoslovakia*

Phyteuma comosum, whose inflorescence is most interesting, is a plant which until recently has been quite rare in rock gardens. The genus *Phyteuma* is one of the Campanulaceae, although its flowers have little resemblance to those of campanulas. However, the foliage, especially of young plants, could easily be interchanged, and the flower colors are blue. In nature *Phyteuma comosum* is found in the Dolomites and other calcareous places in the Alps eastward to the Westkarawanken. Even though it is a European plant, it is rather rare in cultivation.

This species is the most showy of the genus. It produces tufts of coarsely toothed, dark green leaves, bearing at the tips of the stems large flowers of a distinct shape, and of a larger size than in the other species. In color it is variable, flowering from light blue to deep purple. From the calyx upward the color is light blue which graduates to very deep blue at the tips of the elongated corolla. As the color in the flowers gains in intensity so does the green in the leaves.

The petals adhere by inside hairs so tightly that it seems as if the flask-shaped, glossy corolla, elongated toward the tip, is joined and solid. The petals detach one from another and partly open only at the time of pollination at the low, swollen part of the flower. This partial opening is important only that air could have access to the flower so that the remainder of the stamens would not rot.

The pollination of *Phyteuma comosum* is very interesting. I wanted to know why this plant had been so rare in culture and so very difficult to obtain. Even abroad, where there are more advanced growers of alpine plants, it has been almost impossible to get seeds. Because of this I was very curious as to how this plant actually is pollinated when the stamens remain in the closed flower, but the style grows out through the flower. I had enough flowers, so I cut the flowers at various stages of their flowering. At the first stage the style with the unopened stigma and the stamens which surround it are all still in the closed flower. The style is pubescent along almost the entire length so that it looks like a brush. At the next stage the pubescent style wipes off all the pollen from the anthers as it grows through the tip of the tapering corolla and so takes the pollen outside of the closed flower. The pubescence of the elongated style is now much less evident. At the last stage the stigma on its long protruding style opens to be pollinated. At the same time the pollen subsides from the style. Likely it ceases to be fertile because flowers pollinated with this subsided pollen have not set seeds. Thus the plant protects itself from self-pollination. Therefore, there must be more flowers or more opening plants so that there are some blooms at various

*Phyteuma comosum*

Bohumil Janouch

stages of development in order that pollination could be more easily ensured. The winds easily provide the means. All plants do not have the same quantity of pollen. Some plants are quite dark with it while on another it can scarcely be found.

The seedlings bloom only rarely in the second year of their life. When they are well taken care of they bloom in the third year, and as the plant grows stronger the blooming increases. The pictured plant is some five years old and has seven flowering stems. With the inflorescence the plant could reach 10-12 cm in height. The culture of this plant is not as difficult now as is mentioned in the literature.

Phyteuma comosum grows well in a drained, sandy loam with a little leaf mold and a half of limestone chipping or broken tufa. Planted directly into tufa it suffers from drought so it is better only to surround the plant with pieces of tufa or stone. It thrives in a position facing east in a vertical crevice where it will not be harmed by winter wet. Only in summer does it like plenty of moisture. When it suffers drought soon after flowering, it dies back too early and does not grow strongly.

Slugs are its worst enemy. We must protect it against them also when it has died back for they may destroy even the resting bud. The best way is to plant it a little deeper so that the bud is not above ground level, or when it is, to cover the bud with sand before winter.

Let us hope that this attractive plant will soon be plentiful and become available to all alpine plant lovers.

(Editor's Note)—For further information on the genus *Phyteuma*, see Mr. Richard Langfelder's article in the July, 1966 *Bulletin*.

AMERICAN VIOLETS — A SECOND CALL

Mrs. Doretta Klaber is still in need of help to enable her to complete her book on American violets, in 1968, if possible. As has been related in a previous *Bulletin*, each American species will be represented in the book by the author's drawing in full color, showing flower and seed stages, root systems, and manner of growth. All drawings are to be made from living plants. Members in the past year, since the first call, have helped wonderfully in supplying Mrs. Klaber with missing species and she has expressed her appreciation in many ways, however, there is more that you can do to make her task easier. She needs more plants!

