

JUNOS: AN OVERVIEW

by Alan McMurtrie

One fundamental question you may be asking yourselves is, are the plants we refer to as Junos members of the genus *Iris*, or members of Trattinnick's genus *Juno*? I don't intend to attempt to try to answer that question here. For that, you'll have to wait until my book about Junos is published. What I do intend to do, is pass on some key points that I've observed and learned over the past few years.

One important point to remember is that Juno species are very diverse genetically. So much so, that from limited studies it appears that each species is unique. This is even the case when two species have the same chromosome counts: they have elements that are the same, and elements that are different. As you would expect, this means that not all species intercross with each other. And when they do, the progeny are very, very often sterile.

Junos are relatively easy to grow, particularly species like *bucharica* and *magnifica*. Everyone should be able to grow those two¹. A few species are tender, such as *planifolia*, *reggis-uzziae*, etc. (the Mediterranean ones). These would actually be perfect for those of you living in southern states where winter temperatures don't go below about 40°F. Clearly you wouldn't be able to grow these outdoors where temperatures drop below freezing. The only "problem" with these tender species is finding sources for buying them; there aren't any.

Things are not always as black and white as we might like them to be. I have come to learn that plants such as Junos do differently in different parts of my garden. Some of it has to do with the amount of invading tree roots, but there are other factors, such as how much drainage is provided (i.e., coarseness, and type of soil), and even just the general layout of one's property and its affect on how quickly the soil dries out. In this last case, if the soil doesn't dry out as fast as it might otherwise, then bulbs in it have more time to increase in size before going dormant. Each of these different spots in our gardens are microclimates. Some of them occur naturally so-to-speak, and others we purposefully create for specific reasons.

If you plant a Juno in your garden and it dies or doesn't appear to be doing well don't give up on that particular species. It may be that you need slightly different conditions for it, or it may be that there were other reasons for the problem. It's simply a matter of trying to assess what the problem

might be. There have been numerous times when I've had newly purchased bulbs die out for no clear reason, yet I have since been able to grow the species. There are also times when it seemed like I had the right micro climate for a species, only to find out that it died out in that location over the course of a couple of years. Fortunately I try to grow each species in several different spots in the garden, so usually at least one of the spots ends up being a good long-term one.

Of course you may be saying that you simply want Junos which you can stick anywhere in the garden and have them do well. If that's the case I would refer you back to *bucharica* and *magnifica*, as well as to some of the hybrids that have recently become commercially available, and which are masquerading as species (see 'Mistaken Identity, Etc.').

One question that you need to ask yourself is: how "good" is the clone that you're trying? Would you believe *bucharica* is not always a good doer? The wholly yellow form PF8223 collected by Paul Furse has taken quite a long time to bloom for me, yet I have been growing it in one of my better spots for Junos. This is not to be taken to suggest that wholly yellow clones all do poorly. I have one clone obtained from a Czech source which has consistently bloomed for three years in a row (four other bulbs received with it have yet to bloom, and they are mature bulbs. Perhaps they're too crowded. The bulbs had been sent as *vicaria*. Time will tell if they are also wholly yellow *bucharicas* or *vicarias*).

I have several bulbs of two commercial *bucharica* clones which are planted side by side. There is a very noticeable difference between the two: one had quite a number of blooms, the other only a few, and it was slightly shorter in height. There was nothing else unique about the latter one, so given its poorer performance I tossed it out last fall.

Clearly you have no way of knowing how good a clone is unless you are able to get your hands on others and grow them beside the ones you already have. You may not be interested in doing this, but it can lead to some interesting "finds" over time.

Your goal should be to propagate good clones, toss poor clones, and keep some of the mediocre ones for genetic diversity. After a few years, a point is reached when you have surplus bulbs. Ideally you then need to find a way of getting them into the hands of others who can continue to propagate them, thus ensuring their continued survival in cultivation. In some ways, the best

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way of doing this, is to start up a small bulb business. Unfortunately for most of us this is a hassle. The whole reason we're growing Junos and other plants is for the love of them. We have limited time for our hobby, and if we were to have any more spare time we would very likely want to spend it doing other things. Yet, a small bulb business is possibly the best way of distributing one's better clones². I believe that one of the reasons *willmottiana* (true) died out in cultivation earlier this century was because it wasn't distributed widely. Personally, I know I want to focus any of my excess time on research and writing; something that I've been doing in earnest for over four years now. Yet, I do have clones that need to get into other enthusiasts hands.

You will notice that after some species names I put "(true)". This is to emphasize that I am talking about the bonified species itself and not a mis-identified Juno being sold under that name. I tend to use "hort." after mis-identified species (i.e.. horticultural form), though "hort." can also refer to a genuine clone of the species in commerce (e.g.. *aucheri* hort.). See 'Mistaken Identity, Etc.'

Cultivation

I won't say much about pot culture other than that it can be used to grow Junos which you wouldn't be otherwise able to, but you have to put the effort into looking after them. If you slip up, they could die (more likely from over watering rather than under watering). Key: water from the bottom; allow the soil to nearly dry before rewatering; use a soil mix with reasonably good drainage, but not to the extent of pure sand, water uptake into the soil would be poor. It may be best to taper off the watering just prior to the plants starting to die down.

