An Adventure With Reticulatas

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The pictures in the April Bulletin are of my Reticulata Iris hybrids. I could just as easily write an article about Junos, but I'll save that for a future Bulletin.

Let's talk about a problem right up front. I'm sure some of you have grown Reticulatas for a couple of years only to find that all you have is leaves coming up and no flowers. I've found this too. The solution is to replant them every two years or so. If possible it would be best to replant them into new soil. In Holland they are treated as crops, and only grown in the same spot every few years. I did an experiment several years back. I planted 12 *danfordiae* (trade triploid form) and 12 *reticulata* hort. in sandy loam soil. The first year, as expected, there were 12 flowers. In the second year there were 24 in each case. In the third year, and essentially every year since, there have been only about 6 flowers of *reticulata* hort., and none of *danfordiae*.

In my case I have limited garden space, so I'm forced to reuse the same spots where I've grown the bulbs previously. Last year for the first time as an experiment I actually replaced the soil some of my older hybrids had been in. The area was only about 4 x 6 feet, so it wasn't too difficult. Time will tell how much better the bulbs do in it. Certainly though, replanting does help – spread the bulbs out so they aren't too crowded.

What's special about Reticulata Iris? Beside of course their beautiful form and colours. Two things come to mind. One is the fact they have square leaves. Of interest, one new commercial clone even has variegated leaves! The second is the fact they are the very first flowers to bloom every year. Only Galanthus are earlier. Retics are perfectly hardy, and due to cooler temperatures when they bloom, their flowers can easily last 7 days or longer[1].

Did you know Reticulatas can have two flowers per bulb? I had never realized this until I started growing my own hybrids. Since then, I have obtained larger bulbs of commercial clones from Holland, and they too have given two flowers. Commercial clones don't increase as well in size here (Toronto, Canada), so their two flowers per bulb is only a one time occurrence in my garden. Certain of my own hybrids do continue to occasionally give two flowers. Clearly as you will see my hybridizing goals are two fold: first, to create new colours, and second, to produce clones that do well in my garden; which means they should do well in your garden too. Ideally I hope you will be able to leave the bulbs in a given spot and they will continue to consistently bloom, just as some Junos like *bucharica* increase to an equilibrium number if left alone. How easy this will be to obtain with Reticulatas is hard to say. Because of that, it is more of a secondary goal. So far in order to get maximum increase I've been replanting my hybrids every year or two (an ever more demanding task).

My goal with this article is to introduce you to "the wonderful world of Reticulatas." Hopefully you'll try a few, and if you already have some, you'll try a few more. What do you think of my first second generation (F2) *danfordiae* x *sophenensis* hybrid which bloomed for the first time this year: 94-HW-1? If at any point you feel I'm getting too "technical" please skip over that part of the article. I've got a lot of information to share with you. I've been growing these fellows for over 15 years and I continue to enjoy them immensely. I'll just add that I also particularly like Junos[2], a few of which bloom at the same time as Retics. Most start a week after the Retics finish. The Retics themselves last a bit over 3 weeks starting right when the snow disappears, and they are completely unaffected by freezing temperatures. In fact some years there are snowfalls a week or more after the Retics have started.

Dr Rodionenko back in the early 1960s separated these plants into their own genus: Iridodictyum. Since then he has additionally separated out *kolpakowskiana* and *winkleri* into genus Alatavia. Brian Mathew considers these to be Iris in Subgenus Hermodactyloides. Kew Garden's chromosome analysis, details of which still has to be published, supports the idea that they are indeed Iris. Personally I am happiest to call them Reticulatas, or Retics for short. When talking about Reticulatas as a whole I use capitalized 'R'. When writing about the species *reticulata*, I use lower case 'r' and italics.

The species are all quite nice. I particularly like *bakeriana*, but am disappointed how the bulbs I've had, have died out. I'm not sure exactly why. I'm going to have to put in more effort into maintaining it and other species like diploid *danfordiae*, *sophenensis*, etc. I have been doing just that for the latter ones, but have sometimes run into some problems. In the case of *histrioides* I'm hoping, but not counting on, one of my pure seedlings proving to be a better doer here than commercial clones or wild collected bulbs.

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[1] You may not want to do this, but the flowers will stay their best if covered from rain and severe wind. I use upside down dishpans for this especially because of my hybridizing, with a rock on top to keep it in place. Bricks on their edge can be used to give the pans more height where necessary.

[2] If you've never grown Junos (Juno Irises), I'll point out one neat thing is the taller species look like corn stalks! Up to 2 feet tall, with as many as 13 flowers!

