GREAT LAKES CHAPTER

North American Rock Garden Society (NARGS)

FALL NEWSLETTER, SEPTEMBER 2010

CALENDAR OF CHAPTER MEETINGS **meeting details below**

**SATURDAY, 18 Sept., 2010: FALL PLANT SALE & GARDEN TOURS

MEETING:	**9:00 AM – ca. 3:30 PM**
PLACE:	See map insert for Gardens and Directions
BAG LUNCH:	**ca. 12:30 PM** (while touring Mike's garden)
PLANT SALE:	**1:30 PM** at Mike Harvey's (Mike from Telly's)

We will have 3 open gardens on the same day in addition to the plant sale garden:
Amy & Dave Miller, Dianne & George Hilborn, and John & Yvonne Iuppenlatz – see map insert

**SATURDAY, October 30, 2010: FALL MEETING

MEETING:	**1:30 PM – ca. 3:00 PM**
PLACE:	Matthaei Botanical Gardens, Ann Arbor
PROGRAM:	**1:30 PM** – brief business meeting
	1:45 PM Tony Reznicek
	Why plants change their names: Rock Garden Plants, Woodland Plants, and Modern Biology

MARK YOUR CALENDARS:

We will send out our usual timely winter postcard with details of the winter meetings

**SATURDAY, January 22, 2011: Annual Winter Potluck

Program by Curt Hanson from Crintonic Gardens on ***Plant Hybridizing***

SATURDAY, February 19, 2011: **Arrowhead Alpines we will have a hands-on meeting about ***Plant Propagation*: *Seeds*, *Cuttings*, *& Grafting***

Spring Meetings:

****Saturday, 23 April 2011** [more information will be in the Spring Newsletter]
We will have Chris Chadwell from the UK talk about Himalayan plants. Exact topic and place not set yet, but hopefully we can have a couple gardens open for spring bulbs – which we never get to see with our meetings for the spring sale being in mid−May!

****Saturday, 14 May 2011** [more information will be in the Spring Newsletter]
Spring plant sale and garden tours.

UPCOMING NATIONAL MEETINGS **See the Rock Garden Quarterly for details.**

- The 2011 Annual Meeting will be hosted by the Fells in New Hampshire. It will be June 17-19, 2011 and will be a great chance to see the best alpine tundra in eastern North America.
- The 2011 Winter Study Weekend (only one this year) will be in Sidney, British Columbia (on Vancouver Island) February 25-27 and should be another chance to see great plants and gardens.

From the Chair

OK! Enough is enough. The general outlook and attitudes of our fellow Americans, to put it mildly, is down right ugly. Someone has to put a stop to it and I say let it be us. Us being the garden and plant people of the USA. So get out in your gardens and drag some friends along that need an attitude adjustment. Spruce up your garden, plant those troughs, start that crevice or tufa garden. Visit your favorite nurseries and or send them a mail order to buy some new plants for those projects. Let's get the economy growing again!

Something to look forward to is our Fall Plant Sale. It will be at Mike Harvey's garden. Many of you know Mike from Telly's. Bring lots of plants. Also bring a chair as it will be a busy day. We also get to visit 3 other gardens in the area we have not been to before the plant sale. The speaker for our October meeting will be our very own Tony Reznicek and for the January potluck meeting our speaker is Curt Hanson from Crintonic Gardens.

We will do another propagation/grafting workshop at Arrowhead Alpines in February. For those that missed it last year all who attended the workshop got to do 3 or 4 grafts and take them home. We will again supply the understock and scions for several different conifers to graft but this year we will also have understock available to do Gingko and Japanese maples. So if you have something you wish to graft, maybe from your own garden, let me know about it as soon as possible so I can have the understock ready for you at the workshop. If you're not sure when or how to collect the scions, again, contact me as soon as possible. Then in April we get a visit from plant explorer and seed collector Chris Chadwell along with some gardens to visit.

Looking forward to seeing you at the plant sale and remember to keep collecting seed from your garden for the NARGS Seed Exchange and keep buying plants from our nurseries. We'll show America what the "Green Economy" is really about!

John Serowicz

Propagation Workshop at Arrowhead Alpines20 Feb 2010
Meeting Notes by Laura Serowicz

Don LaFond covered how he grows plants from seed, Dawn (Langdon) Paff talked about how they cuttings at Arrowhead Alpines, and Andy Duvall showed how to do grafting. Then after a short break participants were allowed to do some conifer grafting with understock provided by Gee Farms and scion wood provided by Arrowhead Alpines. These are some simple techniques that you can use at home that are a great way to increase the number of plants you have for your garden, to give to friends and to bring to the chapter plant sales [Hint! Hint!].

SEED: Don Lafond started the workshop with a quick talk on how to grow plants from seed. Starting plants from seeds is smart for several reasons – usually it is cheaper [e.g. NARGS seed exchange is $15.00 for 25 packets of seed or 30 packets if you donated seed – open to national NARGS members only – another Hint! Hint!], you usually end up with several plants so you can experiment more with where you place the plant in the garden, thus increasing the odds of finding a spot where the plant grows well. You also get some genetic variety when growing from seed, maybe an interesting color form, or variegation, or more hardiness, or resistance to pests among your seedlings, and seedlings often do better planted into tufa or crevice gardens than would a full-sized plant.

