

Symposium: Special Reports

(Editor's Note: My multiple apologies to Darrell Probst for accidentally omitting this article from its proper sequence in Part Three-Special Reports following the paper by Sam Norris and for misspelling his name)

AUTUMN IRISES

by Darrell Probst

Part 1: Hybridizing x *Pardancanda*

It was my admiration for the way the Blackberry Lily, *Belamcanda chinensis*, bloomed so prolifically through the heat and drought of my garden in southeastern Pennsylvania that led to my interest in x *Pardancanda*. I remember staring at its mass of bloom in August of 1981, wishing they came in other colors. My desire became reality when I opened the 1982 Park's Seed Co. catalog to find "their new creation" x *Pardancanda norrisii*. Later I learned it had actually been created by a very generous man who sent them seed, the person for whom it was named, Samuel N. Norris. I immediately ordered seeds and soon had plants growing. Little did I know at the time that this plant would lead me down the road to an addiction, with all the common symptoms, including inability to concentrate, insomnia caused by visualizing new combinations and near financial ruin from skipping work in order to plant seedlings or make more cross-pollinations.

x *Pardancanda norrisii*, for those unfamiliar with this intergeneric hybrid, is the result of numerous attempts made over many years by Mr. Norris of Owensboro, KY at cross-pollinating *Belamcanda chinensis* with *Pardanthopsis dichotoma*, formerly known as *Iris dichotoma*. Both species are native throughout much of China and Korea with *Belamcanda* extending into Japan. While they may resemble one another in overall plant habitats (both parent commonly reach at least 36" (91cm) tall with flowers approximately 2" (5 cm) in diameter), they differ greatly in bloom shape, color and time of day that the individual flowers open. *Belamcanda* has relatively flat flower with three sepals and three petals that are nearly equal in size and shape, and primarily yellow or orange base color, spotted orange or red, sometimes with a touch of white near the base of the sepals and a simple stigma. The blooms open shortly after sunrise and close before dusk. On the other hand, *Pardanthopsis* flowers do not open until between 3 and 4 pm and may remain open well after sunset. The sepals and petals are held in different planes, as in the genus

Symposium: Special Reports

Iris. The sepals are bent at the hafts. The sepals are usually lavender with a white signal and darker lavender spots while the petals are more upright flaring and solid lavender in color. The stigma also resemble those in the genus *Iris*, being separated almost to the base into three style arms.

The seed capsules of *Belamcanda* are similar in shape to an ordinary hot air balloon. They are rather unique in that the capsule walls dehisce by flexing back toward the stem. The seeds remain attached to the central axis well into winter and indefinitely if the stem is cut and brought indoors. The seed coats are round and glossy black, reminscent of blackberry fruits. *Pardanthopsis* capsules are similar to those of *Iris confusa*, long and cylindrical, and splitting at the top upon maturity to spill the brown, angular seeds. Each seed has a wing-like protrusion resembling that of *Iris nepalensis*, although the seeds are similar in shape and size to those of *Iris confusa*.

Their hybrids provide a mixed bag of characteristics, intermediate between the two parents in early generations, but soon reverting back to those of the original parents in most characteristics with the exception of color. The plants with flowers similar in form to *Belamcanda* retain a wide color range, though orange still predominates. Those with *Pardanthopsis*-type flowers produce mostly typical lavender colored flowers with occasional white, purple or pink flowers showing up. My first challenge was to produce plants with iris-type flowers in wide color range.

I began by requesting seed from Mr. Norris and Gerorge Bush of York, PA (Mr. Bush had advertised the first registered *xPardancanda* cultivar "Summer Snow" in an AIS Bulletin at the time). The resultant seedlings blomed during the summer of 1984. All had iris-type flowers in shades of lavender and white and were over 36 inches (91 cm) tall with narrow petaled flowers 1 1/2 to 2 inches (3.8 -5 cm) in diameter. These were cross-pollinated with the richest orange *Belamcanda* type seedlings to begin what I thought would be a long process to producing yellow and orange-flowered intermediates. To my surprise, I found one yellow and three orange-flowered intermediates on the first attempt. No one had ever achieved this before.

With this first batch of seedlings in bloom I had more diversity to observe, and that lead me to widen the scope of my hybridizing program. My idea was to enhance many characteristics and continue to work toward a

Symposium: Special Reports

larger goal. The characteristics I wanted included increased plant sturdiness, a range of heights from 1 ft (30.5 cm) to 6 ft (183 cm), large quantities of flowers per stem, increased petal width, larger flower size, a greater color range, expanded time of flower opening and many more. With this in mind, I began crossing the best plants exhibiting one or more of these characteristics. I began what I called "quantity for quality", producing large number of seedlings (10,000 or more) to find the top 5 to 10 plants exhibiting the most improvement for specific characteristics.

In 1986 I moved from Pennsylvania to central Massachusetts and a 20° F colder winter climate. Unknown to me at the time, two plants bloomed that would revolutionize my program. They were a wide petaled, bright yellow, near-iris type intermediate and a new strain of *Pardanthopsis* from Korea. Unfortunately, due to a second move, it was two years before I realized their potential value. Meanwhile other beautifully formed, wide-petaled iris-type flowers began showing up as well as a few orange colored, near-iristypes (A "near-iris type" flower is one that is still intermediate between the two parents in flower form, etc, but closer to the iris type).