Flowering plants only of the following species are needed: *Viola adunca* var. *montanensis*—*V. affinis*—*V. cucullata*—*V. egglestonii*—*V. hastata*—*V. hirsutula*—*V. incognita*—*V. langsдорфii*—*V. lovelliana*—*V. missouriensis*—*V. nephrophylla*—*V. occidentalis*—*V. orbiculata*—*V. palustris*—*V. pedata* (need pure white only)—*V. sagittata*—*V. walterii*.

Seeding plants only of the following species are needed: *V. beckwithii*—*V. douglasii*—*V. hallii*—*V. howellii*—*V. labradorica*—*V. ocellata*—*V. pedunculata*—*V. purpurea*—*V. rafinesquii*—*V. septemloba*—*V. sheltonii*—*V. trinervata*.

Both flowering and seeding plants are needed of: *V. bakeri* (*nuttallii* var. *bakeri*)—*V. biflora*—*V. cuneata* (purple form only)—have white)—*V. floridana*—*V. praticola*—*V. selkirkii*—*V. venosa*.

Of the following four, Mrs. Klaber has no specimens at all: *V. arvensis*—*V. langloisii*—*V. novae-angliae*—*V. villosa*.

Mrs. Klaber's address is R.D. 1, Quakertown, Pa. 18951. Quoting from a recent letter from her, "I want to take this opportunity to thank all the kind people who have sent me plants in the past, and to assure anyone of my deep appreciation if they can help me out this coming season."

She says that she thinks it would be well to summarize the method of sending the violets to her—"soilless, dropped into a polyethylene bag upright, enclosed in a cardboard box, and sent airmail (which I'll be glad to pay)."

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SEEDS FROM MONGHOLIAN PLANTS AVAILABLE — After reading Ing. Vladimir Vasak's article in this issue, perhaps you might have become interested in some of the plants mentioned there as having been found on Baga Bogd uul (Little Saint Mountains) in the Gobian desert. Following is a list of seeds collected on the expedition there that are available:

Aconitum barbatum — 539208; *Androsace incana* — 770139; *Aster altaicus* — 1642298; *Arenaria* sp. — 538208; *Astragalus adsurgens* — 187049; *A. laguroides* — 307298; *Chamaenerion latifolium* — 392208; *Cortusa altaica* 1297208; *Goniolimon speciosum* — 1800059; *Hedysarum alpinum* — 511089; *Juniperus sabina* — 318258; *Leontopodium campestre* — 1641298; *Oxytropis trichophysa* — 314208; *Papaver saichanense* — 391208; *Pedicularis flava* — 1087208; *Saxifraga hirculus* — 1830379.

If interested, write to Ing. Vladimir Vasak, Botanic Gardens of the Czechoslovak Academy of Sciences, Pruhonice, Czechoslovakia.

THE PROPAGATION OF DWARF AND PYGMY CONIFERS FROM CUTTINGS

JOEL W. SPINGARN, *Baldwin, New York*

Dwarf conifers rarely produce viable seed, but when available the resulting progeny are usually arborescent trees. However, some exceedingly interesting plants have been produced from seed of the dwarf form of Hinoki cypress, *Chamaecyparis obtusa* 'Nana Gracilis'. Dwarf forms of the Lawson cypress, *Chamaecyparis lawsoniana*, and various junipers have been known to set seed, and experiments are being conducted with seed found in cones of witches' brooms (an abnormal dwarf growth on an otherwise normal tree) in hopes of discovering new and interesting dwarf plants.

It would be unusual, however, for the average dwarf conifer enthusiast to find such seed, so most of us will be content to propagate our plants vegetatively from cuttings, or layering.

It is with some hesitation that I set forth rules of thumb for the cutting propagation of dwarf conifers, for I fully believe that many of the rules can be altered or left unheeded, and that which might insure successful rooting at one time, may not prevent failure the next. Indeed, violation of the rules sometimes paves the way to a discovery of a method to induce rooting in some hitherto difficult form. I recall an instance when the dwarf forms of *Picea pungens* and a pendulous form of *Picea abies* rooted exceptionally well in a cold frame containing a rooting medium consisting of three fourths peat and one fourth sand. A very "wet" mixture, indeed, and hardly recommended for most other conifers. At another time, a defective heating cable thermostat kept the rooting medium at a temperature in excess of eighty degrees. I found this beneficial in rooting a form of *Cedrus brevifolia*, never previously rooted.