Don uses a ready-made seed starter mix that is made of fine peat and vermiculite and he adds roughly equal parts of perlite to the seed starter mix. Don't use a seed starter mix with fertilizer but start using a very weak fertilizer after the seeds germinate.

Don starts most all his seeds in 4" plastic pots, scooping the pot into the starter mix and then leveling it off – without tamping or compressing it. Sprinkling the seed on top, with a few exceptions, is good, since many seeds need light to germinate. Bottom water the seed pots by placing them in a tub with 1-2" of water until the top of the mix is damp, then place the pots wherever you are keeping them until they germinate. Don has better germination the first year without the grit on top. After the first year, if the seeds didn't germinate, he puts on grit fairly thickly to about 3/8". Since some seeds take up to 3 years to germinate, the grit helps keep the moss and liverworts down. Once the seed are sown Don puts the seed pots in his greenhouse that has a small heater and keeps the thermostat at 40°F so that it doesn't freeze.

Don has also tried seeds outside in a wooden seed frame; 2× 4's set into the ground with heavy landscape fabric on the bottom to keep out tree roots and critters, and filled with seed starter mix. However, outside things would start germinating when the snow melted and if there were a freeze he would lose some seedlings – some can't take the freezing while others can. So he now starts most of his seeds in the greenhouse to keep a better eye on them. For seed of bulbous plants like *Erythronium*, *Fritillaria*, etc. that need to be kept moist and need outdoor winter conditions Don uses busboy tubs (about $7 each), with some holes drilled in the bottom, covered with a hardware cloth top to keep animals out and filled with his mix. Sow the seeds and set the tray outside. In the tubs the seeds can be sown and pricked-out once they germinate at a comfortable height inside and the tubs put back outside on the ground. Don finds that 90% of his seeds germinate within a year and the germination percentage goes way down from there – but some seeds need 2-3 (or more) years before they germinate so don't give up. The most important thing is to not let the pots dry out at any time (or keep them too wet).

Most bulbous seedlings like *Crocus*, *Erythronium*, *Fritillaria*, etc. Don keeps in the pots at least 3 years after they germinate before repotting them or putting them in the garden, since drying out before they have sizable bulbs is deadly. Ian Young's Bulb Log on the Scottish Rock Garden Club's site [www.srgc.org.uk] has a lot of great information on starting seeds of all kinds of bulbs including timing and depth to sow the seeds (e.g. *Crocus* seeds should be sown deep like 3" down). Norm Deno's books also cover when seeds should be sown and at what temperature they germinate.

Gibberellic Acid (GA-3) is helpful in breaking the dormancy of certain seeds such as *Glaucidium palmatum*. Different concentrations of GA-3 are used depending on the seed, i.e., 500, 1000 or 1500 parts per million [ppm]. However too strong a concentration will cause seedlings to etiolate (stretch and not produce chlorophyll).You should try the lowest concentration possible that will still result in germination, so you may need to test different amounts for each species you are trying to germinate. Soak a small piece of paper towel with the GA-3, put the seeds on ½ of the paper towel, fold the paper towel, and put it in a plastic bag. [Norm Deno uses the amount of GA-3 that will fit on the end of a toothpick, sprinkled on top of the seeds on the paper towel with about 6 drops of water added to dissolve the GA-3 – this amount equals about 1000 ppm]. Check the bag every day and within a week or two the radicle will start to emerge from the seed, then take them out of the paper towel and sow the seeds in a seed pot putting them in sideways so that the seed isn't upside-down. Esther Benedict found that she damaged the seeds pricking them out of the paper towel, so after sowing

the dry seed in a pot she uses a spray bottle filled with the GA-3 solution and spritzes the pots about 4-5 times then puts a plastic bag over the pots. Esther has found that *Gentiana* seed have done best for her with a combination of GA-3 and cold treatment.

The one thing Don really wanted to emphasize is that there are many ways to sow seed. For most species it is not complicated, by simply putting the seeds in a pot and giving them moisture, you will have seeds germinating and producing lots of plants.

CUTTINGS: Dawn (Langdon) Paff demonstrated propagating plants from cuttings. Dawn learned from Dick Punnett and Bob Stewart and does thousands of cuttings at the nursery every year. Dick kept excellent notes recording what timing/hormones worked best for species and that has been hugely helpful.

Propagating plants by cutting is an easy way to get more plants that are true to type (e.g. cultivars); ensuring that a desirable characteristic (e.g. variegation, color, size, etc.) is passed on to the new plants. You just need clean razor blades, hormones, plant material and a place to put them in.

Lots of things can be propagated from cuttings including conifers, deciduous, and herbaceous plants. Some plants can be cut at any time of the year, but others have a limited time when they respond well to this method.