The strain of *Pardanthopsis dichotoma* from Korea was much different from the original strain used by Mr. Norris. The leaves did not extend more than 1 ft (30.5 cm) from the ground level. They were sickle-shaped and curved away from the stem, very reminiscent, but larger than some aril species. The flowers were more bluish and in 1988 I realized that some plants produced as many as ten flowers from a single spathe. Previous forms produced only three to five per spathe like *Belamcanda*. The Korean strain is also unique in that about 25% of them readily cross pollinate with *Belamcanda* from my experience. Mr Norris spent nearly ten years attempting this cross before finding a successful match!

The wide-petaled yellow-flowered near-iris type turned out to a dwarf with abundant branching and as many as 85 flowers per stem. With these two parents crossed to everything, 1988 was a bountiful year for seed production. Unfortunately, the seed were not planted until the autumn of 1989 and the seedlings didn't mature until 1991. When they did it was amazing. Nearly all of my early goals were reached that year: fabulous flower form, sturdy plants, a range of heights, phenomenal branching - some with over 100 spathes on a single stem, wide petals and

Symposium: Special Reports

a great variety of colors and color combinations. There were deep purples, sparkling lavenders, bright whites and pinks and beautiful yellows everywhere, even a few oranges and a real red. My favorite was a light pink intermediate with a purple signal. It produced over 150 2-1/2 inch (6.6 cm) diameter flowers per stem. Each stem is only 24 inches (61 cm) tall with small, blue-green leaves. The flowers even opened early at 10 am. Now if I can only get a wide color and height range of iris types that are open by mid-morning, I'll be ready to introduce them and let other hybridizers take over. Although there are those two characteristics I noticed in 1991 that I wouldn't mind seeing combined into a single plant: ten flowers per spathe x 100 spathes per stem equals ?and of course they'd have to come in different colors.... and different heights.... well, maybe only a few more sleepless nights !

Part 2: Growing x *Pardancanda*

In my experience, germinating x *Pardancanda* from seed is easy. Nearly 100% germination will result from seeds sown outdoors in the autumn before the ground freezes. They should be planted 1/4 inch (.6 cm) deep in the soil. Seeds germinated in this manner often bloom the first year in climates with a six to eight month growing season. To assure first year bloom, I plant the seeds indoors in early February. I use an ordinary seed-starting mix comprised of approximately 2 parts peat moss sifted through 1/4 inch (0.6 cm) mesh, 1/2 part small aggregate such as perlite or small grit and 1 part fine vermiculite. The seeds are covered with a 1/4 inch (0.6 cm) of the mix, watered, and then placed under fluorescent lights. The soil temperature is 70° F (20° C). Germination occurs within a month. *XPardancanda* seeds resembling those of *Pardanthopsis* give 80-90% germination with this method, intermediate-type seeds give 50-70% germination while only 10-30% germination will be achieved from *Belamcanda* type seeds. These appear to require a cold stratification to obtain higher germination results. After germination they are fertilized bi-weekly with a weak liquid fertilizer solution. In mid-April, when the nights are frost free, I move the seed flats outside to a cold frame for two weeks to harden off the seedlings before planting.

In the garden, x*Pardancanda* prefer a sunny site. Full sun is ideal, but many will survive and bloom in partial shade. In less light they have

Symposium: Special Reports

fewer flowers, tend to fall over or lean toward the brightest light and have a greater affinity to slugs and leaf spot. Both of these culprits can render the leaves unsightly for the remainder of the season and will weaken the overall health of the plant. The plants grow best in loose, ordinary garden soil. They will rot in soils that are primarily composed of clay and remain water-soaked over winter when the plants are dormant. Sturdy plant habit can be achieved by siting the plants in somewhat lean soil. Plants become too robust and require staking in overly fertile soil. They are very tolerant of dry, sandy soil and even salt, which makes them ideal for roadside or seaside planting.

Part 3: Relationship and Hybridization with Member of the Genus

Iris.

Prior to Mr. Norris, I am unaware of information suggesting that anyone else has attempted pollinating *Pardanthopsis (Iris) dichotoma* with *Belamcanda*. In fact, Mr. Norris spent nearly ten years making cross-pollination between numerous individuals of the two genera before he found a *Pardanthopsis* that would cross successfully with *Belamcanda*.

Prompted by this one successful cross-pollination with *Belamcanda* and the fact that there were no reports of successful cross-pollinations with other members of the genus *Iris*, Dr. Lee W. Lenz of the Ranch Santa Anna Botanic gardens decided to remove *Iris dichotoma*, as it was formerly known, from the genus *Iris* and to create the new genus *Pardanthopsis*. (ALISO 17:4, pp.401-403, July, 1972). Using a chart describing their morphological characters he attempted to show that *Iris dichotoma* is more similar to *Belamcanda* than to the genus *Iris* as a whole. Being a novice, it sounded convincing to me. Of course, *Belamcanda chinensis* and *Iris dichotoma* bloom at the same time of the year, so it is more likely that someone would eventually attempt crossing the two. Other iris species have long completed their bloom season. One would have to collect and store pollen or force plants into bloom out of season to attempt hand pollinations.