The moral, of course, is not to expect the following information to be a panacea for propagating problems, nor a sure-fire method of perpetuating your plants. But by applying the rules together with a bit of understanding as to the growth habit of individual plants, some success should be forthcoming.

Most of us are familiar with our plants; as spring approaches the warm air stimulates the buds which swell and grow new shoots, and the eventual hardening off of the new foliage as fall arrives. You may have noticed that different plants terminate top growth at different times, commencing in late summer as evidenced by the deepening color of the foliage and the formation of next year's buds. However, few of us are familiar with the growth which takes place underground. As soon as the soil warms in the spring a minimal amount of root growth occurs, but most of the root growth takes place as soon as the cool air of fall terminates top growth, thereby concentrating growth in the still warm soil underground. Keeping this in mind will aid in timing the insertion of your cuttings. Taking cuttings first from those plants that have finished top growth is generally the rule.

The cutting material should be firm, but not rubbery nor brittle. For the majority of dwarf conifers, I find two-year-old wood roots most satis-

factorily. Extremely diminutive conifers that grow only one fourth to one half inch per year, provide such small cuttings that it becomes necessary to cut three-year-old wood.

The major difficulty of propagation is to keep the cutting material in good condition while waiting for the roots to emerge. If this can be done, I believe almost all cuttings will eventually grow roots. It takes some conifers as little as two weeks, but some require a year or more. The more time required, the more difficult the plant will be to propagate.

METHODS

One of the simplest methods is to use a wood or plastic flat, the size depending on the amount of cuttings to be inserted. Be sure the bottom is not completely sealed. If so, drill holes to facilitate drainage. Line bottom of flat with plastic or aluminum screening to prevent the rooting material from escaping. Bend heavy wire (wire coat hangers will do) in a semi-circle to form ribs and insert in flat to form the framework of a quonset-shaped tent. Three ribs are usually sufficient for the flat of average size. Fill flat with rooting medium consisting of sixty per cent clean, sharp sand (do not use kiddies playground sand) and forty per cent shredded peat moss (do not use so-called Michigan peat). If you wish to hasten rooting, an inexpensive soil warming cable that automatically maintains the temperature at seventy degrees can be spread out on the bottom of the flat before filling with rooting medium. The cable can be purchased in five-foot lengths with a built in thermostat from the larger garden or nursery supply firms. This is about the right length for a flat.

Take cuttings from mid-August to mid-September, depending on individual plants, or take winter cuttings the first part of January. Remove about one half inch of foliage from cuttings, or less from the very diminutive forms; one or two inches for the larger cuttings. Dip base of cutting in a hormone powder to which has been added a small amount of fungicide such as captan to stimulate root growth. Insert cuttings in rows in flat. Be sure to label each group to prevent mixups later. Firm rooting medium around cuttings. Water thoroughly with a fine spray and allow to drain.

Spread polyethylene over wire ribs and staple or tack to flat, sealing in cuttings, forming a miniature greenhouse. Cut a three- or four-inch flap on each side of tent for ventilation. It is advisable to leave flaps open for an hour or so each day to prevent fungus diseases. Your good judgment is essential here. The medium should not be kept too wet, nor allowed to dry out and at the same time it should receive some change of air. Place entire propagation case in bright light without its receiving direct sunlight. A white cloth may be used to shade cuttings during periods of sunshine.