The six basic steps used to do cuttings at Arrowhead Alpines are: cut, clean, cut again, dip, stick, and water. Keep the cuttings out of direct sun as you prepare them. Using *Dionysia*, to demonstrate **stem cuttings**, [methods vary slightly for other types of cuttings e.g., leaf, softwood, hardwood, etc.] **1)** Cut stems from the base of the plant (for small alpine cushions the cutting might only be maybe an inch long, larger plants may be much longer). Keep the razor blades you use for cutting clean/disinfected and replace them often. **2)** Remove brown or dead leaves and leaves that would be below the mix when inserted. Brown/dead stuff will rot in the frame, killing your cutting and infecting others. If the cutting has large leaves you may need to cut the tip half off the leaves so they don't touch other leaves (to prevent the spread of fungus). **3)** Make a fresh clean cut on the end. For herbaceous stuff make a straight across cut, for some woodies you may get better rooting if you strip a little piece of the bark off at the cut end. **4)** Dip the cut end into a hormone mixture and let the hormone on the cutting dry for maybe 5 minutes. If you stick the cutting in, right after dipping into the hormone, you may wipe it off. **5)** Stick the cut end into the mix in your frame and gently firm the mix so that the cutting is standing upright. The cuttings can be stuck rather close together as long as they don't touch. Label each set of cuttings in the frame. **6)** Water the cuttings with a very gentle watering head. The cuttings have rooted and are ready to be potted on when they resist when you tug on them.

Arrowhead Alpines uses liquid hormone solutions rather than the powder. Water-soluble hormones work best since powder ones can rub off or not coat well. Avoid alcohol-soluble ones that can burn the cutting. Arrowhead mixes a fresh batch every couple of days, mixing only what they will use during the time, so that it doesn't break down or get contaminated. They usually get the hormones from Research Organics [www.resorg.com]. Other sources include Carolina Biological Supply [www.carolina.com], and there are a lot of other chemical supply sources as well. You will want to get two different hormones: K-IBA and K-NAA, the potassium (K) salt formulations are water-soluble. Arrowhead Alpines uses an equal amount of each of them: for herbaceous plants (like the Dionysia) usually around 1500 ppm of each hormone mixed together, for woodies and conifers usually around 3000 ppm each. Generally hard-to-root things, like *Acantholimon*, use 3000 ppm and for easy-to-root things try 1500 ppm, and most things will root at one of those concentrations. If it is really hard to root you may have to go as high as 10,000 ppm, but then you usually end up with a big lump of callus on it. If you burn the base off of the cutting or it grows a big lump of callus and no roots you used too much hormone. Japanese Maples and Gingko tend to want higher hormone levels whereas *Chamaecyparis* can root at 3000 ppm easily or can even root at lower amount, it just takes longer.

Fungicides work poorly on cuttings so good sanitation practices are important. If you see something rotting or going downhill in the frame get it out as soon as possible. If the mix in the frame gets infected, dig the whole mix out, throw it away and start with a fresh clean mix. Do not fertilize the plants in the frame or you will grow all kinds of mosses and liverworts etc. You want to get things out of the cutting frame as soon as possible because the longer they are in there the better chance they have of drying out, rotting, or have something else go wrong with them.

Keep notes of what strength hormone you used to remember what works for that species for you. You can also take cuttings at weekly/monthly intervals to see if there is an optimum time to do them. Some things like Daphne can be cut year round and a lot of the conifers at almost any time, set in either a Nearing Frame during fall or cutting frame over winter.

The indoor cutting frames at Arrowhead are bottom heated at about 80°F in the winter. The frames are at a comfortable height on cement blocks and covered with poly-covered lids to hold in the moisture/humidity. The medium that they use is a 50:50 mix of Canadian peat and perlite of peat and perlite to which they add some turface. This works well for them – not too wet or too dry. They try to replace the mix every year or two or sooner if there are any contamination problems. When the temperatures allow, Nearing frames are used outside for cuttings. Nearing frames use reflected light so the placement of them (facing due north) and the angle of the back wall (~47° for our latitude) are important – a detailed diagram was included with the workshop handout. Last summer Dick experimented using busboy tubs with holes drilled in the bottom. For the medium he filled it half-full with perlite, watered it well and stuck in cuttings of a number of things including *Daphne* and *Androsace*. The perlite holds the cutting vertical and maintains moisture so it doesn't dry out. With the tubs placed in the shade, not covered, and watering a couple of times, within 6-8 weeks everything was well-rooted.

Usually with hard-to-root things like Japanese Maples, Lilacs, etc. you want to take the cutting when the wood is soft (butter-soft for Lilacs), if too hard it will not root; for other cuttings, they will rot if too soft.

GRAFTING: Andy Duvall demonstrated grafting. Seeds, cuttings, or divisions are usually more economical but, if there is no other way to propagate it, grafting must be done. Many shade trees, dwarf conifers, and fruit trees have to be grafted.

For top grafting, the **understock** (the plant you are going to graft onto and the permanent root system of the new plant) and the **scion** (a cutting of the plant you want to propagate) should be about the same diameter – that makes it a lot easier to match the **cambium** (the live green layer between the wood and bark of the plant) on both sides. If they are not the same size, there are some grafting techniques that work. The scion wood should be healthy and collected when it is dormant but when the temperatures are above 30°F.

Prepare the scion by pulling off any lower needles or leaves/buds with your fingers. With spruce, because the needles are so tight, it is easier to carefully shave the needles off with shears or a razor blade. Shorten the cut end of the scion to a comfortable length to work with.