My opinions began to change in 1986 when I saw a picture of *Iris* "Darjeeling" , a second generation hybrid between *I. confusa* and *I. japonica*, on the page facing 141 in *The Iris and its Culture* by Jean Stevens, New Zealand. The picture shows a clump with over fifty scapes

Symposium: Special Reports

reminiscent of the visual effect produced by a large mass of *Iris dichotoma*. Immediately I set out to learn as much as I could about these so-called "tender Evansias". In 1988 I acquired three plants through a friend visiting California *I. japonica*, *I. confusa* and the robust *I. "Darjeelling"*. When the first flowers opened in early February 1989, it was obvious to me that they possessed enough similarities with *I. dichotoma* that I might be successful in crossing the two. Unfortunately, "Darjeeljing" lacked pollen and the few flowers produced from the other two barely produced enough pollen to make saving it worthwhile, but I did.

In August of the same year I attempted crossing the two groups. Pods did indeed form from crosses with *I. confusa*, but none from *I. japonica*. I also saved pollen from *I. tectorum* and *I. milesii*. Cross-pollinations with the latter also produced pods. I could hardly contain my excitement when, after two weeks the pods remained and were growing. Unfortunately it was not to be. After one month all ten pods had fallen off. The normal size seeds enclosed were empty inside .

I did not view this small attempt as a failure. To me, it was proof that such a cross could be successful, but it would require more pollen to find the right match. Perhaps another Evansia clone might also be required. I began to acquire every tender Evansia available. In 1991, I tried more crosses with similar results. No success with *I. japonica* varieties or named hybrids, but a few more pods from *I. confusa* and *I. c. "Chengdu"*, This time one mature seed formed. Of course it didn't germinate!

Then my mission changed. Perhaps what I needed was not more pollen from these two clones, but more clones with various genetic combinations in order to find one that would match. I began hybridizing tender Evansias in hopes of creating a seedling in the second or third generation that would be fertile with x *Pardancanda* or *I. dichotoma*. At the moment I am in pssesion of seeds from F2 crosses awaiting germination.

Meanwhile, my reason for crossing the two changed. Originally I saw two beneficial qualities the Evansias could pass on to x *Pardancanda*. In my cool dining room where the Evansias bloomed January through March, the flowers lasted for two to three days. This would certainly give hybrids with flowers that lasted at least a day, whereas present x *Pardancanda*

Symposium: Special Reports

opened at noon at the earliest. The other characteristic I believed that would make a difference was the long rhizomes *Evansias* produced. *XPardancanda* produced extremely short rhizomes. After three or four years, the clumps tend to die out. I attributed this to the thick mass of rhizomes inhibiting growth of the newer rhizomes which soon die. If I could create plants that spread three inches (7.5 cm) a year, they might live longer.

The first characteristic proved untrue when a late summer bloom spike appeared on one of my hybrid *Evansias* seedlings. The blooms lacked enough substance to keep them firm in the August heat. They deteriorated and essentially closed up in less than day. The spreading rhizome characteristic has become less necessary since advanced *Pardancanda* have now survive five and 6 years without being divided. The idea of introducing genes of the *Evansia*, unable to survive 20° F (-4 °C) without complete bloom stalk destruction into something at the limit of its hardiness range here in Massachusetts, where it drops to -20° F (-27 °C) , has never been appealing. The only reason left for me attempt more crosses would be to prove the close relationship.

During this time I have made many comparisons between *Iris dichotoma* and tender *Evansias*. Surely Dr. Lenz did not have the recent species introductions, imported after he removed *Pardanthopsis* from the genus *Iris* in 1972, with which to compare. He may not have considered their close examination worthwhile. In light of my finding, I believe they are.

Using the same morphological features Dr. Lenz used (No. 1-10) to separate *Iris dichotoma* from the genus *Iris* as whole, I have made the following comparison using *I. confusa*, *I. dichotoma* and *Belamcanda*. These comparisons clearly show that *I. dichotoma* approaches *I. confusa* in more respects than it does *Belamcanda*. *Iris setosa* has been used in the comparison to highlight the wide diversity within the genus *Iris*. To assist others in making similar comparisons, three clones of known wild origin were used. *Iris confusa* 'Chengdu' collected in Sichuan, China, *I. dichotoma* and *Belamcanda* both collected on islands off the coast of Korea in 1986 by the National Arboretum and growing in the Asian collections of that institution.