In the mid 1980s my primary Juno plantings were in a raised bed of coarse sand. The area was within a three to four foot high wooden frame (like a miniature building), enclosed on it's sides by sheet metal, and covered during the summer with sheets of clear acrylic (forming a sloped roof). I referred to this as my Juno hut. It seemed the safest place for Junos, since I could generally allow mother nature to look after them, but starting in late spring, I could use the acrylic cover to keep rain off. Literature suggested the scourge of Junos was excess moisture.

The intent was that once a plant multiplied I would try a piece of it elsewhere. In some cases starting a Juno off in the hut worked well (e.g..

albomarginata & *warleyensis*), and in others it didn't (e.g., *parvula* & *willmottiana*). For one thing, sand is not the best medium to promote increase, but then slow increase is better than risking a prized plant! However I believe one summer I allowed the hut to get a bit too hot and dry, resulting in loss of two *kuschakewiczii*s which had consistently bloomed there for several years (at least that's the only thing I can think of that might be attributed to their death). A few other *kuschakewiczii*s elsewhere in the hut survived.

I still have my Juno hut, but I plant most of my new Junos straight into raised sandy loam beds out in the open. The only exceptions to this are *nicolai*, *rosenbachiana*, and *warleyensis*. These are actually planted in a section of very coarse sand within the Juno hut. Several *rosenbachianas* died out over time in the coarse sand (concrete sand), but several others in the very coarse sand have continued to do well and bloom. I actually have all three species growing out in the open, but they seem to do slightly better in the hut. For the past three years I haven't bothered to cover the Juno hut during the summer, and the bulbs have done fine. The only exception has been *caucasica*, which hasn't been blooming as well as it had previously. So this past summer I covered the area above it. I'll see whether bloom is improved in 1995.

Both *aucheri* and *caucasica* need a baking during the summer. This showed itself quite evidently in 1993 by virtue of the fact that not one of my *aucheris* bloomed (except for a couple imported the previous fall). This was in spite of having more than 50 bloom stalks consistently for prior years. During the summer of 1992 we had 15 weekends in a row with at least some rain. Normally the grass turns brown, but not so that summer. As a result the *aucheri* bulbs did not get the baking they normally would. All of my other Junos were unaffected. This suggests that, like *Reticulatas*, flower development occurs in August. It's interesting to note that this is at a time when any new bulbs you've ordered have not yet been planted. In contrast, Dutch and Spanish Iris flowers form in April.

Although *aucheri* likes to be baked, its bulbs do not increase well if grown in pure sand or very porous soil. They have a difficult time getting back up to bloom size. I have some which haven't bloomed for at least five years (it's about time that I moved them: I had left them in that spot just to see how they would do). The species *aucheri* does fairly well in sandy loam soil. It even seems to do fairly well in sand loam soil that has been invaded

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by maple tree roots. However, I have some *aucheri* hort. bulbs in good sandy loam which bloomed, but took two years to bloom again. I had fully expected consistent bloom, and am baffled as to why I didn't get it. Some *aucheri* Leylek clones in good sandy loam soil haven't bloomed in the three years that I've had them in that location. The bulbs increase well number-wise, but don't bloom. I can only figure that they must specifically be poor clones³. Other *aucheri* Leylek clones in similar situations bloom well. Dwarf *aucheri* (*nusairiensis* hort.) does only so, so. It didn't do well once the tree roots invaded. It is now doing well in a location which is just starting to be invaded by maple tree roots. However, I still need another two years before I can really say for sure how well it does there.

The species *caucasica* does well in coarse sand. I am trying it in sandy loam, but I don't feel the bulbs are doing all that well. It may be that *caucasica* needs a particularly good summer baking. The sandy loam situation I have it in is in the open garden, and it may be that the bulbs would do better if they had a cover to keep even the low amount of summer rain we usually get off.

A slight word of caution however. Don't let your bulbs over "bake". As well as my loosing some *kuschakewiczii*s (as mentioned above), Panyoti Kelaidis lost a number of *warleyensis*. Just because some species like to be baked doesn't mean they all do.

The *Juno albomarginata* is doing quite well outside of the hut, after being started off in it. I still keep a bulb of *albomarginata* in the hut "just in case". I expect though, that a couple more years of experience will show that, that really isn't necessary.

The species *parvula* bloomed in the Juno hut, but died out after two or three years, whereas it's doing well in sandy loam soil that's been invaded by maple tree roots.

My first bulb of *willmottiana* (true) died out in the hut during it's first winter in my garden. I was quite disappointed over this and I wished I had planted it out in the open garden. However it's hard to say what the problem really was. It might have died regardless. The *willmottianas* (true) I have now are doing quite well out in the open, and they seem surprisingly easy.

The species *willmottiana* (true) is quite a lovely species. It has only recently been reintroduced into cultivation. It is clearly closely related to *kuschakewiczii*. I particularly like a powder blue form which Kew Gardens in

England has. Let's hope it can continually be passed amongst enthusiasts who can insure it's survival in cultivation.

I did have had one additional problem with a *willmottiana* clone. Upon investigating why its leaves weren't coming up, I found the bulb's whole base had rotted. The rot was proceeding towards the top of the bulb. I had received the single bulb the previous fall, and it seemed to be in perfect health when it was planted. I had hoped to cross it with my other *willmottiana* clone, rather than just selfing the latter as I had been doing.