One theory suggests plants you raise yourself from seed will be more likely to do well in your garden than plants originating elsewhere. A nice theory, with perhaps a little bit of truth, but you could easily find yourself having wasted a lot of time. In terms of hybrids, you certainly can't quite expect to get anything as good as the commercial clones without putting in a significant effort. In my case I'm now up to planting several thousand seeds every year. What is of particular importance though is parentage! More on this in a moment.

Brian Mathew has mentioned that he regards *hyrcana* as just an early blooming form of *reticulata*. I would certainly agree with him. I have seen a fair number of forms of Iris *reticulata* from the wild, and the fact that certain clones are earlier blooming, or have wider fall blades, etc. does not mean they are different species. Rather the variability of Iris *reticulata* is wider than that of many other species. This is not to say that there aren't other Reticulata species waiting to be found in the wild. For example, for certain specific reasons I think for that the Çat Reticulata is a new species. This has yet to be verified by chromosome analysis.

How many of you grow the gorgeous hybrid 'Katharine Hodgkin'? It is from *histrioides* x *winogradowii*. Unfortunately in spite of both parents having chromosome counts of 2n = 16 it is sterile. Individual chromosomes are different enough that ovules and pollen cannot form properly. Thus it, and others from this same cross, unfortunately are a dead end from a hybridizing perspective.

Now is as good a time as any to mention how it's quite annoying to look in garden catalogs and see 'George' and 'Katharine Hodgkin' listed as forms of *histrioides*. They aren't! They are hybrids with one parent being *histrioides*. They are listed this way in hopes of giving people an impression that they have large fall blades like *histrioides*. The Armenian Caucasus Retic, which I happen to be using in many of my hybrids, also has wide falls. Other clones like 'Harmony' have wide blades, as well as *histrioides* as one of their parents, but are listed under the heading "reticulata". Note that in catalogs often a lower case 'r' is used, which from my point-of-view is confusing, since many of the named varieties are hybrids with other Reticulata species.

The Royal General Bulb Growers Association has similar problems in their 'International Checklist for Hyacinths and Miscellaneous Bulbs.'

Back in 1985 and 1986 I went plant collecting in Turkey. In particular I was hoping to find diploid *danfordiae*. I was lucky. Near the end of the first trip, with the help of several local Turks I did collect *danfordiae*. In later years a slightly larger diploid *danfordiae* became available from a limited number of sources. Over the years I have made a fair number of crosses with both. After seeing 'Katharine Hodgkin' you might expect I would have first tried to cross *danfordiae* onto *histrioides*. In fact only one of ten crosses I made the first year involved *histrioides*, and it didn't give any seed. In fact only 8 seeds were produced from two crosses, and none germinated.

In 1989 I happened to make a number of crosses with *sophenensis* (previously known as Iris *histrioides* var. *sophenensis*). Sixteen of these from three crosses first bloomed 5 years later in 1994. They were clearly true because their standards were extremely narrow (from *danfordiae*, which has short bristle-like standards). They ranged in width from 0.3 mm to 3.0 mm; all being 2.0 to 2.5 cm in length. Typical Iris *reticulata* standard width is 7 to 10 mm. Each of the three crosses were fairly consistent in their standard's width: in one case all 7 plants had approx. 0.3 mm widths. Another telltale mark of their *danfordiae* heritage is faint wide greenish-yellow ribs on the back of their style arms; most, but not all, had this. In one plant, the style arm lobe area was quite wide, as typical of *danfordiae*. Fall blade width varied from 10 mm to 14 mm. Their colours ranging from light blue to dark blue, and even a violet. A few had some yellow influence, but where it was more pronounced the flowers had a muddied appearance – *danfordiae*'s bright yellow carotenes "mixing" with blue anthocyans (they don't actually physically mix).

I expected these would be sterile (ie. 2n = 20 x 2n = 18), but felt at the time that I had to be sure. If anything would work it seemed that intercrossing the progeny would be the most likely. To my pleasant surprise they set seeds – they were fertile!!! This wasn't going to be a dead end after all. Now 5 further years later, two of these bloomed. As you can see, 94-HW-1 was worth the wait. Its bud was pale yellow like *winogradowii*! The overall colour when it opened was cream. Its style arms were white with wide greyed blue stripes on either side! There were blue veins on the fall, but they weren't on the fall blade itself, rather up by the style arm. There was a soft yellow highlight around the end of the fall ridge. It's quite nice. I couldn't have asked for a more special first F2 bloom! Now it's a matter of increasing stock to the point where there's enough to start introduction: possibly in 7 years time. I expect the four flower parts are just an environmental anomaly and next year it will have the normal three.

I wanted to be sure of getting seed so I selfed it, then a day later crossed it with the clone below, followed several days later with pollen from *danfordiae* as well as an F1 clone. Initially it appeared my efforts had been successful, but unfortunately the pod was turned out to be false. Hopefully next year… Its pollen was used successfully in many crosses, including back crosses to F1s and diploid *danfordiae*.