Comparison of *Iris* species with *Belamcanda*

<i>Iris setosa</i>	<i>Iris confusa</i>	<i>Iris dichotoma</i>	<i>Belamcanda</i>
1. After anthesis flower parts assume no regular arrangement.	After anthesis flower parts assume a loosely-spiraled arrangement.	After anthesis flower parts assume a tightly spiraled arrangement.	After anthesis flower parts assume a tightly spiraled arrangement.
2. If articulated then above the ovary.	Articulation below the ovary.	Articulation below the ovary.	Articulation below the ovary.
3. Perianth tube present.	Perianth tube present.	Perianth tube absent.	Perianth tube absent.
4. Flowers remain open for more than one day.	Flowers remain open for one day or less in warm temperatures.	Flowers open between 3 and 4PM and close by early morning lasting less than one day.	Flowers open around 8AM and close by 7PM lasting less than one day.
5. Blooms in June.	Blooms in May.	Blooms in July & August.	Blooms in July & August.
6. Inflorescence with few branches (up to 3 branches), alternately spaced with a definite terminal spathe.	Inflorescence with many branches alternately spaced, with a definite terminal spathe, the lower branches usually branched as well (with up to 23 branches).	Inflorescence with many branches alternately spaced with a definite terminal spathe, the lower branches usually branched as well (with 15 to 20 branches).	Inflorescence with many branches alternately spaced, usually without an obvious terminal spathe.
7. Style branches large, petaloid in shape, divided nearly to the base; each style branch with stigmatic flap on underside and two style crests above.	Style branches narrow, slightly winged, divided nearly to the base; each style branch with a stigmatic flap on underside and with two style crests above.	Style branches narrow, slightly winged, divided nearly to the base; each style branch with a stigmatic flap on the underside and with two style crests above.	Style branches not petaloid or winged, divided about 1/3 the length of the style; tip of each division divided into three parts, outer ones rolled inward, center one forming a lip-like flap, all three parts stigmatic.
8. Stamens held firmly against the underside of the style branch.	Stamens held firmly against the underside of the style branch.	Stamens held firmly against the underside of the style branch.	Stamens free, not held against the style.
9. Sepals geniculate, with a distinct claw and blade.	Sepals geniculate, with a distinct claw and blade.	Sepals geniculate, with a distinct claw and blade.	Sepals not geniculate or separated into a claw and blade.
10. Hybrids with <u><i>I. confusa</i></u> , <u><i>I. dichotoma</i></u> or <u><i>Belamcanda</i></u> unknown.	Hybrids with <u><i>Iris setosa</i></u> , <u><i>I. dichotoma</i></u> or <u><i>Belamcanda</i></u> unknown, but pod stimulation was achieved from a limited amount of crosses with <u><i>I. dichotoma</i></u> .	Hybrids with <u><i>Iris setosa</i></u> and <u><i>I. confusa</i></u> unknown, but pod stimulation was achieved from a limited amount of crosses with <u><i>I. dichotoma</i></u> . Hybrids with <u><i>Belamcanda</i></u> were achieved after numerous attempts with <u><i>I. dichotoma</i></u> as pod parent.	Hybrids with <u><i>Iris setosa</i></u> and <u><i>I. confusa</i></u> unknown. Hybrids with <u><i>I. dichotoma</i></u> were achieved after numerous attempts with <u><i>I. dichotoma</i></u> as pod parent. No pod stimulation recorded from crosses where <u><i>Belamcanda</i></u> was the pod parent.
11. Petals generally subulate, very small compared to sepal.	Petals generally oblong-emarginate, somewhat smaller than sepals, unspotted.	Petals generally elliptic to oblong-emarginate, somewhat smaller than sepals, unspotted.	Petals oblong, not emarginate, nearly equal in size to the sepals, heavily spotted.
12. Seed capsules elliptic-obovate, splitting at the top upon maturity at which time the seeds detach.	Seed capsules narrow-oblong in shape, splitting at the top upon maturity at which time seeds detach.	Seed capsules narrow-oblong in shape, splitting at the top upon maturity at which time seeds detach.	Seed capsules elliptic obovate, splitting at the top upon maturity, valves reflex to expose column covered with seeds which usually remain attached for months.
13. Seeds somewhat rounded, with glossy, light brown, somewhat hardened seed coat with conspicuous raphe down one side.	Seeds somewhat angular, with dull brown seed coat that is tightly attached to the seed.	Seeds somewhat angular, with dull, dark brown seed coat that is tightly attached to seed and a papery wing about 1/3 as long as the seed on one end.	Seeds round, with glossy black seed coat that is very loosely attached to the seed.

Symposium: Special Reports

Upon examination of the characteristics, Dr. Lenz used (No. 1 -10) to separate *Iris dichotoma* from the genus *Iris*, I believe it is highly unusual to use bloom season, the length of time individual bloom remain open and branching as criteria for separating genera, especially when the differences are minor. Disregarding these three, *I. dichotoma*, is similar to *Belamcanda* in (1) arrangement of floral parts following anthesis, (2) articulation below ovary and (3) absence of a perianth tube. It is similar to *I. confusa* in (1) arrangement of floral parts following anthesis, (2) articulation below the ovary, (3) the structure of the style branches, (4) position of the stamens and (5) having geniculate sepals. Additional comparisons made by me (Nos 11-13) of petals, seed capsules and seeds show even more similarity between *I. dichotoma* and *I. confusa* while differing even further from *Belamcanda*.

The genus *Iris* is a large and varied one. As it is clearly outlined here, *I. dichotoma* shares more characteristics with *I. confusa* than *I. confusa* shares with *I. setosa*. If *Iris dichotoma* can be removed from the genus based only upon a few difference isn't the entire *Iris* Genus in jeopardy?

GROWING IRIS: STEPPE BY STEPPE

By Panayoti Kelaidis

MATCHING IRIS TO MICROCLIMATE IS A SECRET OF SUCCESS FOR GROWING A RANGE OF SPECIES.