For cuttings inserted in fall, the propagation case can be placed outdoors in a shady spot when the air temperature is sixty-five to seventy-five degrees. For winter cuttings, an unheated sunporch, or the window of an unheated basement is good. Ideally, the air temperature is best kept lower (45-60 degrees) than the rooting medium temperature, being kept at a constant seventy degrees by the soil warming cable. Most of the cuttings taken in January will be rooted by spring and after a hardening off period will be ready for planting outdoors. Fall cuttings should be rooted by the



A MINIATURE GREENHOUSE: Cuttings root easily in a flat covered with polyethylene plastic. Cut flaps in sides; open each day for ventilation to prevent fungus disease.

end of November. Pot up cuttings and after the young plants have shown root growth they can be hardened off and placed in a shaded coldframe. If no frame is available, plunge pots in a protected area and cover with oak leaves, salt hay, or some other similar material that will permit air to circulate around the plants, but will prevent excessive freezing and thawing, thereby heaving plants out of pots. When spring arrives, remove covering a little at a time to harden young plants to full exposure of air and light.

COLDFRAME PROPAGATION

Another method of cutting propagation, well known to most gardeners, is the use of a coldframe situated on the north side of a structure where no shading is required. This is a most practical and inexpensive way to handle a large amount of cuttings. For best results, the coldframe should be dug deep enough so that the rooting medium is well below grade level. This will prevent the freezing and thawing that tends to heave out the cuttings. A four-inch layer of rooting medium (60 percent sand and 40 percent peat moss) over a four-inch layer of coarse gravel is adequate.

It is best to take cuttings starting in mid-August through October, as the plants appear ready. Taking cuttings during winter is not practical for coldframe propagation.

GREENHOUSE PROPAGATION

For those fortunate enough to have a greenhouse, the procedure is the



GREENHOUSE MIST PROPAGATION: An ideal set-up for propagating dwarf conifers. The propagation bench is on the south side of the greenhouse in sunlight. A heating cable under the rooting medium maintains the temperature at seventy degrees. The mist nozzle burst is set for one second every five minutes to maintain turgidity.