The second F2 *sophenensis* x *danfordiae* (s x d) hybrid 94-GU-1, wasn't anything special. It was light blue, with small amount of soft yellow influence. I would have been disappointed if this clone had been the first to bloom. Now I'm eagerly looking forward to seeing what other F2s look like! It appeared to have set 9 seeds using 94-HW-1 pollen, however the seeds turned out to be soft. There goes the chance of seeing an F3 in 5 years time.

Kew Gardens in England has done some chromosome analysis of my hybrids and they have some interesting news to publish, hopefully in the not-too-distant future.

The s x d hybrids all have a reasonable number of bulblets, which is not surprising, since both parents are well known for producing a fair number themselves. Often people refer to *danfordiae* and *sophenensis* as having "shattered." This is particularly apt since their new parent bulbs are generally not large enough to bloom the following year, and because of all the rice-grain sized bulblets. Fortunately in many cases the F1 progeny are proving more robust, with at least one bulb being large enough to bloom.

Typical Reticulata clones are talked about as having "split". This is because if you were to dig them up in the summer you find two large bulbs where there had been one. They don't actually split. In fact blooming bulbs use up all of their energy (the old bulb) putting up their flower(s) and leaves. At the base of each leaf a new bulb developes. This means early on you can count how many bulbs you should have in the fall. The leaf diameter and length can give you a good sense of how big its bulb will be. Bulbs that don't bloom simply push up a leaf, then form a new (hopefully larger) bulb at its base. Rice-grain bulblets don't put up leaves until the following year, assuming they are not buried too deep. If they are, the bulblet runs out of energy before its leaf reaches the soil surface, and it dies (which is why I replant them closer to the soil surface).

As you can see in Table 1, bulblets help propagation of a clone enormously down the road (89-Q-3 is one of the best s x d clones in terms of bloom and rate of increase). The only question is how difficult the bulblets will prove to be for commercial growing. So far I've been handling them manually, and this is becoming a chore. No doubt machines used for planting and harvesting will need to be modified to handle the bulblets. Clearly this means more cost, and is a nuisance. However on the positive side it means stock can be built up faster than it otherwise would.

	End 1994	End 1995	End 1996	End 1997	End 1998	
					Actual	Predicted
Bloom-sized [3]	2	5	7	25 [4]	21 [5]	58
1 year away	?	1	16	37	81	95
2 years away	?	8	27	82	309	249
3 years away [6]	8	36	67	249	807	700
Total:	?	50	117	393	1211 act.	1102 est.
If Doubling	2	4	8	16	32	

(updated)	End 1999	End 2000	End 2001	End 2002	End 2003
Bloom-sized	85	394	1,205	3,206	9,996
1 year away	309	811	2,001	6,790	18,849
2 years away	811	2,001	6,790	18,849	56,014
3 years away	1916	6,396	17,644	52,808	155,364
Total:	3121 est.	9,602 est.	27,640 est.	81,653 est.	240,223 est.
If Doubling	64	128	256	512	1024

Table 1: 89-Q-3 (*sophenensis* x *danfordiae*) Bulb Count

[3] Bloom-sized are > 10 mm; 1 year away are > 7 mm; 2 years away are <= 7 mm; 3 years away are bulblets. Note: keep in mind that sizes may be different for other hybrids. Where appropriate, the actual number of blooms are shown, and the '1 year away' numbers were adjusted accordingly.

[4] 21 bloomed here in 1988, but 4 which were given out for testing should also have bloomed. I had predicted only 17 in total would bloom. This means that 8, which were about 10 mm in diameter, also bloomed.

[5] Includes 10 sent to Berney that aqre potentially large enough to bloom in 1999.

[6] In some clones, from time to time a few bulblets are quite small. By the next year they are only up to being considered large bulblets.

Keep in mind that although there will potentially be 250,000 bulbs at the end of 2003 (end of its 10 year of bloom), only 10,000 will be bloom-size (saleable). I don't expect this particular projection to come true since I don't have room for all of them here …this isn't the only s x d clone I'm increasing. Two years ago when Wim de Goede and his wife visited my garden he commented "they're just blues", which was aimed at the fact that there are already a number of blues on the market. Of course if some are better doers in North American gardens than commercial clones, they should definitely be introduced.

If a doubling were to occur every year, which is the best increase I've gotten with other of my Retic hybrids, it would take 17 years to reach over 100,000 bloom-sized bulbs (end of 17th year of bloom); a small number by Dutch standards. Of course well before that some of the bulbs would need to be sold in order to start building up interest in the clone. At any one time less than half could be sold in order to keep enough for continued propagation. So in reality it would take at least 20 years to have 100,000 bulbs for sale.