From the very inception of the Rock Alpine Garden in the Denver Botanic Gardens, the genus *Iris* has been featured as one of the principal genera to furnish this garden. Representatives of practically every section of the genus can be found in this garden, most of them growing with the same vigor you would find in nature. This includes everything from the supposedly tender, maritime Pacific Coast species (Section *Californicae*) to woodlanders such as the Gladwyne (*Iris foetidissima*), moisture loving Japanese Irises (*Iris ensata*) to the heat tolerant arils. Ironically, the Rocky Mountain iris, *I. missouriensis* Nutt., named for the river along which it was discovered, is the only iris that occurs naturally throughout the extensive Western Intermountain Region, the Rocky Mountains and the High Plains. In Colorado it occurs from the lower fringes of the foothills zone to the upper limits of the tree line. This wild iris is one of the few native wildflowers that has probably increased its acreage since the advent of settlers. Cattle and sheep avoid eating its toxic foliage; as a result, overgrazed pastureland often presents glorious displays of this lovely flower.

Interesting color variations of the Rocky Mountain Iris, including albinos and a deep-purple clone, have been selected to grow in the Rock Alpine Garden. This garden was conceived as a place where plants adapted to natural environments such as alpine tundra, desert, cliff and bog could grow in a garden setting. Only a handful of wild irises are adapted to arctic and alpine environments, but many species grow on the high, dry plains of central Asia. Most of these are truly dramatic in growth form and flower color; and some are being grown in the Alpine house and on the dry steppe portion of the Rock Alpine Garden adjoining the Plains Garden. Most irises, however, are woodland or streamside plants from climates with moderate rainfall. At present approximately seventy species of irises are growing in Rock Alpine Garden. Let's take a casual walk through the garden located in the southwest corner of Denver Botanic Gardens and preview its beauty in the coming months. We will have to rush a bit, for the season of wild iris

bloom is rather long; most years reticulate irises will bloom in February and Vesper Iris not until August.

As we enter the garden to the left we will see several of the crested irises (section *Lophiris*). We are confronted with *I. tectorum* Maxim. in both the blue and white forms. A vigorous and carefree plant in Colorado, it is found in many local gardens where it will thrive under most any garden regimen short of desert. Called the Japanese roof iris, since early travelers to Japan reported that it grew on the thatched huts of those islands; botanists now believe it is actually Chinese in origin. A close relative is *I. japonica* Thunb., a lush, evergreen species which produces long panicles of pale, frilly, orchid-like flowers. This iris, too, is apparently Chinese in origin, although it currently occurs spontaneously throughout most of the lowland regions of Japan. The clue to its origins is the fact that this Japanese crested iris never produces viable seed in Japan. The millions of plants throughout the islands apparently originated from a single, sterile importation. Unlike the hardy roof iris, it is only marginally hardy in colder regions: for several years this prospered in Denver, until a series of hard winters reduced it to just a few fans..

As we continue along this montane slope, with its woodsy soil and shade from young paperbark and amur maples, we encounter another crested iris. This is the Crested Iris, *I. cristata* Solander in three color forms, that has woven an almost impenetrable mat under these trees over the last two growing seasons. Its low leaves are broad and pale green, forming a lovely ground-cover in summer. This is fortunate, for the flowers are often criticized for being ephemeral. The crested iris invariably blooms during the two or three weeks rainy season Colorado seems to have each year in May. During these weeks, there is an almost constant progression of the striking, flat flowers that have an icy, translucent color in the blue forms. and an ivory texture in the albino. The Eastern Crested Iris has proven a good plant for a variety of sites in Colorado gardens, but needs a certain amount of hand weeding and replanting every three or four years to maximize blooming.

Several robust clumps of *I. graminea* L. occur in the background of the montane slope. Few visitors can enjoy the flowers, but it will reward those who seek them out, buried deep in foliage, for the waxy spuria blossoms smell exactly like a ripe plum. Nearby we have *Iris sintenisii* ssp.

urumovii, another compact spuria section iris. Here the leaves are even thinner, and the flowers a bluer shade. Although both of these irises are rather widespread in the eastern Mediterranean region they adapt to a surprisingly variety of sites in local gardens blooming in late May. They both tolerate full sun in rich soils even managing to grow in full shade if provided adequate moisture. Tucked along the skirts of a Colorado Blue Spruce, we have several large clumps of *Iris foetidissima*. No other hardy iris has such lustrous, broad evergreen leaves. Of course, the rather squinny lavender flowers are nothing to write home about, but no iris can boast a more spectacular, long-lasting seed pod--reminiscent of bittersweet. This is a great candidate for covering ground in shady areas--tolerating quite dry conditions.

A number of unusual, inter-sectional hybrids occur along the path from here to the summit of the garden. These are the so-called "Cal-Sibes", hybrids between the Pacific Coast Irises (series *Californicae*) and Siberian irises. All of these hybrids were produced by Jean Witt of Seattle, WA and appear to be vigorous in Colorado. They possess the lustrous, glossy, semi-evergreen foliage of California irises with the vigor of Siberians. The hybrids do best in an open woodland setting, and need periodic division.

Looking to the west of the path at the scree mound opposite the montane slope, you will notice several species of dwarf bearded irises, that supreme section of the genus for rock gardens. The dwarf bearded irises are the most prevalent wild iris in southern and eastern Europe, where they occur from the higher elevations in Greece, Italy, and southern France to the very margins of the Mediterranean Sea. A number of species have been planted throughout the Rock Alpine Garden, beginning with the tiniest of bearded iris, *I. suaveolens* Bossier & Reuter which occurs in a variety of colors and sizes throughout the Mediterranean basin. This iris can be distinguished from other dwarf bearded iris by its tiny stature and sickle shaped leaves, and by its difficulty of cultivation.