I treat this incident as just a fluke: don't give up, something strange happened and you will likely succeed next time. This same sort of thing happen with purchased *cycloglossa* bulbs. I had *cycloglossa* coming from seed, but one year I went ahead and purchased two bulbs. They rotted the following spring, yet they had appeared fine when planted. It's disappointing to say the least when something like this happens. I have also had at least one *Crocus* species die in its first year here, only to have it thrive and multiply very well after being re-acquired. I can only wonder if the problem is just something related to getting acclimatized, or a dislike to being moved.

I can't understand for the life of me why I can't grow *kopetdagensis* (true). It just keeps dying out no matter where I try it; and this is in spite of the fact it comes from 1000 - 3000 m where temperatures are said to get down to -30°C.

I have also had difficulty with *fosteriana* and *narbutii*. These two survive but don't do all that well in the open garden. I'm not willing to move them for fear they'll dislike the spot I move them to even more, and as a result, die: a catch 22.

It's been my experience that *vicaria* bulbs don't tend to increase in number. A few clones do increase, though somewhat slowly, while others for all intents and purposes, don't increase at all. If you want to get them to increase then you have to force them to do so by cutting off a bit of basal plate and roots (see below).

As you may be seeing from what I've written, it actually takes quite a few years to learn what is best for Junos. In some cases, it may start off appearing like you have a good spot for a given species, but if it doesn't survive more than three or four years, then clearly the spot was not a good one.

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Yes, excess moisture is a problem with Junos, but here in Toronto we don't get enough excess moisture to cause problems. English gardens, or the west coast of North America may be wetter, making growing Junos much more difficult. Even the unusual summer of 1992 with 14 wet weekends in a row didn't have any ill effects on my bulbs. But it may have been that my soil dried out reasonably well between the rainy days.

Elaine Hulbert (Virginia, U. S. A.) has some difficulty with Junos outdoors since in early spring, they have a tendency to put on a fair amount of growth during warm spells, only to get hit hard by cold weather. Often their leaves and flowers are badly damaged. One form of *bucharica* has been "frozen back" three times in the past five years, and has bloomed only once since she moved to Virginia. "When the plants are just in early growth I don't worry about frost at all." It's when they are in full growth that significant damage can occur. "*Caucasica* comes up late enough, with *aucheri*, but couldn't take the cold as well as *aucheri*."

Maurice Boussard (France) mentioned, "all of them have to be grown in a limy but well drained ground. They are sun-lovers. Hardiness is good: withstand the occasional frost of -15°C with their bulbs embedded in hard frozen ground."

Henrik Zetterlund (Sweden) wrote, "the large-growing and late-flowering Junos are quite easy. Most will survive in the rock garden but they need frequent division in order to remain healthy. However, the best place to grow them in Gothenburg is in the glass covered frames in our bulb garden. Here the compost is rich and deep and species like *warleyensis* are capable of building up large clumps."

Brian Mathew (England) wrote about Junos in *Flowering Bulbs For The Garden*; "on the whole little known in gardens, mainly because the majority of them are difficult to grow even in an alpine house or bulb frame. There are, however, a few which are easy and these can be cultivated in the open garden in a sunny, well-drained site where the bulbs receive a warm dryish period after they have dried down in summer. The bulbs are unusual in having an ordinary-looking bulb but with thick fleshy roots attached to its base."

An interesting point concerning cultivation: at the 1963 international Iris conference in Florence Dr. Rodionenko commented "Iris *songarica*, which covers in USSR an extent over 3000 square miles of a more or less dark blue

color; in Leningrad [St. Petersburg] it is quite impossible to cultivate it. It thrives only in desert districts. In Leningrad, five years are sometimes necessary to obtain a young shoot from *songarica*. At Tashkent, brushes are made from [it]."

Clearly, ease of cultivation of any plant varies greatly. Your experience will depend on the exact conditions inherent where you live.

The one thing that will help make Junos more popular is the development of hardy, easy to grow plants (like *bucharica* and *magnifica*). Purists will shudder, but this can be obtained through interspecies hybrids such as the relatively recent introductions: "*bucharica x aucheri*", "*graeberiana* dark form", and *willmottiana* hort. Without plants like these, Junos won't gain the overall popularity that they should.

Variation Of Species

One area I'm quite fascinated in, is the variation of species. When I first started growing plants, I grew, just like most of you, what I was able to obtain from various nurseries. It appeared that once I had *bucharica*, that was it, I had *bucharica*. Certainly I would have said this was especially true of *caucasica*. I had thought for example that *caucasica* was fairly uniform/singular. This was the case when I found it in the wild. However, I now have two interesting variants, so my current assessment is that 98% of all *caucasicas* are the typical yellow-green color, etc.. This is very high, but certainly no longer 100%.

In the case of *bucharica*, my assessment is currently that roughly 80% are the typical whitish and orangish-yellow combination. However the amount of variation in terms of other characteristics, although still narrow, is much wider than that of *caucasica*. Perhaps 5 to 10% of the remaining 20%, are wholly yellow forms.

Originally I was under the misconception that some species came in one form and only one form, with only very minor variations from it; and in a few cases perhaps two or three color forms. This stemmed from the fact that a lot of species available in the trade are only available in this fashion. For example, there is only one *aucheri*⁴ two *bucharicas*⁵ one *caucasica*, one *graeberiana*, two *magnificas*⁶, etc.