It is interesting to realize that if my projections above are correct, 85,000 bloom-sized bulbs of 89-Q-3 would be reached in just a further two years (end of 2005). At this 12 year mark, all 85,000 could be sold and there would still be 155,000 available the following year!

I have the late Frank Kalich to thank for sending me Iris *sophenensis*.

Generally s x d clones are the earliest Reticulatas to bloom. This year there were over 340 F1 blooms from 52 clones, representing 9 crosses spanning 6 years; up from 262 last year. This doesn't count 20 boom-sized bulbs given out for testing.

In 1995, 7 years after being hybridized, one of my 1988 *danfordiae* hybrids bloomed: Çat[7] ANM2175 x *danfordiae* ANM2325. It is a nice dark red similar to its Çat parent, with a bit of orange on its fall from *danfordiae*. Three clones in total have now bloomed, all similar in appearance. They're nice, but not stunning, and are slow increasers. What is most AMAZING: they're fertile! What does this say about the Cat clone? I have suggested to Kew, via Brian Mathew, that they take a close look at the Çat clone. I am actually quite hopeful that these will intercross with my s x d clones AND continue to be fertile! Unfortunately I've still got a bit of a wait for that since it was only in 1997 that I was first successful with crosses along this line (I had tried one in 1995, but it didn't work). I am though looking forward to seeing a back cross onto *danfordiae* next year. Like *danfordiae* and *sophenensis*, the Çat clone also produces lot of bulblets.

In 1995 the first of four 1989 *hyrcana* x *danfordiae* hybrids bloomed. It was a slightly muddied "*hyrcana* blue", with wide fall blades. It was okay, but nothing special. As expected it was pod sterile. Surprisingly it's pollen has been used successfully on a few crosses (a big question is, are they true?; 3 have germinated). Last year two more bloomed. They were exciting by comparison, and of particular importance, they showed that *danfordiae* had the ability to express more than just a single shade of orange-yellow. One had light yellow in it, and the other was orangish – perhaps an orange Reticulata is possible one day!

Over the years a couple of *danfordiae* x *histrioides* crosses have bloomed, but all have turned out to simply be *danfordiae* selfs. Of course even if they had been true I'm reasonably certain they would be similar to the s x d hybrids. Without question they would be sterile dead ends. For what its worth I'm still hoping to one day see such a cross, though I will need to make more crosses along this line since most had been made in the early 90s, and there's currently only a very slim chance any will eventually bloom.

Similarly, Armenian Caucasus Retic x *danfordiae* has given ~590 nice large seeds from 35 crosses over the years. I don't believe any have germinated. I don't really expect anything spectacular, and it would be a dead end, but it's just so amazing that from so many seemingly good seeds, not one has bloomed let alone germinated.

A 'Cantab' x *winogradowii* hybrid bloomed this year. It was definitely true! Usually very special crosses like this either don't germinate, or don't turn out to be true. It was cream overall with a "masked" blue fall blade (ie. very subdued). The flower had *winogradoii*'s shape. It's bud was pale yellow.

Have you ever thought of hybridizing Reticulata Irises? The reason I've been doing so much is both: to create cultivars that will do better in my garden; and to create new colours, patterns, etc. One of my goals early on, was to get wild collected clones in order to bring new genes into the limited pool available from commercial clones. In the wild *bakeriana* is somewhat variable[8], and some of those clones are nicer than others. Table 3 shows you just how limited their parentage is.

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[7] Collected near Çat in eastern Turkey.

[8] You'd never realize this if all you were to look at is what's available commercially.

You can't expect to take ordinary parents and get something exceptionally good. I say this thinking that 1) it's probably already been done e.g. William van Eeden's crosses such as 'George', and 2) the fertile commercial clones are too similar to each other, plus they are close to the species level.

If you cross two similar parents, the progeny will understandably be similar. This suggests that the best thing is to make wide crosses, plus use parents that are different from those used by anyone else. If you cross two pure species then the first generation expression will be very limited. This is quite understandable because the genes contributed by each parent are very uniform (each, after all, is a pure species, with limited variability). The expression opens up tremendously in the second generation; particularly when intercrossing the F1 hybrids. If you want to bring out recessive characteristics you should self a given clone. I tend to intercross clones and should do more selfs. Too bad I didn't think of that when I was hybridizing this year.

You only realize the clones you have aren't terrific when you see something better (number of flowers, flower shape, shade of colour, rate of bulb increase, etc.). For example I originally thought there was essentially only one form of Juno *bucharica* – the commercial one you get from Dutch sources. Now I have at least 10 distinct ones (ones collected in the wild by many different people), the majority of which are equally nice for varying reasons. I'm sure the same is true of Reticulata Irises species. It's just a matter that not as many forms have been collected from the wild. Martyn Rix's book 'Bulbs' for example shows an ameona (white standards and coloured falls) clone from Iran. I'd love to use it in my hybridizing.