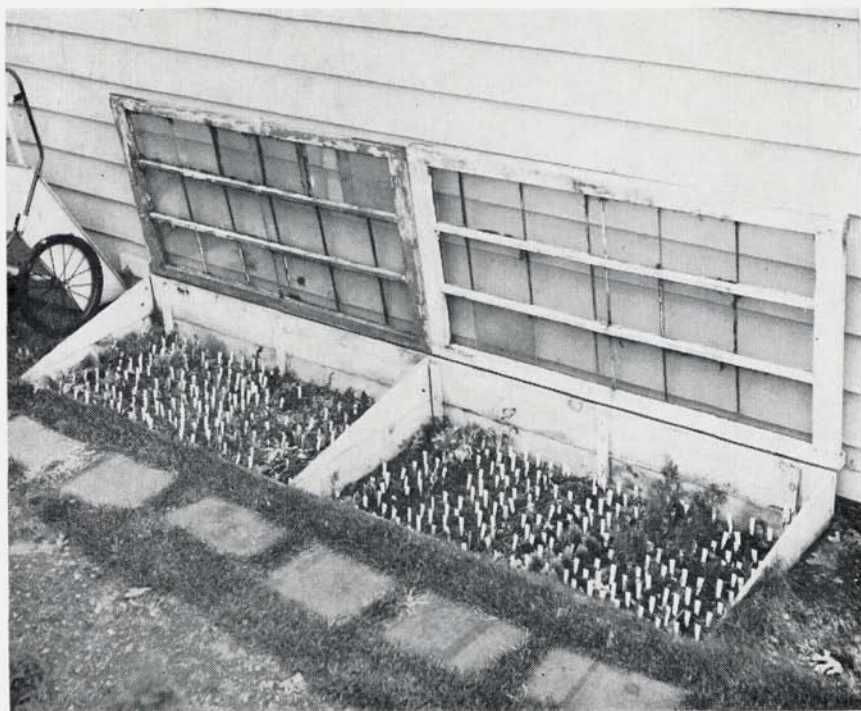
Photos by Joseph W. March

same, except instead of using a covered flat or coldframe, a portion of the greenhouse bench is used to contain the rooting medium. An area of five square feet will easily produce 500 to 1000 plants from fall through spring, by replacing cuttings as rooting occurs. Here again the soil warming cable is of immeasurable help. The greenhouse thermostat is set at fifty degrees, while the rooting medium is kept at seventy degrees by the soil cable. A wire framework can be built around the propagating area and covered with polyethylene, much the same procedure as used to cover the flat previously mentioned, however a much improved method to keep the cutting area turgid is to use a mist nozzle over the cuttings, which in this case can be situated in an area with some sunshine. A solenoid valve and time clock can be incorporated into the system so that any degree of misting can be obtained. It is necessary to have the mist burst only for a second or two every five or ten minutes. The theory being to replace only the amount of water lost by evaporation and transpiration. Some experimentation will be required to determine the amount of mist required. The advantage of using the mist system for maintaining turgidity over the polyethylene covering method is that the problems of damping off and stem rot of cuttings are almost eliminated by the improved circulation of air.

OUTDOOR MIST PROPAGATION

A good deal of the conventional information must be disregarded when propagating outdoors under mist. The propagating area should be in full sun. Flats of wood, plastic, or non-rusting metal can be used, but drainage must be perfect. The rooting medium should be sharp builder's sand with no other material added. Mist nozzles, the number depending on the area to be covered, are erected about two feet above the flats. The mist nozzles can be obtained from various nursery supply firms and specifications as to the required height and coverage are usually supplied by the manufacturer. A garden hose can be adapted to supply the mist nozzles with water from the nearest faucet. The system is turned on manually during all daylight hours except during periods of rain.

An improved method is to employ a solenoid valve and timer such as that previously discussed, that automatically turns on the mist intermittently. This method has the advantage of using less water and is less apt to leach the chlorophyll out of the cuttings. In addition, the rooting medium temperature remains warmer due to the reduced flow of water. Larger cuttings can be used than with the other methods of propagation. They are taken during the first two weeks of June while the plants are in full growth. Be careful to keep the cuttings moist until placed under the mist. The soft



COLD FRAME PROPAGATION: Frame is constructed on north side of building where no shading would be required. The deeper the level of the rooting medium, the less susceptible the cuttings will be to the freezing and thawing action of winter.

growth can easily be dehydrated if precautions are not taken. Dip the base of cuttings in the hormone powder before inserting in flat. If wind becomes a problem by preventing the mist from evenly wetting cuttings, a fence of polyethylene can be erected around the flats.

Cuttings of the easier forms can begin to root in two weeks and the more difficult in up to three months. The weather plays an important role, and periods of bright sunny skies will hasten rooting time. After cuttings have been rooted and potted it is necessary to wean them away from the mist environment. This can be accomplished by plunging the pots in a half sunny area and wetting down the young plants two or three times a day for the first few days. Decrease this operation gradually. If weather is hot and dry it may be necessary to water plants more often. Protect plants over the first winter.

ABIES — Most forms can be rooted using No. 3 hormone powder. Terminal shoots should be used for erect growing plants. Take cuttings of side shoots for globose, procumbent, and prostrate forms.

CEDRUS — The true cedars are difficult, but *Cedrus deodara* and *C. brevifolia* respond using No. 3 hormone powder.

CHAMAECYPARIS — Cypress cuttings are among the less difficult. Use No. 3 hormone powder, or No. 2 on softer wood. The juvenile forms can generally be inserted at any time of the year with success.

CRYPTOMERIA — The dwarf forms of cryptomeria root easily using No. 3 powder.

JUNIPERUS — Most junipers root readily with the exception of those forms with primary adult or scale-like foliage. These may prove more difficult. Use No. 2 hormone powder on the juvenile forms and No. 3 powder on the scale-like forms and also any cuttings with woody bases.

PICEA — The vast majority of spruce variants can be propagated from cuttings. Use hormone powder No. 2 and 3 depending on the hardness of the wood. Weeping forms of *Picea abies* and dwarf forms of *P. pungens* respond well using No. 3 powder. The weeping form of blue spruce, *Picea pungens* 'Glauca Pendula' is very difficult. This form is usually perpetuated by grafting. When preparing spruce cuttings for insertion, it is best to cut off needles at base of cuttings with scissors rather than pulling them off which injures the stem.

PINUS — Most pines require grafting, but *Pinus mugo* and possibly *P. strobus* can be rooted. Take soft growth during summer, outdoors under mist. Hormone powder No. 3 is best.