I. reichenbachii Heuffel grows a little further along on this same mound. Much larger in size and more robust, it forms sizable patches in a brief period of time. Primarily Balkan in distribution, this dwarf bearded iris blooms in a wide range of yellow and purple tints. We grow several forms varying from a bronzey-yellow-flowered form to a deep-purple

clone, both of which will grow under various conditions of cultivation. They have persisted without division for over a dozen years.

Moving onto the fell field and the north slope we come upon *I. setosa ssp. canadensis* (M. Foster) Hulten, a reputedly dwarf variety of the Labrador Iris, although it is only six inches or so smaller than Alaskan forms. This subspecies is prevalent in Labrador and extends to northern Maine on the eastern seaboard. *I. setosa* Pall. ex Link is one of the most widespread of irises, occurring in Siberia, northern Japan and most of the arctic reaches of North America. While the Labrador Iris has been in the garden for only two years, each clump produces dozens of flowers over a six-week period. It is sure to attract attention in June, as it overlaps with tall bearded irises in blooming period. The smoky, gray-blue flowers are not nearly as showy as the Alaskan form of the same iris found further along this slope; but to sophisticated tastes, a clump of Labrador Iris in bloom is second to none.

Another few paces along this slope grow some robust plants of *I. bracteata* Watson, one of the lesser known native American irises belonging to the series *Californicae*. It is reputed to be a difficult plant to grow in many parts of the United States, but given an acid soil rich in humus with a sunny exposure and mulched with pine needles this has proven a reliable garden plant in Colorado. It has lustrous, evergreen foliage of a very waxy and almost succulent texture. The orchid-like, yellow blossoms are produced in late May and June; lasting for several weeks on an established clump. Unlike bearded iris, the Pacific Coast native irises do not like to be disturbed. In our climate, a clump can persist for several decades without needing division.

Further along the same side of the north slope is one of the greatest prides of the garden, a large bed smothered with *I. ruthenica* Ker-Gawl. This unusual little iris has been found sporadically from eastern Europe all across Eurasia to the Pacific Coast, occurring in a bewildering variety of sites and climates. In our area it seems to grow well in any good garden soil in part shade or sun, forming huge mounds of grassy foliage with an amazing profusion of miniature jewel-like flowers throughout most of the month of April. In wet climates, the Ruthenian Iris can go years without blooming. In Colorado, they have proven long-lived and relatively easy to

grow. Divide them in the spring or early summer when they're in active growth. They love a rich, humusy loam with lots of sun..

Across the crushed limestone path on the fell field, *I. lacustris* Nutt. has formed a number of dense, diminutive mats. This is one of the tiniest wild irises, rarely exceeding two inches. In nature it was largely restricted to woods and meadows around the margins of the Great Lakes, but vacation home development has almost wiped out this American wild iris. A difficult plant to grow requiring moisture, lime and humus, it thrives here along the path producing dozens of miniature sapphire renditions similar (only half the size) to its close relative, *I. cristata*. The albino appears to be just as easy to grow as the type. The type form, bright blue, has been proposed for endangered species status. Imagine what ethereal status of rarity the albino must qualify for? Nevertheless, it's been making the rounds of rock gardeners in recent years, and seems no harder to grow than the type.

Further west along this same slope one can find several large clumps of *I. minutoaurea* Makino. another miniature iris. This one comes from Manchuria and Korea and belongs to the little known series *Chinenses* of the genus *Iris*. It also produces tiny, jewel-like flowers, but of a pale yellow and mahogany color, among the grassy tufts of leaves.

I. kemaonensis Wallich ex D. Don is the last tiny iris one encounters on this side of the path. This almost mythical iris is named for the Kamaon or Kumaon region of the western Himalayas, where it can be found up to 15,000 feet in elevation. It is regarded as one of the best series *Pseudoregelia* irises, the highest alpine of all iris species. They form low, blunt-leaved mounds of foliage and produce their strange flowers early in spring. These flowers are usually pale blue, blotched with a bizarre pattern of pink, white, and deeper blue. We obtained seed of its tinier cousin, *Iris goniocarpa* collected in Qinghai Province in China, not far from the Kokonor. It is a perfect specimen for the alpine garden, only 4-6" tall with jewel like mottled blue flowers.

Iris enthusiasts are invariably surprised and pleased to see how well *L. verna* L. has taken to cultivation in Colorado. In our garden it grows along the crown of the north slope just above the water fall, forming dense mats of glossy, deep green leaves that bronze considerably under our winter sun. Nevertheless, this eastern woodland iris seems to grow far

better here in sun with acid, peaty soil than under any other regimen. It blooms and grows prolifically here.

Around the bend in the path at the summit of the garden, clumps of native Alaskan *I. setosa* grow along the stream bank. There are a variety of Pacific Coast Native Irises growing on the west side of the path, including the yellow form of *I. tenax* var. *gormanii* (Piper) Foster which was once very rare in the Coast Range of Oregon. As more of the mountains around Portland were clear-cut, this, this once rare iris emerged from long-buried seed in ever increasing abundance so that it is now regarded as relatively common. This grassy-leaved iris produces dense tufts of foliage and very large flowers, sometimes five inches across, of a pale, lemon-yellow tint.