Some other hybridizing goals in no particular order are: strongly scented flowers; variegated leaves; ameona flowers (white standards with coloured falls); tri-tones / tri-colours; new colours and patterns; large showy flowers[9]; and ability to normally produce two flowers per bulb in average gardens. Ideally all hybrids should include the following characteristics: resistance to disease; good bloom year after year without requiring special conditions to do so. The following aren't currently a problem, but still need to be given consideration: strong stems that won't break or fall over in the wind; thick petals to stand up well to rain; long lasting flowers.

One characteristic to breed out is weak flower to stem attachment. This is a characteristic of a number of collected Turkish clones! There's nothing more frustrating than removing anthers and tearing the flower off in the process. It's especially true when they're special flowers that you're particularly wanting to set seed.

If you were to visit my garden during bloom you'd find a majority of the flowers covered by upside down dishpans and tin cans (with lids cut off of course). There are a number of reasons for this: it prevents bees from making there own crosses on warm sunny days; on windy days it means the pollen doesn't blow away before I get home from work; and it means the flowers aren't damaged by rain (both anthers and stigma), and thus can still be hybridized.

Incidentally I punch 5 or 6 holes around the bottom of the tin cans using a single-hole hand paper punch. This allows any condensation that forms overnight to dissipate. A stone can be used under one edge of dishpans to do something similar.

For hybridizing, I collect anthers in glass baby food jars, which in turn I put into dishpans (20 or more fit). Typically by the end of bloom season I can be seen carrying 4 or more dishpans stacked one inside the other, from one part of the garden to another. I mark on each jar which clone's pollen it contains (the name can later be washed off so the jar can be reused next year). Overall this means I have the pollen close at hand, and I don't have to go running all over the garden just to make one cross. It also means that I can use the pollen even after a given clone has finished blooming. And on top of that, I have a place to keep partially used anthers.

When I make a cross I write the parents on a plastic tag in black permanent marker (pod parent x pollen parent). Note: it is important to use black because coloured marker fades! Imagine going to collect an important cross, and finding you can't read the pollen parent! Worse yet, imagine collecting many pods before noticing the problem – you won't even know the pod parents. Typically I can get 6 years worth of crosses recorded on a tag (3 per side). Since the plastic eventually becomes brittle, I write the following year's cross on the other side, then, after I'm finished with it for that year, I break off the used portion.

When the pods ripen they are put into the baby food jars and then allowed to dry in the garage for a number of days. From here information about each cross and the number of seeds produced is entered into my computer; along with information about unsuccessful crosses. Metal tags, which are more expensive than plastic (plus difficult to reuse), but longer lasting, are then made up.

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[9] The flowers don't necessarily have to be large. A large clump of small flowers can be just as effective from a distance if they are brightly coloured.

I usually plant my seeds by late September. Planting earlier might be better, but I'm typically sending plants off to people over the prior 3 or 4 weeks. Because of limited garden space (I grow too many things), I have to squeeze the seeds into as small a space as possible. In recent years this has meant "double planting": Reticulata rows 3.5 cm apart, with Juno seeds planted in-between. The seeds themselves are 1 cm or less apart within a row. An effort to plant the seeds shallower than I originally had, seems to have paid off, particularly for Junos. The only drawback is some of the baby bulbs get heaved out of the ground by mother nature's daily spring freeze-thaw cycles (in spite of being covered a thin layer of straw).

As I'm planting the seeds I make up a map showing where each cross is, and listing its parentage. This is just in case the tags get disturbed, plus the map is an invaluable reference for finding a given cross. Afterwards I put down a two to three inch layer of straw, and then a plastic net in order to minimize any problems with curious squirrels looking for nice easy soft places to dig in order to bury their winter food supply (which they never seem to use). A layer of straw should continue to be used every winter after as well, since it helps prevent the seeds / seedlings from starting into growth during winter warm spells. A week of warm weather would start their cell sap flowing and in the process raise its freezing point. A sudden cold snap back to –25°C (-6°F) would have deadly consequences. The straw acts like a blanket and keeps the ground frozen under the straw so the seeds / seedlings are oblivious to the warm spell (large bulbs are deeper in the ground and consequently aren't as effected).