Andy concentrated on "side grafting," best done in December through February, possibly into March, when the plants are dormant. You need an understock and the scion. You will try to

match the cambium of the rootstock to that of the scion. The cambium is just about one cell thick, thus matching is pretty difficult (unless you are working under a microscope), but in side grafting close enough counts. The scion and the understock must callus and grow together. Callus is mass of undifferentiated plant cells that differentiate, knitting the cut edges together, forming bark on the outside and wood on the inside.

Your understock should be as close as possible to the species or genera you are grafting; you can't graft apples to oranges. For pines, try to stay within the needle groups, i.e. 2-needle scion grafted onto 2-needle pine understock, 5-needle–5-needle, etc. There are some exceptions: 1- and 3-needles will work on 5-needle understock. Certain conifers make good universal understock; they are vigorous, economical to grow, and work for a wide range of scions. Some generic understock include: white pine, *Pinus strobus*, for 5-needle pines, Scotch pine, *Pinus sylvestris*, for 2-needle pines (*P. densiflora*, *P. mugo*), Norway spruce, *Picea abies*, and blue spruce, *P. pungens*, work for most spruce, and balsam fir, *Abies balsamea* is used for true firs: *Abies*.

The understock should be well-rooted, vigorous and pest free. There is an adage about grafting success: 40% will depend on the condition of your understock and scion, 20% on the grafting, and 40% on the aftercare. The understock should be kept at 55-65°F for 3 weeks or so, to stimulate root growth, but keep the scion as dormant as possible. Andy uses a grafting knife kept very sharp but razor blades are cheaper and can be thrown away. The safest way is to cut away from yourself, with the scion wood laying on the table or the understock facing away from you. Before cutting your scion, practice making cuts until you feel confident enough to try it on the understock and scion wood.

You want to make your cuts smoothly, in one motion with a single stroke to keep the cut straight to make an even contact with the cambium in the understock. In side grafting, a thin flap is cut into the side of the understock and the tapered cut end of the scion wood is inserted into the flap with the cambiums lined up as best they can on both sides. The cut in the understock should be a gentle, sloping cut about an inch long that produces a flap of bark and thin wood, and exposes the cambium.

Slice off at the cut end on one side of the scion about an inch long at a slight taper. The thicker the scion and understock the longer you can make the cut. On the opposite side make a somewhat shallower cut about half as long as the first cut and then at bevel the end at about 60°. Immediately insert the cut scion into the understock flap with the long cut side of the scion against the cut stem side of the understock and the short cut side of scion against the flap. Line up the cambium layers on either side. If you have big understock and thin scion you will have to try to match the cambium as much as possible on just one side.

Binding the scion and understock together can be tricky. There are different ways you can do it; you can even use regular wide rubber bands. Rubber bands do break down in sunlight so they won't choke the graft. The rubber band is cut so that it is a flat strip and you simply wrap it around one time to catch the end and then either spin the plant around holding the rubber band snugly or hold the pot in place and wind the rubber band around the graft. Wrap from one end of the graft to the other, taking care to keep the scion in place so that it stays matched with the cambium. Tie-off using a slip knot. Put thumb and forefinger against the last wrapped layer of the rubber band, take it around again wrapping the rubber band over your thumb and forefinger, wrapping around until it comes back over and pinch the rubber band between your thumb and finger, and tugging it down so that a loop forms under the last wrap around. This slip knot will make it easy to remove it by pulling on the free end when the new graft begins to grow.

Parafilm is a very stretchy tape that sticks to itself. You wrap it the same way, but stretch it tighter and at the end it just sticks to itself so you don't need to make a knot. If the tape breaks you can just stick the tape back onto itself and continue wrapping. Andy also covers over the top 50% of a rubber band graft with this so it doesn't dry out and to seal it from fungus.

Andy doesn't use wax to seal the top of the graft and in the crotch but he does use a grafting sealer [Doc Farwell's Grafting Seal] adding enough to make a thorough coat. This allows overhead watering without worrying about water following the stem down and getting into your graft union, it also keeps out bugs, fungus and other evil things. It is non-toxic and won't hurt you or the plants but is persistent, so if you get any on your clothes it doesn't wash off easily. If you want to use wax, use a mixture of paraffin and beeswax, heated in a double boiler or small crock-pot, being careful that it isn't hot when applied or it can damage the cambium tissue. Be sure to label your graft, so that you remember what you've grafted, the date grafted, and any other information you want to remember about the graft.

A shady greenhouse at 60-70°F is great for new grafts or even a heated garage or basement. Humidity is very important; the scion has no way to replenish moisture loss until it bridges the tissue across to the understock, which may take 3 weeks. The understock shouldn't need to be watered much at this point since it is dormant. One thing you can do at home is put it in a clear plastic bag to make a humidity tent. Not much light is needed at this stage. Keep them loosely tented in the plastic bag so that they stay moist but check that the plastic is not lying on the plant and open the top of the bag as needed if they get too warm or too wet.