In a sense, one thinks that they can grow all of the species that exist of a particular plant genus/subgenus. The reality is quite otherwise. Generally

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speaking, plants in the wild vary significantly and, so-to-speak, those in commerce form only the "tip of the iceberg". This is actually very exciting. Think of the beautiful things that are just waiting to be discovered. Think of all the beautiful hybrids that could be created ...and when one looks a little deeper, the potential for developing better hardiness, thicker substance, more reliable bloom, etc.

Josef Halda wrote in a letter, "Junos, especially in Tadjikistan and Uzbekistan are a big taxonomic problem. Almost all of those are highly polymorphic and each hill has its own, sometimes very different form (but only a form).... It is too big country to generalize and many mountain ranges and valleys are quite virgin -- many collections exist only in our private herbarium and each year I am again and again surprised with new discoveries. Junos - they are able to hybridize with each other, probably a very young group and not so stabilized (genetically)."

Often we separate species on the basis of whether their hafts are winged or not. Some species are actually more semi-winged than truly winged. And other species which are unwinged, specifically *bucharica*, have forms that appear to be semi-winged.

The hort. form of *aucheri* (of which there are several related clones) is quite nice, but there are other forms which are even more striking. There is no single best *aucheri* clone, rather there is a subset (a handful or more), which are the best.

With different clones, some may be more fertile than others. "So what" you say. One point concerns hybridizing: just because a cross doesn't work with one set of parents doesn't mean it won't work. You may find the cross will work if different clones are used.

Bloom Times

The bloom times shown in Figure 1 are 95% based on 1994. For example *nusairiensis* (true) didn't bloom in 1994, so it's bloom period was estimated based on previous years. I have never recorded *planifolia*'s dates, so what I've shown for it is approximate. Since my *planifolias* are grown in pots bloom dates are somewhat dependent on when I start giving the pots water. I have a few other tender Junos in pots, but they have yet to bloom.

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Exact bloom times vary from year to year. In the four years that I have been recording bloom dates I have found the start of Juno bloom can vary by eight days (*nicolai* starting April 3rd), and the end can vary by 21 days (*cycloglossa* ending as early as May 28, to as late as June 19). Some species have more than one bar on Figure 1 indicating distinct bloom times in different parts of my garden. A given clone's bloom period can be extended by planting some bulbs in locations that receive a lot of sun in early April, thus allowing them to get a jump on spring. Other bulbs can be planted in areas that are the last to lose their snow. Having some extra mulch can help keep the ground frozen a while longer, thus delaying the bulbs' growth. But once the ground thaws above the bulbs, get the straw off to allow the bulb's stem to grow properly, etc.

'Max. Flowers' in Figure 1 is the maximum number of flowers per bulb that I've observed to date. The minimum is of course is one (i.e.. the bulb is just big enough to give a bloom).

Yearly Growth Cycle

Foster wrote in 'Bulbous Irises' (1892): "If you study the history of the plant during the yearly cycle of its life, you will find that, as the foliage and bloom are developed, these thick roots shrink and disappear; when the plant is at the height of its vegetation, only their shriveled remains are to be seen. But as the leaves are withering in the ripening process, new roots of the same kind are formed, which become thick and stout, like the new bulb which is forming while the leaves of the past season fade and depart. Obviously these thick finger-like roots are, like the thickened coats of the bulb itself, stores of nourishment for the coming plant. In *Xiphium* the plant possesses such stores only in the thick coats of the bulb itself; in *Iris*

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Figure 1. Juno Bloom, Toronto, Canada