Over the years I have found that roughly 40% of my crosses are successful (see Table 2). Note: be sure you are working with fertile clones. Any with *histrioides* parentage are sterile (see Table 3). Only about 30% of the seeds germinate on average, with about 5% losses leaving a net 25%. It is important to realize that this 25% is an average figure. Many crosses won't have any seeds germinate, while others will have perhaps 60%. Sometimes, particularly for special crosses, I ask disappointedly "why didn't ANY of the seeds germinate?" As a guess is that 80% bloom, and a small percentage of those are truly special (assuming of course interesting parents were used). After seeing 94-HW-1, I wouldn't be the least bit surprised if the percentage of truly special clones increases significantly over the next few years.

If you look at the math, you quickly realize there's not a lot success for all of the work. Of course when working with over 400 successful crosses that produce 5,000 or more seeds, I still end up with a fair number of hybrids each year. Several years ago William van Eeden wrote, "there is one comfort, a cold comfort: natural selection. Only the strongest, the most adapted and tolerant to your climate will survive -- survival of the fittest. Even in the years after germination there can be many losses. Under the best conditions it takes 4 to 5 years for seeds to flower."

What sort of faults have I seen over the years: some flowers grow too high above their spathe and as a result, flop over. The original 'Hercules' had the opposite fault: its flowers didn't always grow fully out of their spathe, and thus tended to remain closed; I haven't yet seen this characteristic in any of my hybrids. Others start off in the first 2 or 3 years seeming to do well, then their numbers drop off. A few have falls that twist: 'Cantab' x *bakeriana* ('Clairette'-like). A few have falls that curl under too much, so you can't see the fall blade properly. In many cases the "fault" is not really a fault at all, it's just that the progeny look too much like their parents.

Typically germination starts after the 2nd winter. This year something about the conditions, winter, etc. was just right since quite a few of last year's seeds have germinated.

Once you do have something that seems good, it takes a couple of years to fully evaluate it. In the first year you of course get a clear idea of how beautiful its flower is. Slight differences show up between clones in terms of numbers of bulbs and their size. This becomes magnified significantly after several years. At the same time you are starting to building up stock. 5 years out it's nice to see a clump of 16 blooms. The next step is to test it in other peoples gardens, develop commercial interest in it, all the while continuing to build up stock. In my case some of my hybrids are being evaluated by Wim de Göede, a Dutch grower. He will only be interested in just a couple for his market, which I believe is the wholesale European trade. I really need to also partner up with growers selling into North American markets, as well as with smaller speciality bulb firms selling to "connoisseurs."

Every year the amount of work required to build up stock keeps increasing. Ideally in order to get maximum increase I should replant all of the bulbs. Just to give that a little perspective, last year I replanted my 1989 hybrids the majority of which are now *sophenensis* x *danfordiae* bulbs. I actually managed to count a large portion of those bulbs (this continued to allow me to see exactly how well each clone is doing). I estimated there were 26,000 bulbs (2/3 rice-grain sized bulblets), all crammed into an area approx. 4' x 15'. When I say crammed they're planted up to 3 layers deep: large bulbs at the bottom (bloom-size and 1 year away), then 4 to 6 mm bulbs followed by the bulblets. By the end of this summer there could be up to 70,000 bulbs (remember this doesn't count all of my other Retic hybrids). Clearly it won't be long before I can't handle all of the bulbs.

Reticulatas can be grown in many different soil types. I have grown them in coarse sand, but would say in the long run, sandy loam soil is better. All of my soil is "imported" since the area where I live is "rich" in clay. As a result, when I make a new garden, its simply a matter of taking up the grass and dumping sandy loam soil on top to a height of 20 cm (8 inches), and voilá, a raised garden. One important factor though: the bed should be kept moderately moist in late spring when bulbs for next year are forming. You don't want it too wet, but on the other hand, if it dries out too quickly, then the bulbs don't have a chance to get as big as they otherwise would. If you look carefully you will observe various microclimates in your garden. It took me a couple of years to realize that beds at the back of the yard, though wetter in early spring, dry out sooner than ones up near the house.

I have started watering my seedlings every couple of days during dry spells in late spring since they are closer to the soil surface and therefore more prone to drying out. Hopefully this will give them a chance to get a bit bigger than they otherwise would.

I do fertilize, but tend to put only a bit on in the fall and spring. It's a trade off between wanting the bulbs to do well on their own, and wanting to get a good increase (number-wise), while recognising my bulbs are quite tightly packed and need a little boost as a result of all of the competition. I use either 7-7-7 or a fall 4-8-12, which are ones I've found I can get reasonably cheaply.

I haven't had too much trouble with pests. Last year a mouse ate some *kolpakowskiana* leaves and a seedpod, but as soon as I figured out what happened, a trap was set and he met his demise. Elaine Hulbert wrote, "rabbits did their usual destruction, gnawing off all the leaves every night. Years before they would never touch one of these funny leaves, even though there was nothing else green except maybe some unpalatable Galanthus. But then they got to like them, and now I never see an ordinary Reticulata, except in a pot". Several years back William van Eeden mentioned the same thing happening in Holland.