PSEUDOTSUGA — Few forms of the Douglas fir have been rooted. Propagation is usually accomplished by grafting, however, I believe further experimentation is in order.

SEQUOIA

TAXUS

THUYA

THUJOPSIS — All root easily with few exceptions, using hormone powder No. 3.

TSUGA — Very few hemlocks present any difficulty. The dwarfs are generally easier to propagate than the arborescent form. Take cuttings

starting in late August through January, or first of June for outdoor mist propagation. Problems that arise in propagating hemlock often can be traced to a lack of air circulation. For this reason allow plenty of space between cuttings. If using a polyethylene covering, be sure to raise cover each day to obtain a change of air. Use hormone powder No. 2 or No. 3 depending on hardness of wood.

* * * * *

GARRYA ELLIPTICA — From the January, 1968 newsletter of the Alpine Garden Club of British Columbia comes this paragraph on this fine shrub, "*Garrya elliptica* when seen at its best, is very spectacular. Its common name, "Silktassel," alludes to its fascinating clusters of long, dangling, gray-green, silky catkins, which sway about prettily in the cold winter wind. Native to Oregon and California, it is a dioecious plant, and care should be taken to obtain the male form, with its longer catkins. It will not thrive in a heavy, poorly drained soil. It has formed a few flower buds for the first time."

May the editor of the *Bulletin* add his experiences with this plant which he has seen growing naturally near Florence on the seacoast of Oregon. It was flourishing at the very edges of the wind-blown sand dunes. Years ago, he was given two rooted whips of this garrya, scantily leaved, and promptly stuck them in two meager holes, hard-won from the stubborn clay soil of his garden. A year later, they stood there just as they had been poked into the ground. Another year and they were the same as ever — no better, no worse — too resentful to go ahead, too stubborn to turn back.

This time they were placed without any enthusiasm whatever but with a bit more care, on top of a five foot wall. There was at least six feet of level wall-top ground between the top of the wall and the edge of the lot. This is pure clay for at least six feet down. This is known to the editor because he personally wheel-barrowed clay from a neighbor's lot above to fill in behind the wall and the property line. It so happened that the surface of the clay had been worked with Krillium and bales of peat moss had been dumped there to absorb moisture, though most of it had later been used elsewhere. It was where this peat moss had lain that the two static sticks, still with the same leaves, were planted again. This clay must certainly be considered as "heavy, poorly drained soil." So, for another two years nothing happened; then the miracle!

Today, these two plants are as one. The trunks and the larger branches cannot be seen for the myriad of dark green, beautifully vein-patterned leaves that are rather shiny on the surface in a modest way and are gray beneath. The combined plants have a spread of 15 feet along the wall and are ten feet across, extending into the neighbor's property, and on our side, out over the path, between the house and the wall, which leads to the garden in the rear. These plants are ten feet tall and since the overhanging growth is high in the air, it presents no problems in the use of the path.

All winter the developing aments have been a delight. Right at this moment (January 30) the pale yellow-green catkins are at their best (though they will remain beautiful, and continue to lengthen, for several months). From the tip of each branchlet dangles from one to five catkins, from three to seven inches long. They do dance in a strong wind, chill or not. But when

stirring gently in a light breeze these many thousands of tassels create an illusion of a shimmering curtain, and when seen against the blue of a cloudless winter sky, (for one must always look up at them), the longing for spring and its flowers is assuaged, and winter in still another way proves that it can make its own contribution to beauty.

OMNIUM – GATHERUM

The Chairman of the ARGs International Relations Committee, Mrs. Sallie D. Allen, received from a new Russian member a very beautiful greeting card for the New Year—a greeting to all other members of the Society. In this way Dr. Victor Gavrioliouk has made known his pleasure in being a member of the American Rock Garden Society.

Dr. Gavrioliouk is an instructor of Botany at Uman University, Uman, Ukraine, U. S. S. R. He reads and writes English, although he feels that he is much more fluent in French. He is a very talented artist and his lovely botanical drawings in color, received by Mrs. Allen from time to time, have brought pleasure to all who have had the opportunity of seeing them. A black and white reproduction of *Rhododendron camtschaticum*, drawn in delicate color on the greeting card, appears on the opposite page.