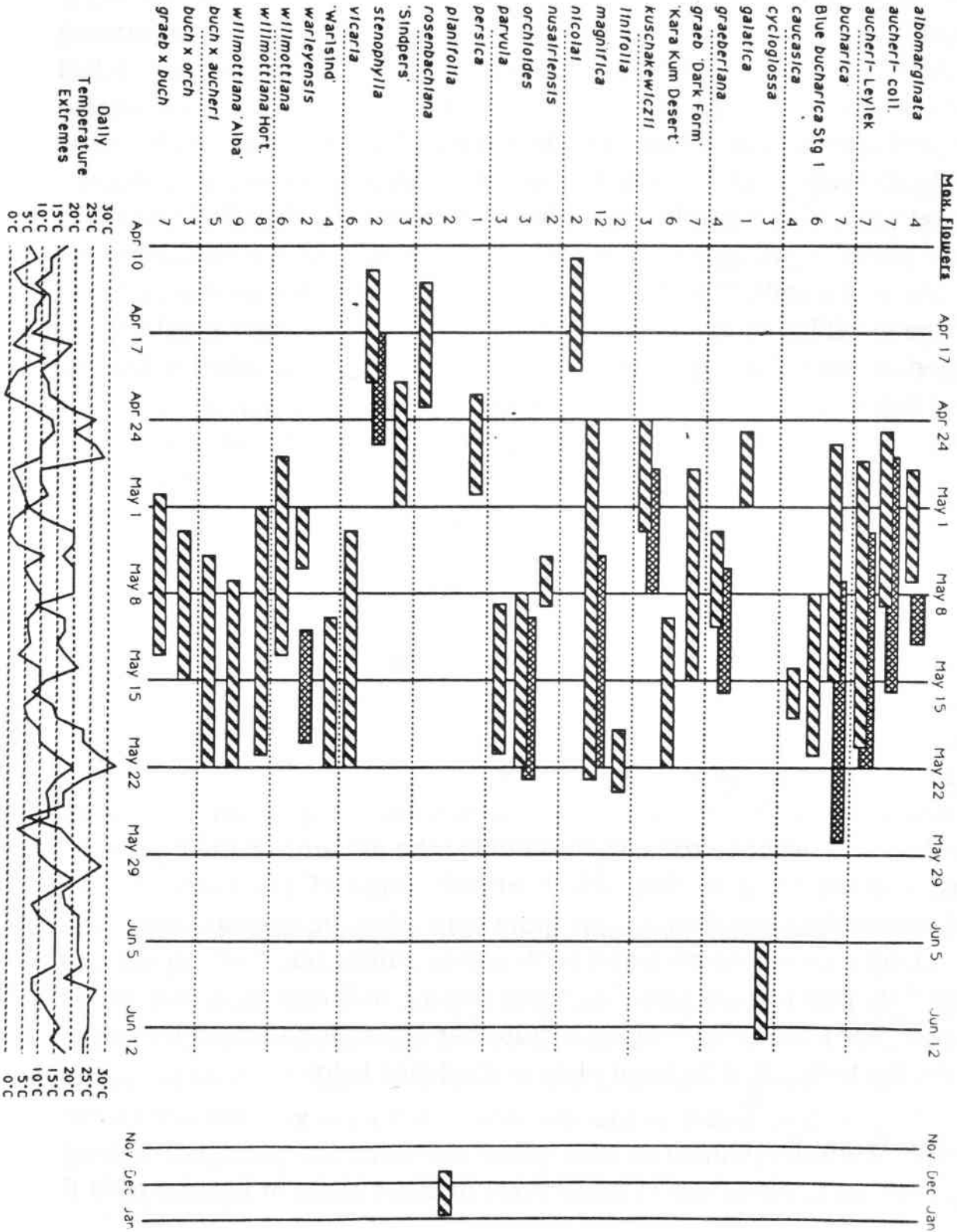


Figure 1. Juno Bloom, Toronto, Canada

persica the plant can fall back upon the supplementary stores afforded by these peculiar thick, fat root."

Division Of Bulbs

Usually I divide my Junos every two to three years (the clump forming ones). I have sometimes wondered if this is a good practice because I feel they don't bloom as well the next year (I have never kept records to know for sure). In part it seems like a second bulb or a side shoot is needed to help the flowers bloom. Quite likely though, this is just a misconception. It may appear this way because, if one checks bulbs that have bloomed, they find the bulbs often have either "split" into two, or at least have a side shoot (the bulbs don't actually physically split, they just give the appearance that they have). Since I haven't been willing to experiment because of wanting to have good bloom, I've tended to take the conservative approach, and divide clumps leaving either two bulbs, or a bulb and side shoot together.

I know for a fact that with some plants, particularly Siberian Irises, transplanting definitely causes setback. I typically have very poor bloom the following year, and it seems to take two years to get back up to good bloom. I have seen similar things with Junos, but quite possibly it may be happening only to certain species. It certainly isn't happening to all of the Junos I transplant.

It may be due to the timing of when the bulbs are lifted, but I'm not clear on this. Generally once I lift the bulbs I replant them very shortly afterwards. Even this brief interval is enough to cause noticeably fewer blooms the next year (in at least some cases).

A word of caution: when digging Junos, insert your shovel well back from the bulbs in order to somewhat minimize the amount of their primary roots that you are going to chop off. Invariably some of the roots will get chopped, especially since they can be quite long. Also, be sure to loosen the soil by rocking your shovel back and forth before pulling on a bulb to remove it. It is actually best to work your fingers under the bulb and then pull up. At least once a year I end up pulling on a bulb that I thought had been loosened, only to rip the bulb off of its basal plate -- yiks!! (see below).

New Bulbs From Roots

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Roots with a bit of the basal plate attached can be made to form a new bulb. The new bulblet will form on the basal plate. If a root doesn't have any basal plate attached, then toss it; it's only going to rot. Some techniques for handling the basal plate portions require dry conditions, while others require moisture (slightly damp sphagnum moss). It is best to allow cut areas of the basal plate to dry before proceeding. A properly dried basal plate can then simply be stored in a plastic bag in a cool environment. After two or three months you should find some new bulblets have formed. Ideally you could cut off some pieces of basal plate soon after your Junos go dormant so that the new bulblets can be planted out in the fall. But you could just as easily cut off the pieces of basal plate in the fall, and then plant them in the garden as soon as their "wounds" have healed.

It is my belief that the basal plate and new bulblet must be planted close to the soil surface in order to be successful. Any deeper and they may not have enough energy to get a leaf up to the soil surface. Note: be sure to protect with mulch, but remove the mulch as soon as your other Junos start to come up.

Clearly it's the starch in the primary roots that is providing the energy for forming the new bulblet on the basal plate.

Bulbs that have been ripped off of their basal plate can be saved. However they do seem to be a bit more tricky to handle than portions of basal plate. If you allow the bulb to properly dry, it can then be stored in a plastic bag (to prevent it from drying out too much during hot summer months). After a month or two you will find root nubs forming by the ripped scales. Again, plant the bulbs just below the soil surface so they can easily get a leaf up in the spring.