Within 2-5 weeks callus should develop at the cut edges. After that, by late April, you may see some active growth on the scion, and you can start reducing the top of the understock by a little bit (called "heading back") to force some of the strength from the understock into the scion. By June you can reduce the top of the understock even more and you will have new growth on the scion. When the scion growth hardens it is time to either plant it outside or put it into a larger pot. Cut off the parafilm or rubber band since as the stem grows it could choke the graft. Take a sharp knife and carefully slit the parafilm open, or pull up the loose end of the rubber band to untie it. Keep the plant unstressed, in the shade or north side of the house and keep the moisture fairly low. One nice thing with side grafts, if the graft fails you can try another graft as long as you didn't cut off all of the growth on the understock, just make the next cut on the other side of the understock from where you had it and try again.

If the understock is a much larger diameter than the scion you can also modify the cut on the understock by cutting a down slit and a top cross slit carving down so that one side of the flap remains attached like a side-pocket [called a side-inlay graft] that the scion fits into rather than a flap cut. Then cut one side of the scions into a wedge shape that will slip into the side-pocket. The charm of it is that for big mismatched grafts it self-aligns the cambium layers.

There are lots of different types of grafts, depending on what you are grafting, and there is no one right way to do any of it. Side grafting is one of the easier types and works well for most conifers. We hope to make grafting workshops a regular part of our chapter activities, so be thinking about what scions you might bring that you want to graft in the future [see the *Notes from the Chair* in this issue of the newsletter for more information].

Remember to send your seeds to Laura Serowicz for the NARGS seed exchange.

"From the Wine-Dark Sea to the Olympian Heights: Plant hunting in Greece" by Nick Turland
Meeting Notes by Laura Serowicz

The January 16, 2010 meeting featured a talk by Nick Turland of the Missouri Botanical Garden in St. Louis. Nick is a botanist who worked for many years at the Natural History Museum in London on the Mediterranean flora, especially Crete, home to many garden plants we grow here. In 1997 he began working at the Missouri Botanical Garden on the Flora of China Project. He is also an expert in plant nomenclature.

Nick first went to Crete in 1984 on a botanical walking holiday and was instantly hooked. Greece has a huge flora, with about 6000 species; Nick concentrated on those that have rock garden potential. He began our tour on the island of Crete, moved on to the Peloponnese peninsula of Greece then to the Vikos Gorge and Mt Olympus in northern Greece.

Crete is the southern-most and largest Greek island. At sea-level there is lowland vegetation of juniper scrub, a middle zone has olive groves and cultivated fields, higher up there are patches of mountain forests of mostly prickly oak, *Quercus coccifera*, and then the area above tree line from about 6000' up to 8050' at the mountain summits. Crete is about the size of Long Island, but with three main mountain ranges. The White Mountains, or Lefka Ori on the western side of the island is an area of high altitude with a 50 miles square plateau at around 6000' with valleys and mountain peaks rising to 8000'. Mt Psiloritis (aka Mt Ida) in the center of the island is almost the same height as Lefka Ori but it is a big ridge not a large area at a high altitude. The Dikti Mountains in eastern Crete are slightly lower at 7045'. The mountain ranges each have distinctive and interesting floras. Snow on the mountain tops persists until May or even June.

There are 4 species of Tulips in Crete; red-flowered *Tulipa goulimyi* is the rarest of them, only known from a single place at the western end of the island. It is a lot more common in the Peloponnese in southern Greece but will probably become extinct in Crete because the place it grows in, low sparse scrub by the sea, is prime real estate for building. The bulb tunic is hairy on the inside and in cultivation it may be more sensitive to summer moisture and rot. In general, Nick has found most of the Mediterranean bulbs do very well in the Midwest; they don't seem to mind the non-Mediterranean climate.

There are 5 or 6 species of *Arum* in Crete and some related genera as well. *A. purpureospathum* typically with dark purple spathes, is one of the most rare and localized species. It sends leaves up in autumn that tend to get damaged in winter. This may not kill the tuber, but the plant weakens and eventually dies. In Crete it flowers early in March to early April with showy seedheads in summer. *Arum creticum* is the famous yellow-flowered arum of Crete, though not endemic. Typically it has big glossy green leaves and a yellow or pale yellow spathe which becomes recurved and rolled down when it's in full flower and then a deeper yellow spadix remaining erect in the center. Quite a large plant, often at 18-24" tall, it usually grows in the medium altitudes, but is found from sea level up to 3500'. There has been some confusion in the past between *Arum creticum* and *A. idaeum* so Nick showed us photos of them side-by-side. Although they are related they look different, if you ever see "white form" of *A. creticum* offered it is most likely *A. idaeum*. *A. idaeum* is strictly a mountain species, only found above about 4500' in Crete and growing almost to the highest summits. It is a smaller plant; the whole spathe is only around 4". The spathe is white with a slight purple or greenish tinge and remains erect (doesn't recurve) and the spadix is always a dark purple color. It is bone hardy, not happy without cold in winter. An excellent choice to grow here.

Dracunculus vulgaris, the dragon arum, is a striking plant, as a big robust plant to 4-4½' tall. It smells absolutely terrible, like a decomposing donkey, so whatever pollinates them presumably goes for rotting flesh. *D. vulgaris* grows in St Louis in the MBG woodland garden so it should be totally hardy here; coming up every year above the snow in late January-February, flowering in April, and producing big plants just like in the wild. The dark purple spathe and spadix being the normal form, Nick showed us a white-spathed form with a dark spadix, but there are a few unusual purple-marbled ones, and one with a white spathe and an orangey colored spadix. The white form is now in cultivation.