Again congratulations are due Director Lawrence Crocker and his helpers for another outstanding seed list. There was a small increase in the number of donors, especially was the increase noticeable in the donors who live outside the United States. Listings went to a new high, from 1964 last year to approximately 2220 this year. It was unfortunate, however, that there was no room for the inclusion of the cultural notes that are sent in with the seeds of some donors. For several years, last year included, these notes have been included in the seed list and were very helpful to many who received the seeds mentioned in the notes. The seed list is very attractive, and nicely printed, and has been received by our members with pleasure and pride.

Your attention is invited to a new feature which will appear regularly in the *Bulletin*, starting with this issue. It is the idea of Mrs. Sallie D. Allen, of Seattle, and will be conducted by her. This feature speaks for itself and the mechanics are simplicity itself. Whoever has a desire for hard to obtain plants, seeds, cuttings, bulbs, even slides, make your desires known to Mrs. Allen, 18540 26th Ave. N. E., Seattle, Wash. 98155 (a new address). She will compile the requests for their appearance in the *Bulletin*. This is the end of her obligations. Those who can and will supply any of the material requested should do so directly to the person making the request.

Particular attention is called to the current request of the Henry Foundation for Botanical Research. The late Mrs. J. Norman Henry, one of America's foremost botanical explorers, had been a member of the ARGs for a great many years. The plants listed, having been collected or originated by Mrs. Henry, are needed to complete the collection at Gladwyne, Pa., her home, which is to be preserved as the Henry Foundation for Botanical Research. If you can help, send plants to the Foundation at Gladwyne, Pa. 19035.

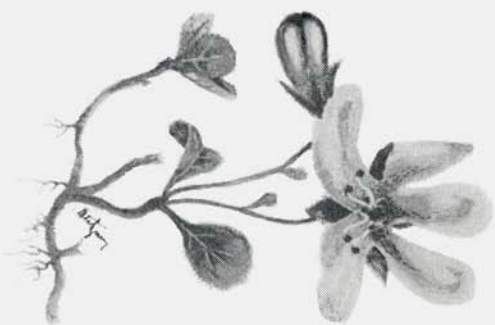
Sophievka Uman, Ukraine

Le 18 décembre, 1967.

Permettez-moi, si vous n'êtes, comme le membre
 et Américain Rock Garden Society
 à l'occasion de la
 Nouvelle Année,
 de souhaiter bonne santé, grands succès et
 prospérité complète.

Thakumny
 (Todor Gavrilov)

Le candidat es sciences biologiques
 U. R. S. S.



Rhododendron camtschaticum Willd.

Cette petite, mais très charmante, plante vit sur les pentes, rocailleuses
 de l'Estrem-Orient, dans le territoire mandchou de l'Union Soviétique.
 Elle réjouit la vue de chaque excursionneur qui la verra.

Thakumny

"If there is royalty among flowers, and what plant lover can doubt it, the Grass Widow is the queen of the *Sisyrinchiums*. The clear purple bells, opening to a full inch and a half in diameter, with the golden anthers, is a beautiful sight when viewed alone. But a single blossom is no less striking than an entire field containing tens of thousands of plants all bowing and dancing in the spring breezes.

"I have known these plants since I was a high school boy when I used to travel from Portland up the Gorge of the Columbia to Hood River with one of my teachers on weekends to work in his apple orchard. But my most memorable visit with these spring blossoms was ten or 15 years ago.

"It was on Memaloose Island in the Columbia River where the Indians have buried their dead since legendary times. The lofty hills of the Cascades rose high from either shore while at my feet among the native grasses were a hundred or so Grass Widows, their purple blossoms a royal tribute to the ancient people deep in their long and lonely sleep beside them. The great silence was unbroken even by the whisper of a breeze. A loneliness I have never before known swept over me. Here was the ineffable beauty of the living flowers. Here were the souls of a forgotten race awaiting their Resurrection."