I have been finding the Armenian Caucasus Retic to be an important parent. Another good parent because of it's variable characteristics is a collected form from Ahmet Atilla. Unfortunately it, like a number of species, is dying out in my garden for unknown reasons. There's something about the conditions in my garden that it just isn't happy about. For a number of years I have been using Janis Ruksan's *hyrcana* Talish which is slightly variable. It appears to be a good parent. This year a couple of very light hybrids bloomed: very light mauve; very light blue.

I have a very nice pure white Armenian Caucasus Retic. It just showed up in a batch of collected bulbs a couple of years after I received them. Unfortunately it's extremely slow to increase and I've had some problems with trying it in another spot in the garden.

The commercial clone "Iris *reticulata* Alba" which has become available recently is a misnomer. From the name you would think this is a white form of Iris *reticulata*. It is actually a hybrid from the same breeding as 'Natascha'. Like 'Natascha' it has pale blue fall blades.

Incidentally there is also a clone making the rounds called *winogradowii* Alba. It isn't. It's a *winogradowii* hybrid possibly with *hyrcana* 'Talish'.

My Reticulata hybrids 87-BN-1 ('Gordon' x Armenian Caucasus) and 87-BB-1 (Armenian Caucasus x {'J.S. Dijt' & 'Purple Gem'}) have done quite well. Both are good increasers, and have showy flowers. I have a number of other good hybrids coming along. One interesting note were two or three tri-tone hybrids: falls, styles, and standards all slightly differently coloured. It seems that style arm colour and standard colour are very tightly coupled, but the coupling can be broken. It will be very interesting to see what shows up in 2nd generation hybrids from these tri-tone parents. Unfortunately I haven't been seeing more tri-tones in recent years.

Unfortunately *winkleri* appears to be just as difficult as *kolpakowskaiana*. People's first impression is likely that it's simply a "dwarf" *kolpakowskiana*. Too bad it doesn't have dark cherry red falls as literature seemed to suggest – that would have nicely complimented *kolpakowskiana*'s velvety purple / violet. Comparing the two you would even probably say *winkleri* is inferior, since *kolpakowskiana* is bigger, and it's colours are more vivid. I did self *winkleri* successfully, as well as intercross it with *kolpakowskaiana*. None of the seeds germinated this year. In the past I have raised a number *kolpakowskaiana* bulbs from seed, only to have them disappear a few years later.

	kolpakowskiana	***winkleri***
bulb:	yellow flesh	white flesh
stem height:	13 cm	10 cm
fall:	16 mm x 4 cm long, rich velvety purple (with a white tip on the particular plant observed)	13 mm x 3 cm, hafts reflex somewhat, purple blade, with some veining at the hafts
style arms:	pale ~white	pale blue or purple, lobes 5 mm
ridge:	1.5 mm, yellow (or may not be coloured)	yellow 2 mm wide
standards:	10 mm x 4 cm	7 mm x 3.5 cm
leaves:	7 cm @ bloom	6 cm @ bloom

You can see a colour picture of *winkleri* in the September 1998 Alpine Garden Society Bulletin, Vol. 66 No. 3. The clone pictured had more purple between the haft veins than the ones here (none of mine bloomed in 1999). Janis wrote an excellent accompanying article about his and Arnis Seisum's historic and arduous adventure.

In conclusion, I hope that I've encouraged you to try growing some Reticulatas. You will definite enjoy the burst of colour and relief from "the winter blahs" they provide right as the snow disappears. Reminder: for continued bloom try replanting every two years.

Overall Reticulata Hybridizing Results

Year	Tried	Successful		Seeds	#/Pod
1983	78	19 (24%)	gave	106	5.6
1984	249	97 (39%)	gave	1751	18.1
1985	290	127 (44%)	gave	1452	11.4
1986	170	75 (44%)	gave	564	7.5
1987	268	93 (35%)	gave	1162	12.5
1988	295	63 (21%)	gave	1280	20.3
1989	175	64 (37%)	gave	997	15.6
1990	242	96 (40%)	gave	945	9.8
1991	380	123 (32%)	gave	1965	16.0
1992	495	265 (54%)	gave	3952	14.9
1993	477	274 (57%)	gave	3978	14.5
1994	605	351 (58%)	gave	5943	9.8
1995	533	292 (55%)	gave	3528	12.1
1996	816	486 (60%)	gave	6242	12.8
1997	889	400 (45%)	gave	5116	12.8
1998	845	564 (67%)	gave	9062	16.1
1999	1118	721 (65%)	gave	9864	13.7
Total	7925	4110	gave	57,898	