Another yellow-flowered Oregonian can be found further down the slope. *I. chrysophylla* Howell produces many blue-gray or silvery leaves and spidery flowers of a straw-yellow or creamy tint. This is regarded as one of the more temperamental and temporary Pacific Coast irises, although it has persisted with undiminished vigor more than seven years in Colorado. *Iris douglasiana* Herbert has grown for even longer in a number of local gardens. In nature it is restricted to the narrow fog-belt of the Pacific Coast. It has grown for over 15 years in Allan Taylor's Boulder, CO garden. A number of plants have been established here in the Rock Alpine Garden. It is a rather variable iris with three or four inch wide flowers blooming in June above the deep green, winter-persistent foliage.

On the back side of the boulder field, a large clump of *I. milesii* Foster from China has been established. This is the largest of the hardy crested irises, but one of the least known in cultivation.

Other native irises have been established along the northern slope of the upper seepage area. *I. tenax* Douglas ex Lindley, in its most common blue and purple forms, is growing among a variety of ericaceous plants on this peat bank. This most common "Oregon" Iris is one of the loveliest wild flowers of the Willamette Valley. It is probably the hardiest of the Pacific Coast irises since it is deciduous.

The first irid to be planted on the limestone cliffs was the unusual Vesper Iris, *Pardanthopsis dichotoma* (Pallas) Lentz which was included in the genus *Iris* for many decades. Iris-like in shape, each flower lasts only one day, opening in the late afternoon and closing shortly after dawn most

summer mornings, so only a few nocturnal insects enjoy its beauty. This strange iris from northern China and Manchuria, blooms not only late in the day, but also late in the year, rarely starting to blossom until late July. The common form of this irid is a smoky lavender purple in color, flecked and speckled with white and dark blue--a jewel of a blossom. We have subsequently obtained an accession of this same species collected on the Great Wall of China that is white in color, with similarly dramatic markings.

On a steep, west-facing bank of this garden we planted a cultivar obtained from the Danielsons in Chapparral, New Mexico as *Iris* "Dushanbe". This appears to be a pure *Regelia* section hybrid and I suspect that it could be a cross between *Iris hoogiana* and *I. stolonifera*. The shape of the flower is typical *hoogiana*, but the color is an extraordinary mahogany brown suffused with dark purple; a color that would seem to be subtle, but in fact stands out dramatically. This is a vigorous plant in a section noted for its vigor and has spread to cover an area a yard or more in extent.

There are several large clumps of *Iris* "Sea Bass" growing a few yards from 'Dushanbe'. This too is a hybrid, actually produced by the Danielsons at Pleasure Iris Gardens. It is a pure *Oncocyclus*, however, and one of the largest flowered plants in that group we have ever grown. The flowers have tremendous substance, and each can be nearly 10" tall and almost as wide. The first day the flowers are open, the falls cup out in a peculiar, let's say almost "fishy" fashion, hence the name. The pale, almost white, background color is striated in a dramatic fashion with thin, brown lines.

On the shady side of the north slope grow large clumps of *I. gracilipes* A. Gray in the blue, white, and strangely contorted double form. Sometimes described as the most delicate of irises, it forms a graceful swirl of wispy leaves and cartwheel of wiry stems with the prismatic inch and a half blossoms quivering atop the clump during most of May. This rare Japanese iris requires shade, drainage, humus-rich soil and moisture throughout the growing season, but once established it is permanent and one of the loveliest of rock garden plants.

A number of other cool-loving irises have established in niches among the rhododendrons, daphnes and ferns of this bright, but cool, steep peat bed. *Iris colchica*, like a slightly wider leaved, more compact *I. graminea*, has grown in one spot for years. This is the bed where *Iris*

goniocarpa has done the best: this tiny high alpine *Pseudoregelia* was collected by a botanist friend in the Qinghai region near Xining and the famous Kokonor lake in the province neighboring Tibet. It is a very tiny plant, with leaves only six or eight inches tall by summertime. The flowers are produced fleetingly in flushes all the late spring; the rounded outlines size of a quarter in dark lavender with smoky mottling some horticulturists associate with virus. I am very proud of our few clumps, they are being pampered and coaxed to reproduce. We have grown its larger relative, *I. kamaonensis*, on several occasions on this slope where it seems to prosper for a year or two before it disappears. I am not sure what it needs to be long lived in Colorado. We also have four or five slender clumps of *I. kerneriana*, a delicate Turkish spuria that grows 18" tall and has white and yellow flowers in late spring. It seems to like a somewhat cooler root run than most spurias.

A low, moist spot on this slope is the first place we succeeded in growing *Moraea huttonii*: the first plant of its genus to be grown at Denver Botanic Gardens (probably anywhere outdoors in this entire phyto-geographic province!). This is an early summer bloomer that looks absurdly like a yellow siberian in bloom from a distance. The flowers are fleeting, however, although new ones open up each day for several weeks. The foliage is a single, endlessly long deep-green channeled leaf around each flower stem that tries to be evergreen in Colorado, but a large clump looks thoroughly bedraggled and wild by winters end when they are best trimmed back hard. We have added another four species in this genus thus far that are hardy outdoors: *M. stricta*, *M. alticola*, and the true *M. spathulata*, with an army of seedlings of other species marching along to be tested outdoors. There are likely to be several dozen hardy moraeas, mostly from the cool, wet alpine slopes of the Drakensberg. They make wonderful companions to moisture loving irises in peat beds.