Iris planifolia, a Juno iris, is more common in the western Mediterranean, and is only in one small area on southwestern Crete growing on schist or non-limestone rocks. Strong blue flowers bloom early, from February through March, and should be hardy here. *Cyclamen creticum*, a more tender cyclamen, is a common spring-flowering cyclamen in Crete up to about 3000'. Mostly white-flowered, but occasionally pink-flowered, it has quite a variation in leaf patterns with green on top, or marbled on top, and green or purple underneath. The best form Nick ever saw was one plant with fantastically white marbled leaves, purple on the underside and pink flowers, growing on a limestone scree slope in open pine woodland, on a mountain in eastern Crete. *C. creticum* can take only a little bit of frost.

There are about 5 species of lilies in Greece, *Lilium candidum*, Madonna lily, is extremely uncommon and is known in the wild from a few places in eastern Crete, and southern and western Greece. Nick found it in a limestone gorge with lots of crevices and ledges, on south and west-facing slopes where it gets sun-baked. It flowers at the end of May, when things are starting to get quite dry; by then the leaves are brown and withered.

There are probably 100 gorges in Crete, possibly formed from earthquakes corrugating and cracking the earth's crust The habitat is perfect for the shrubby chasmophytes (cliff plants) growing on the vertical limestone cliffs. Often attractive plants with showy, large flowers they are very rare and restricted in their distribution. A lot of plants that are endemic to Crete grow in these gorges, sometimes only in one or a few gorges. *Campanula saxatilis* subsp. *saxatilis,* the color varying from almost pale steely gray to a good strong blue, is endemic to western Crete known from about 10-15 places around the coast, with another subspecies on the island of Kithira and might be hardy if kept from winter wet. *Petromarula pinnata* in the Campanulaceae is an endemic genus in Crete, with its nearest relatives probably being *Physoplexis* and *Phyteuma*, a perennial forming a rosette of leaves, taking several years to reach flowering size, the stalk up to 4' tall. It should be hardy, but with a big tap root it does not grow well in a pot.

Peonies seem to have a particular endemic species on each Mediterranean island. On Crete and Karpathos northeast of Crete is *Paeonia clusii* subsp *clusii*. Normally white-flowered but sometimes pink, it usually grows in natural habitats such as native Mediterranean forests. Nick showed a montage of photos illustrating the variation of colors. It is also very sweetly scented, like nutmeg and cinnamon, and is as hardy as any Peony, taking about 7 years to flower from seed. In Crete most of the plants have narrow leaf segments but some have broad segments, and may look like separate species, but are not.

Nick described *Biarum davisii* subsp *davisii* as "picture an anteater that's become a monk", a cute little thing, only 2-3" high and flowering in the fall. The spathe curves forward and is right at ground level. In the winter it forms a flat rosette of oblong leaves and in the spring, if it was pollinated in the fall, you find a cluster of berries right in the center of the rosette; probably borderline hardy but certainly worth trying. *Biarum davisii* subsp *marmarisense*, from southwest Turkey and the island of Symi, is

easier to grow. It is more slender, the spathe is not quite as curved forward, and is more vigorous, being freer to flower.

Tulipa saxatilis is one of the commonest tulips in Crete, and quite established in cultivation. The Dutch bulb companies commonly sell two varieties, *T. saxatilis* and *T. bakeri* 'Lilac Wonder', a selection of *T. saxatilis* from Crete. In the wild they grow in a variety of habitats from limestone rock crevices on the vertical cliffs of gorges to open hillsides among scrubby vegetation. It is interesting to see it as a weed of cultivated fields, sometimes with more tulips than crops. Another species growing in cultivated fields is *T. doerfleri*. Nick showed a photo of tens of thousands on the Gious Kambos plains in central Crete, the type locality. It is related to *T. hageri* from mainland Greece, but spreads vegetatively underground by stolons. It is a red flower with black and yellow zones at the base of the petals. Nick grows *T. doerfleri* in St. Louis in stiff heavy clay soil which is similar to its native habitat. It blooms for him in early April, the same time as it does in Crete.

A traditional method of cultivating in the area is by using narrow terraces on the hillsides and hand cultivating them with a mattock (similar to a pickaxe) going into the ground maybe only 6". This was an excellent environment for bulbous/tuberous plants which would be further in the ground than the mattock could reach. There are remnants of the terracing all over the area. One of the most famous plants left in these areas is *Leontice leontopetalum* a member of the Berberis family. It has a tuber like a potato at least 12" underground and a rather loose rosette of leaves and then a pyramidal inflorescence of yellow flowers. The flowers are followed by colorful inflated fruits each with a small, pea-sized seed, which once dried fall off and get blown around in the fields until cultivated into the ground to germinate.