Pests

I'm only going to speak briefly about pests here, and I won't be saying anything about diseases. Basically Junos are trouble free. The pests and diseases I could mention are typically only of minor significance. I have had slight problems with slugs in recent years, they want to eat the tender emerging shoots in Spring. The local slug population seems to have exploded since I started keeping a reasonable amount of leaves and straw left on the garden. Originally the straw was being used as winter protection (see below). It then seemed to make sense to leave some of the material on the garden in

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order to help keep the beds from drying out as summer approached; conceivably extending the growing season for the bulbs slightly. It appears however that a proper balance needs to be struck regarding the amount of material left on the beds at a given time. I'm certainly not looking for extra work, but it would appear that the proper method would be to take nearly all of the straw and leaves off in early spring: the ground would be essentially bare and the sun would be able to keep the area around new shoots relatively dry. Then as summer approaches and temperatures start to rise, material can be put back on for moisture control and to try to extend the growing season, with the aim of producing slightly larger bulbs.

Winter Protection

I protect my Junos and Reticulatas with straw "just in case". A cover of straw, leaves, or other mulch keeps the ground frozen even if the air temperature stays above freezing for several days. It's the seedlings that I'm most wanting to protect, but I now mulch all of the beds. Since seedlings are close to the soil surface, they are susceptible to being fooled into growth. I believe I lost quite a number of Reticulata seedlings in the mid 1980s to this.

How much cold a plant can survive depends on how good it's antifreeze system is, coupled with how quickly the antifreeze can be brought into effect. Clearly, it doesn't matter if a plant can withstand -100°C if it can be fooled into active growth (resulting in raising the cell's freezing point), with a week of warm temperatures. Follow that with a sudden return to very cold temperatures, and... wipe out! Be sure to use straw not hay. The last thing we need in our garden is more weeds!

Availability

Junos are not as commercially available as they should be. You can purchase them from bulb specialist nurseries such as Potterton & Martin in England, and Bulbs d'Opal in France. Most bulbs cost over \$7.50 U. S. each, with all costs factored in (postage, and phytosanitary certificate). My philosophy is: gett'em while you can. Numerous times I've seen species available only for a year or two and that's it. With the exception of *bucharica*, Junos are not like other bulbs which are available year after year without fail.

Unfortunately, most bulb nurseries are just wholesaling bulbs. They aren't growers propagating their own plants. They tend to be focused on

whatever is most popular, plus things that they can put high mark ups on. Of course they end up being stuck with whatever bulbs they can't sell; which doesn't encourage them to sell things with low demand. Nurseries that grow some of their own bulbs can simply replant any bulbs they don't sell. If their supply of a species builds up, then it's just a matter of lowering the price in hopes of increasing sales. Hopefully that point is reached well before the grower decides he could more profitably grow something else entirely.

Another source is Juno enthusiasts. It's quite possible you can obtain better clones from an enthusiast than you could commercially. Enthusiasts however may be more interested in trading plants with other enthusiasts than in straight selling plants. We all have only a limited amount of spare time, and there's just not enough to do everything you might like to.

I should point out that sometimes you can pay less than \$7.50 per bulb, but more likely than not what you are going to get is undersized bulbs which will take two or more years to reach bloom size. This is fine if the bulbs are clearly identified as needing a year or two to get up to bloom size.

Species Facts

albomarginata A beautiful light blue species that is fairly easy to grow, but a tad slow to increase. Unfortunately it isn't available commercially.

aucheri Quite a lovely species. Many forms are available, though not all commercially. The hort. form is actually several similar clones. Bulbs from Leylek Station in Turkey range in color from pure white to purple, with dark blue forms being quite spectacular. All shades of blue in-between can be found, and some pale blues are quite gorgeous due to their color and shading, in combination with their flower shape. Bulbs from Bechçe, Turkey also had a dark blue form, as well as a one clearly mauvish when compared to other clones beside it. Height: 20 to 60 cm. Alpine Garden Society Bulletin, Dec 1967: "Iris *aucheri* is hardy in the open, but should be protected from spring frosts which may damage the young foliage."

Dwarf *aucheri* (*nusairiensis* hort.) is about 6" (15 cm) tall at bloom, extending to 8 to 12" (20 to 24 cm) by the time its seeds ripen. Its color ranges from glassine white to powder blue, sometimes white with light blue stitching on its fall edge.

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- bucharica* An excellent, easy to grow, species. Does very well in almost all situations. Clones: white styles and fall hafts, with bright orangish-yellow fall blade (typical form); varying amounts of orangish-yellow in the styles and fall hafts; wholly bright orangish-yellow. Note: we tend to say *bucharica* is yellow in color, but the color is more typically orangish-yellow. I have a clone which is distinctly lemon yellow.
- caucasica* Does well, but needs a hot summer to trigger bloom formation. One of the last species to bloom. Clones: yellow-green (typical), often with two green ribs on the style arms; white with blue-green ribs on the style arms (rare form); grayed yellow green (rare form).
- cycloglossa* Fairly easy, but may dislike being moved. Grows in moist situations in the wild during spring. It seem to do quite well in pots outdoors with out additional watering. Easily grown from seed. It's the only Juno that doesn't really look like a Juno. Very easily distinguished by its large spoon-like standards. Color: blue with white around the ridge
- fosteriana* It has proved to be very difficult in my garden. The only way to handle may be in pots. Color: yellow, with purple standards
- galatica* Somewhat tricky, but easier than *persica*. Generally the flowers are dark reds.
- graeberiana* Fairly easy in the open garden. Does well in either pure sand, or sandy loam. I now have a second clone, which has a wider fall blade. Color: mauve.
- kopetdagensis* (true) Very difficult in the garden. I am extremely surprised by this. The only way to handle it is likely in pots, but I have yet to try this. I thought there wouldn't be any problem with it outdoors. Color: greenish yellow
- kuschakewiczii* and *orchioides* seem to have done well out in the open in sandy loam as well as in the Juno hut. The species *kuschakewiczii*s fall has a dark grayed-blue blotch with the rest of the flower being slightly colored dark grayed-blue.
- linifolia* It is quite similar to *parvula*. Both are dwarf pale yellow Junos, but *linifolia* is the bigger of the two. This species has a yellow fall, with a 3 mm edge of creamy white. Typically the fall has a lot of very tiny "black" speckles; the crest top is smooth (unbroken). The species