Opposite, on the moraine mound, are several unusual bulbous irises. *I. reticulata* M. Bieb pierces mats of *Herniaria glabra* L. and *Paronychia kapela* (Hacq.) Kerner in early spring. These dazzling early spring bloomers, rarely grown by local gardeners, will grow vigorously in a variety of sunny sites in a Colorado garden and are available from local garden shops. Even more striking, perhaps than *I. reticulata* is *I. histrioides* (G. F. Wilson) S. Arnott var. *major* Grey which also blooms in late winter

most years and belongs to the same section of the genus. The flowers in this Turkish iris are sometimes five inches across, and emerge before the leaves pierce the ground. They last remarkably well for weeks on end and through snowstorm after snowstorm.

The Juno irises have captivated the imaginations of gardeners from the time that Thomas Jefferson first grew *I. persica* L. at Monticello. Bulbs of this fabulous, sea-blue winter iris are still grown by gardeners; although, regrettably we have none in the Rock Alpine Garden. Other junos obtained from England are planted out here and there in the Rock Alpine Garden, most in small colonies still at this point. We are particularly struck with the lovely lavender blooms on *Iris wilmottiana*, with darker markings. *Iris warleyensis* is a particularly striking and long lived Juno with dark blue and purple-black striped flowers. One Juno has established itself as a superb rock garden plant; *Iris bucharica* Foster resembles nothing so much as a miniature corn plant with Dutch iris blossoms pinned to the leaf axils. The form growing on the moraine mound is a two tone yellow and cream in color, and more dwarf in stature than most *I. bucharica* cultivars. In England this iris often exceeds two feet in height, and ranges from yellow to pure white in color. We have recently received a chrome yellow form of this iris of a much darker shade than the familiar plant in commerce. And of course, the white form is stunning.

For many years the only iris growing along the stream below the waterfall was *Iris ensata* Thunb. grown from seed collected in the wild in Japan. This striking iris has deep purple, yellow-splotched flowers which are more graceful than its huge flowered "Kaempferi" progeny. Although it is a gorgeous plant that thrived for four or five years, the lime in the surrounding rock apparently weakened our clone, and it has gradually faded away, after we were duly warned by chlorotic foliage. A short ways further along the path and a long strip of boggy soil has been planted to *Iris typhifolia*, from seed distributed a few years ago by Dr. James Waddick, collected in Northern China. We grew over 100 plants from this collection and they have been all planted in this one site. Fortunately, the conditions suited our plants, and they have clumped up so that they can have over ten flowers per clump. The leaves are over 5 mm broad, much too wide for true *typhifolia* according to the books. I suspect the authors of Rocky Mt. handbook I don't believe the Chinese know how rich our

native soils are, the plants seem to have really prospered and outgrown their measurements, as is so often the case in North America.

To the north of the moraine, the lower meadow forms a large flat expanse, a pleasant contrast to the rest of the garden's rocky terrain. The simulated stream bisecting the meadow is bordered with several irises and iris relatives. Let's meet them. Clumps of a strange Siberian iris, *I. sibirica* L. grown from seed originating near Brno, Czechoslovakia bloom in late June with coarsely reticulated blossoms.

Several large clumps of *I. lactea* Pallas occur along the bank further up the stream. This is one of the most tolerant and adaptable irises that grow in Colorado gardens. The form growing here closely resembles our native *I. missouriensis*. except for its white falls blue standards and an unforgettable cigarette-lighter-fluid aroma. I believe we originally received this from Mongolia. We grow a variety of accessions of *I. lactea*: mostly with pale lavender, small spidery flowers. The leaves are far more persistent than our native iris, remaining green and firm well into autumn. It makes a tremendous show for much of May and early June, and seems to thrive in almost any soil or exposure in our climate. This has become a very popular plant with the leading local nurseries in our area.

I. missouriensis is found further up the stream bank in a number of different color forms, from deep blue and purple selected by Alan Taylor from populations near Boulder, to three separate albino clones from three different western states. Other irises growing around the meadow include the dwarf bearded species *I. x barthii* Prodan and *I. furcata* M. Bieb, *I. flavissima* Pallas flourishes on the warm bank at the top of the meadow.

The northern portions of the Rock Alpine Garden are especially suited to dryland irises such as the arils and junos. Here the soils vary from sandy loams to heavy, alkaline clays with a long summer baking among the limestone cliffs. The first year after planting, *I. hoogiana* Dykes, *I. stolonifera* Maxim, and *I. hoogiana* 'Purpurea', they produced dozens of flowers. In another year, the display should be more impressive. Other aril iris in the garden include *I. gatesii* Foster, and *I. iberica* Hoffm.

Every time I survey the Rock Alpine Garden from a distance, my eyes always seem to rest on some view or vista framed with the graceful, arching foliage of iris. Their blossoms light up this garden from the dark days of winter when *Iris reticulata* and its relatives form large patches of

bright blue, yellow and purple, to the late summer when *Iris foliosa* and *Pardanthopsis dichotoma* sparkle at dusk. Even in the depths of winter, the grassy clumps of iris enhance the wild feel of this garden, and form a counterpoint to the predominant mats, tufts, cushions and buns that comprise most alpine plants. They represent the largest number of accessions of any genus in our collections. Quite simply put, they are essential.