Nick then took us into the mountains of Crete to show us some of the higher elevations plants. Samaria gorge in western Crete is a spectacular large gorge with the mountains at about 7500' and the bottom of the gorge at about 1500'. There are vertical cliffs and a scree slope that is about 2/3 mile straight down. The forest near the top is *Cupressus sempervirens*, Funeral Cypress, which is the western limit of its distribution and down in the valley is *Pinus brutia,* Calabrian Pine. Up near the tree line are gnarly, weather-beaten cypress that are quite ancient, the side branches being dated to 1200 AD, so who knows how old the trees are. On the vertical cliffs a new species, *Anthemis samariensis*, was found. Nick was sent a photo of it in 2007 just before he was visiting the site and was able to determine that it was indeed a new species. The nearest species to it grows in southern Turkey, but there is nothing else quite like it. It should be quite hardy since it grows at 6000' on exposed north-facing cliffs, in a tough habitat that gets cold, and since it is on the cliff doesn't get buried in snow. Growing with it is a shocking-pink member of the pea family, *Onobrychis sphaciotica*.

Deep into the White Mountains of western Crete above the tree line there are a lot of sheep and goats which keep it sparsely vegetated. All of it is limestone; the valleys are really more like sinkholes with the land all sloping down to the water then drains into cave systems underground. You get some interesting plants in the flat areas at the bottom of the sinkholes where it tends to be a flat clay pan. In extreme examples the karst limestone does have potholes in the ground with fluted sides where the bare limestone has been eroded by the rain and the snow melt, with some of the holes being more than 100' deep. At first glance this area looks like it is just bare rock and gravel, but there are many plants growing in the crevices. It is a harsh environment being heavily grazed, windy, blasted by the sun and absolutely baked as soon as the snow is melted – so what grows there is small and keeps its head down.

A few things are capable of getting a little larger, such as *Daphne oleoides*, which can be about 3' across but only 4-5" high. It is poisonous so is not grazed. Plants either have to be very small, very spiny, or deadly poisonous to survive there. Another species of Daphne, *D. sericea*, is widespread in the mid-level hillsides of Crete not growing at high altitudes in the mountains. Both would be hardy here. *Euphorbia rechingeri* closely related to *E. myrsinites*, but a bit smaller and endemic to the White Mountains of Crete, has fantastic glaucous leaves with red margins and a strongly red-tinged inflorescence.

Anchusa cespitosa with its beautiful blue flowers is perhaps the most famous mountain plant from Crete. The deep clay pans with limestone gravel at the bottom of the potholes are its preferred habitat. It has thick roots, many of them like ropes, anchoring the plant into the ground through the clay to a permanent water source down below. Nick once grew it in a piece of tufa embedded on sand in a cold frame and it sent its roots through the tufa, split the tufa in half, went down through the sand into the subsoil underneath and started producing 6" long leaves, unfortunately the flowers were all hidden down amongst the foliage and looked terrible, so Nick prefers to enjoy them in the mountains of Crete Growing in exactly the same habitat, and often together, is *Hypericum kelleri*. It forms creeping rooting mats with large yellow flowers and is a perfectly hardy rock garden plant worth growing. Another endemic, *H. trichocaulon*, is similar but not as mat-forming and has been confused with *H. kelleri* in cultivation.

Prunus prostrata is a dwarf cherry that is prostrate and gnarly growing over the rocks, beautiful in bloom with pink flowers in May-June and red fruits in June-July. The cherries are about the size of a pea, and sour with a small stone inside. Nick grew it once from a stone he saved, but in cultivation you need a well-trained sheep to constantly prune it to keep a low habit or you get a more upright shrub about 2' tall.

There are two main snow-melt bulbs in Crete, *Crocus sieberi* subsp. *sieberi* and *Scilla nana* subsp. *albescens*. *Crocus sieberi* is also found in mainland Greece, but subspecies *sieberi*, the typical form, is endemic to Crete. It is very common in the three main mountain ranges in early spring when the snow is melting. In the wild there is quite a bit of variation, but it is mostly white with a little violet feathering on the outside of the outer tepals and with an orange base. One form in cultivation with the outer three tepals a clear violet on the outside so in bud you have a bicolor effect. *Scilla nana* subsp. *albescens* (syn. *Chionodoxa albescens*) is endemic to central and eastern Crete (western Crete has *S. nana* subsp. *nana*). *Tulipa cretica* is very hardy here and probably the most common tulip in Crete; endemic to Crete and growing from sea level up to nearly 5000' in a wide range of habitats from low Mediterranean scrub communities with bare soil patches among the shrubs, to rock crevices or in the mountains in a limestone soil pocket. Often it is a very small plant, sometimes only 2" tall, where 3-4" tall is the more normal size. The color varies from white to a good strong pink usually with a yellow center. Endemic to the mountains of central and eastern Crete, up in the mountains in autumn you will see *Crocus oreocreticus*, the name meaning "of the mountains of Crete". It is essentially a wild saffron crocus, related to *C. sativus* and *C. cartwrightianus.* It seems to be quite easy in cultivation, but lends itself to pot culture so it is easier to see in flower.

Peloponnesus in the southern part of mainland Greece, is a large peninsula, now technically an island since the Corinth canal was built on the isthmus separating it from the true part of the mainland. Nick took us to some of the mountainous areas there that are almost as high as on Crete with Mt. Taygetos in the south being the highest at 7895'. The Peloponnesus is also limestone

but differs from Crete in having meadows, which Crete is too rocky for. In alpine grasslands *Lilium chalcedonicum*, is widespread in Greece, usually growing in clearings around the margins of woodland, growing about 18" tall with red Turk's-cap flowers. A lowland woodland species is *Hymenonema laconicum* which looks like an unruly dandelion but with long flowering stems that grows about 4' tall and is found on scrubby roadside banks in the lower part of the mountain.