There is beauty and feeling in these paragraphs. Surely you agree! This excerpt from a book written and published by Mr. Leonard Wiley, an ARGS member who lives in Portland, Oregon, is but one of many lovely passages telling of the author's experiences with some of America's most-loved native flowers. The book, *Rare Wild Flowers of North America*, was released to the public in January of this year. The editor hurried to possess himself of a copy of the book and finds himself most happy with it; all on the strength of the above excerpt which appeared in Mr. Wiley's promotional literature. In this issue you will find a review of *Rare Wild Flowers of North America* written by Mr. John Lambert, of Wixom, Michigan.

BOOK REVIEW

RARE WILD FLOWERS OF NORTH AMERICA by Leonard Wiley. Published by the author at 2927 Southeast 75th Avenue, Portland, Oregon 97206. 1968. \$12.50. The first edition is limited to one thousand numbered copies.

This is the second book published by the author. His first publication was *Wild Harvest* in 1967. The new book consists of 501 pages, 83 subjects, 78 excellent black and white photographs of the subject matter. In addition there are seven drawings relating to rock garden construction, sketch drawings of flower heads, tree outlines, and named types of leaf structure throughout this book.

Each subject is discussed under the following categories: the author's commentary, botanical history, botanical description, rarity, distribution, propagation, culture, and flowering time. The opening chapter is devoted to the proper way to collect these rare wild flowers and bring them back alive. The closing chapters are devoted to rock and wild flower gardens—the construction and maintenance, and give many worthwhile tips.

The author shows his wealth of knowledge and familiarity with the subject matter, and great love for and personal association with these rare wild flowers of which he writes. His descriptions are accurate and the language used would appeal to the layman as well as to the botanist. It is apparent a great amount of research was done before this book was published. A wry sense of humor is injected into the writing in a delightful manner.

After reading the book, one becomes better acquainted with these rarities, though some of the specimens may not be obtained commercially. I believe this beautiful book has more practical and down to earth information for the rare wild flower enthusiast than any previous publication on such flowers. It should be a must for every horticultural library.

JOHN C. LAMBERT

REQUESTS BY MEMBERS FOR RARE PLANTS, CUTTINGS, SEED, OR SLIDES

Will any member who is able to fulfill a request, please contact directly the person who had made the request!

Silene hookeri, seed of a good, true form; *Sisyrinchium douglasii*, plants; *Primula clarkei*, a plant—Betty Jane Hayward, Rt. 1, Scarborough, Maine 04074

Saponaria X 'Olivana' (*pumila* x *caespitosa*), a plant—Mrs. Ben L. Harris, 16738 27th S.W., Seattle, Wash. 98166

Rydbergia grandiflora, seed; *Senecio fremontii*, seed; *Antennaria plantagina*, seed—Mr. Richard Langfelder, 170 Bedford Road, Chappaqua, N. Y. 10514

Dryas drummondii var. *tomentosa*, seed or plant—Mr. Paul Buckman, Box 217, Buckingham, Pa. 18912

Kelseya uniflora, cuttings or plant; *Salix boydii*, cuttings; *Dionysia*, any species — Mrs. R. S. Peterson, 16414 12th Ave. S.W., Seattle, Wash. 98166

Iris grant-duffii, *I. bungei*, *I. grijsii*, *I. henryi*, *I. potaninii*; plants preferably for any or all—Mrs. Joseph A. Witt, 16516 25th Ave. N.E., Seattle, Wash. 98155

Ansonia ciliata 'Alice', *A. c. tenuifolia* 'Aquamarine', *A. c. t.* 'Whitecap', *Phlox carolina* 'Gloriosa', *P. ovata latifolia* 'Pinkster', *P. divaricata* 'Chattahoochee', *P. floridana bella*, *P. nivalis* 'Gladwyne', *P. n.* 'Azure', *P. henryae*, *P. h.* 'Blue Henryae', *Polemonium lindleyi*, *Silene* 'Virsylvania', *S. wherryi* 'Alabama', *Juniperus horizontalis* 'Horizon Blue'—Henry Foundation For Botanical Research, Gladwyne, Pa. 19035. (Plants please).

Please send your requests to Mrs. Sallie D. Allen, 18540 26th Ave. N.E., Seattle, Wash. 98155.

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