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parvula on the other hand is more gray, greenish-yellow, sometimes with a reddish-purple influence. It has a strong, but slightly dark yellow marking right beside its hairy crest. The picture in "The Bulb Book" ("Bulbs"), by Roger Phillips & Martyn Rix, 2nd edition, on page 68 is actually that of *linifolia*, NOT *parvula* (the picture was not in the 1st edition).

magnifica An excellent easy to grow species. This is one of the tallest Junos. It is also the most floriferous, with up to 12 flowers per stalk. It does very well in most situations. Clones: white with varying amounts of mauve which increase as the flowers age; a white form is available which completely lacks any blue anthocyanin. A shorter clone may also exist, but I have not tried it to see whether it is significantly shorter. In some forms the yellow blotch around its crest is more of a yellow-orange.

maracandica Difficult! It is clearly related to the *kuschakewiczii* group. Color: bright yellow.

nicolai Beautiful, but unfortunately difficult! This species can quickly be distinguished from others in its group by its bright yellow pollen. Color: white with rich dark-velvety fall blades, and two wide dark red stripes on the back of its style arm.

nusairiensis (true) Does well, but doesn't like the soil too dry (i.e.. not pure sand or sandy loam with tree roots). It is only about 4" tall (10 cm) during bloom, extending to 8" (20 cm) by the time its seeds are ripe. The plants in cultivation are slate blue in color.

orchioides (true) Bicolor of light yellow and strong yellow-orange. It is very clearly distinct by its widely winged falls: so wide that one fall's wings touch those of the next fall and gives a very full look. Does well.

palaestina Tender, so needs pot culture. Maurice Boussard wrote "*palaestina*: flowered in mid-January. Not very impressive (dull colored, a dirty greenish white), but probably the most scented of all Junos, giving off an overwhelming pungent spicy scent, reminiscent of the South African *Ferraria crispa*. It's very tender and prone to virus."

parvula Small, and obscure due to its grayed-yellow flower. Will die out if allowed to get too dry; if grown in pure sand. See comments under *linifolia*.

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- persica* The ease with which *persica* was said to have been grown in the 1600's must be a myth, because it is very difficult to keep. The only way *persica* could have been grown is to receive bloom-sized bulbs and then toss them after blooming (what a waste of such a beautiful plant). Very variable colors, including browns (from light sand brown to reddish brown).
- planifolia* Tender, so needs pot culture, but rewarding with its winter blooms. Medium blue, with white by its yellow ridge.
- pseudocaucasica* Surprisingly very difficult. I have not been very successful in growing it in spite of the fact it is found just south of where *caucasica* grows in Turkey; and *caucasica* is a fairly good doer here. Clones: pale yellow; blue (rare).
- rosenbachiana* Very beautiful, but unfortunately difficult! Not one for the "beginner". As you might expect, it is rose in color. A nearly white form exists in the wild.
- stenophylla* (sometimes called *tauri*) Fairly easy. Deep purple, with white veins, ridge yellow, no crest. I believe *stenophylla* is likely the pollen parent of 'Sindpers', due to the fact that good solid seeds are easily produced with *aucheri* as pod parent. Color: purple.
- vicaria* Easy, but surprisingly tends not to multiply. Some forms markedly more beautiful than others. It is easy to distinguish from *magnifica* by the fact it's falls are unwinged. Clones: pure white; white with mauve standards; white with narrow or wide purple veins; light mauve with veining. All have yellow blotches around the crest, occasionally also coloring the crest. Typically there are two purplish ribs on the back of each style arm.
- warleyensis* Beautiful!! Not too difficult if given dry conditions. I have tried a couple of other locations in the garden, but results are inconclusive (which is to say I have had some problems). For now I am exercising caution with new clones and putting them in very coarse sand where they have done well. Clones: near white; wholly purple; and the typical form which has the appearance of being white with a rich velvety purple fall blade (the styles actually have light purple tones).

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willmottiana (true) An exquisite pale blue which does well in sandy loam. Clones: light blue to dark blue, all with a pure white patch on the fall blade.

zaprjagajewii Should be somewhat difficult since it is related to *nicolai* and *rosenbachiana*. I have a number of seedlings coming along in pure coarse sand. Color: white.