Bee Seed

Pods		Seeds	#/Pod
207	gave	3022	14.6
203	gave	2586	12.7
410	gave	5608	

Table 2 **Reticulata Hybridizing Results**

Species	Count	Colour*		Cultivation in hectares (1998/99)
bakeriana	2n = 20	orange		
Çat Retic	2n = 18?	white		
danfordiae (diploid)	2n = 18	white	The commercial form is a triploid (3n = 27) and therefore sterile.	7.10
histrio	2n = 20	white		
histrioides	2n = 16	white		.01
hyrcana	2n = 20	white		
kolpakowskiana	2n = 20	white	Only crosses with itself and *winkleri*	
pamphylica	2n = 20	orange	Only crosses with itself	
reticulata	2n = 20	orange	Commercial clone. Wild collected forms have olive, orange, or yellow pollen	5.95
sophenensis	2n = 18	white		
vartanii	2n = 20	white		
winklerii	2n = ?	white	Only crosses with itself and *kolpakowskiana*	
winogradowii	2n = 16	white	Note: different chromosomes from *histrioides*	
Armenian Caucasus Retic	2n = 20	white	Collected form with wide fall	
			All others (in total)	.55

Hybrids Available Commercially In Recent Years

Name	Overall Colour	Registered	By	Pod Parent	Pollen Parent	Sterile Or Fertile	Pollen Colour*	
'Alida'	light blue	199?	?	sport of 'Harmony'		sterile	?	.02
'Blue Veil'	blue	1955	C.J.H. Hoog	*reticulata*	*histrioides* 'Major'	sterile	yellow	
'Cantab'	light blue	1914	E.A. Bowles	?	?	fertile	orange	.79
'Clairette'	blue	<1953	C.J.H. Hoog	*reticulata*	*bakeriana*	fertile	orange	.04
'Edward'	blue	1973	William van Eeden	'Cantab'	?	fertile	yellow	
'Frank Elder'	blue & pale yellow	<1978	Mr & Mrs H.F.D. Elder	*histrioides* 'Major'	*winogradowii*	sterile	white	
'George'	dark wine red	1973	William van Eeden	*histrioides* 'Major'	'J.S. Dijt'	sterile	yellow	7.26
'Gordon'	blue	1971	William van Eeden	*bakeriana*	'Cantab'	fertile	orange	.22
'Harmony'	blue	?	C.J.H. Hoog	*reticulata*	*histrioides* 'Major'	sterile	yellow	9.49
'Hercules'	"red black"	<1933	A. Van Der Berg Gzn	*histrioides*	*reticulata*	poor	yellow	
'Hercules II'	violet	-	?	*histrioides*	*reticulata*	sterile	?	
'Ida'	blue	1973	William van Eeden	'Gordon'?	?	fertile	orange	.09
'J.S. Dijt'	wine red	<1938	J.S.Dijt	(supposedly *reticulata* x *histrioides*)		fertile	yellow	1.41
'Jeannine'	violet	1958	Van Tubergen	?	?	fertile	yellow	
'Joyce'	blue	<1943	C.J.H. Hoog	*reticulata*	*histrioides* 'Major'	sterile	yellow	1.29
'Katharine Hodgkin'	blue & pale yellow	1960	E.B. Anderson	*histrioides* 'Major'	*winogradowii*	sterile	white	.03
'Marguerita'	blue	199?	?	sport of 'Clairette' with variegated leaves		fertile	?	.01
'Michael'	dark blue	1973	William van Eeden	'Springtime'?	?	fertile	orange	
'Natascha'	almost white	1973	William van Eeden	'Cantab'	self	fertile	orange	.17
'Pauline'	wine red	<1953	C.J.H. Hoog	*reticulata*	*bakeriana*	fertile	orange	1.06
'Pixie'	dark blue	199?	?	Sport of 'Harmony'		sterile	?	
'Purple Gem'	wine red	1952	Van Tubergen	*bakeriana*	?	fertile	orange	2.46
'Royal Blue'	blue	<1936	Miss A.L. Hutley	?	?	sterile	yellow	
'Springtime'	blue	1950	C.J.H. Hoog	*reticulata*	*bakeriana*	fertile	orange	.12
'Violet Beauty'	violet	<1953	C.J.H. Hoog	*reticulata*	*histrioides* 'Major'	sterile	yellow	.08

Table 3 Reticulata Species And Named Hybrids

* Pollen colour can be separated into essentially three groups: white, orange/yellow and olive green. There is a clear tendency for parents with white pollen crossed with orange ones to give progeny with somewhat yellow pollen; a diluting effect so-to-speak. Note: some sterile varieties have essentially no pollen (ie. no complete pollen grains). In these cases the colour is of the pollen grain "garbage".