Mistaken Identity, Etc.

bucharica x *aucheri*: the flowers look a fair bit like *bucharica*, but they have distinct dark gray veins perpendicular to the fall edge. It's quite likely that the pollen parent was actually *warleyensis*: for one thing the fall is unwinged. Sterile.

caucasica: as a point of interest: back in the late 1800s there was a lot of confusion surrounding *caucasica*. If a plant was pale-ish yellow then it was thought to be a form of *caucasica*. Believe it or not, Regel thought *albomarginata* was a form of *caucasica*. He named it: *caucasica* var. *coerulea*.

graeberiana 'Dark Form': actually it is clearly a hybrid involving *albomarginata*. If you've never seen *albomarginata* then I can understand why someone might think it's related to *graeberiana*. Possibly the pollen parent is *vicaria*. It has a yellow blotch around its crest. It's quite a lovely robust Juno. Sterile.

kopetdagensis hort.: this plant is either a form of *vicaria*, or a hybrid involving *vicaria*. Its falls have a slight yellowish and greenish cast to them. Fertile.

kuschakewiczii was sold commercially during the 1980s as *albomarginata*. That's the kind of mistake that you don't mind having made since both are relatively rare. The only problem is that, until you realize the mistake, you yourself will be misidentifying *albomarginata*, and possibly compound the problem in any writing you do about your plants.

nicolai, *rosenbachiana*, and *baldschuanica*: there has been a fair bit of confusion surrounding these three. I believe they are each distinct species. For now all I will say is that *nicolai* has bright yellow pollen, while *rosenbachiana* has white pollen and is, as you might expect, rose in color. Nigel Service took pictures of near white forms of *rosenbachiana* in the wild.

nusairiensis hort.: these clones only recently appeared commercially. They are actually a dwarf form of *aucheri* from Turkey. They are about 6" (15

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cm) tall at bloom, extending to 8 to 12" (20 to 24 cm) by the time its seeds ripen. They are colored glassine white to powder blue, sometimes white with light blue edge stitching. True *nusairiensis* is only about 4" tall (10 cm) at bloom time, extending to 8" (20 cm) by the time its seeds are ripe. The true *nusairiensis* plants in cultivation are slate blue in color.

orchioides hort. of the 1980's was actually a more yellow form of *bucharica*. Back as far as Sir Michael Foster's day at the turn of the century, yellow forms of *bucharica* were clearly being confused as *orchioides*. Only recently has *orchioides* (true) appeared commercially. The forms available are bitoned yellows, with no trace of violet (as is sometimes stated in catalogues).

vicaria of old was actually *magnifica*

willmottiana hort.: is a hybrid likely involving *magnifica*, with either *willmottiana* (true) or *graeberiana* as its pollen parent. It is tall like *magnifica*, and increases well. Sterile.

Note: *willmottiana* (true) has only just recently reappeared. The plants were wild collected and have a small amount of variation in their shade of pale blue. Only one nursery had bulbs available in 1994 at \$30 each (excluding shipping, etc.). It may be a couple of years before *willmottiana* (true) is available again commercially.

Some Specific Questions and Answers:

Q: Are Junos difficult? The species *persica* is perceived to be difficult, as are *nicolai* and *rosenbachiana*. Is this really the case?

A: In its simplest sense the answer is yes. If all you're wanting is to stick a few bulbs in your garden for consistent bloom year after year, then you'd best stick to *bucharica*, *magnifica*, and some of the recently introduced hybrids that are masquerading as species. If on the other hand you are willing to put a bit of effort in (and it doesn't have to be too much), then its very likely you'll be able to grow *nicolai* and *rosenbachiana*. However, my suggestion would be to try others like *kuschakewiczii* and *orchioides* first, since they are a bit easier as well as less expensive. The species *persica*, unfortunately, is a bit more tricky, and I wouldn't say that I really have a good feel for what it wants; *pseudocaucasica* and *kopetdagensis* (true) are really mysteries as far as I am concerned: they both die no matter where I plant them in my garden.

Q: Should you buy Juno bulbs that lack roots?

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A: Buy them. It's a myth that Junos without roots won't bloom. Bulb size plays a greater roll in determining whether a bulb will bloom or not. A small bulb with lots of roots likely won't bloom! So evaluating a bulb based on whether it has roots is nonsense. One year I bought some bulbs of *aucheri* from a bulb retailer. The bulbs turned out to be huge, but completely lacked roots. The grower had clearly cut off the side shoots, keeping the roots attached. The bulbs bloomed quite well the following spring.

Note: some species have naturally small bulbs.

Q: How deep should Junos be planted?

A: Generally the tip of the bulb should be about 5 cm (2 inches) below ground. This can be slightly deeper in sand. Bulblets, and roots with basal plate attached should be planted about one cm below the soil surface; any deeper and they'll likely just die (i.e.. not have enough energy to get a leaf up).

Q: Should Junos be fertilized?

A: A bit of low nitrogen fertilizer in late fall and early spring is useful. I haven't yet studied the effects of fertilizer on Junos, but I do apply small quantities. Junos are said to like lime, but I haven't yet gotten around to studying whether adding lime to my soil makes much difference.

The Last Word

There's a lot more that we could talk about, but for that you'll have to wait for my book ...at 290+ pages what else can I call it? Currently I'm actually envisioning a CD ROM disk with the text plus more than 200 pictures. For now my main focus is simply to get all of the text written, which, with my increasingly limited spare time, could still take another two years. Once that's done I can look into the best way of getting the material published. I already have more than 200 pictures.

See also the paper "A Juno Miscellany" in the Appendix