Mt. Taygetos is not all limestone. It has a high schist rock ridge area. There you will find *Dianthus androsaceus*; a small cushion plant with blue-mauve flowers, endemic to Peloponnesus and found on a few other mountains on the peninsula. It should be hardy here as it grows at about 6000' on an exposed ridge. Related to *Centaurea* is *Jurinea taygetea*, a little limestone crevice plant that is 2-3" tall, which is endemic to Mt. Taygetos. *Verbascum acaule* a stemless mullein, grows in flat clay pans around the edges of snow patches, where the snow melts late in June or July. It forms flat rosettes that are 6-8" wide with short-stemmed yellow flowers. *Pterocephalus perennis* is a mat-forming Scabious type, very common above the tree line mountainside growing all over the rocks and an excellent rock garden plant that is perfectly hardy. *Campanula radicosa* grows in mini-meadows by springs right next to the schist outcrops where the *Dianthus androsaceus* grows. These meadows are grazed by cows so you have little, closely cropped green meadows and among the grass is this *Campanula*. Another *Campanula* that is much rarer is *C. papillosa*, it has much broader leaves and bigger flowers although the plant is only about 4-5" across. It was discovered and described as a new species in 1908 and then never found again until 2008 by Nick and a Greek friend who is working on the flora of Mt. Taygetos. They found only about a dozen of the plants so it is pretty rare.

Cyclamen rhodium subsp. *vividum* (syn. *C. peloponnesiacum* subsp. *vividum* or *C. repandum f. vividum*) from Mt. Parnonas to the east of Mt. Taygetos is a strong vivid pink. Autumn blooming *Cyclamen graecum* is common all over Greece and gets down into Crete as well, but it doesn't grow very high up into the mountains so may be borderline hardy here. Most of them are pink-flowered but Nick has also seen a few white ones in Greece and in cultivation there are some good white-flowered forms that are worth looking out for. Another autumn-flowering species is bright yellow-flowered *Sternbergia sicula*, growing quite commonly near villages and old cultivated areas. *Fritillaria mutabilis* about 8" tall, grows in northeastern Peloponnesus on Mt. Oligyrtos, on grassy rock ledges on a steep north-facing slopes, probably moist and cool compared to other parts of the mountain and relatively inaccessible to sheep. Orange-flowered *Tulipa orphanidea* is quite common in the mountains of the Peloponnese but doesn't grow in Crete. It grows in a variety of habitats but tends to like clay soil in cultivated fields.

Dactylorhiza sambucina is one of many orchid of Greece; it is quite variable in color from pink to white to sulfur yellow and quite often a mix of colors within a population. It was growing in prostrate *Juniperus communis* scrub on a limestone mountainside at 6000' so it should be hardy here. *Echinops ritro* at a slightly lower elevation was flowering in August in the driest part of the year when everything else is burnt dry so the unearthly blue of the flowers stood out even more. *Saxifraga sibthorpii* is a specialized and delicate little plant, was growing on Mt. Chelmos at the source of the river Styx in a north-facing shady hollow at the base of a cliff in limestone rubble.

The Vikos gorge is a big limestone gorge in northwestern Greece and quite a different habitat than anything we had seen up to now. It is full of deciduous forest and very moist with a much higher rainfall and cooler summers/colder winters, being more of a continental rather than a Mediterranean climate. He showed us *Aesculus hippocastanum* the European horse chestnut; the genus is found in North America, in the Balkans and in the Himalayas and this species is endemic to the Balkans. Another famous plant in the Vikos Gorge is *Ramonda serbica*, in the Gesneriaceae of which 4 of the 5 European species are in Greece. This one grows on moss-covered limestone boulders in the forest, it is fairly drought tolerant so if the air is dry the plant will shrivel up and come back to life when it gets wet again.

The final area that Nick took us to was Mt. Olympus from the forest zone to the alpine area and eventually to the summits. On the northern side, the forest zone is mostly *Pinus heldreichii*, Bosnian pine, it is mostly limestone but there is some schist as well. There are about 50 plant species endemic to Mt. Olympus. *Asplenium viride*, green spleenwort grows in the limestone crevices. Growing in the low juniper scrub is *Hieracium pannosum* with attractive white wooly foliage and bright yellow flowers. One of the other famous Gesneriads in Greece is *Jankaea heldreichii* which is endemic to Mt. Olympus. It is very common on limestone rock faces throughout the forest zone and peters out once you get above the forest zone and even at low altitude you will find it in the summer completely shriveled up on the rocks. The best time to see it in flower is April and May. It is not the easiest plant to grow but should lend itself to tufa cultivation quite well and since it can grow at up to 7000' it is hardy, but is not too happy with water sitting in the leaf rosettes.

Aquilegia ottonis subsp. *amaliae* is quite uncommon and tends to grow in steep narrow gullies with limestone rubble where it is sheltered and has some moisture. The plant is about 12-18" tall, with soft blue and white flowers. Growing in similar habitat is *Doronicum columnae*, forming quite large drifts and gets about 2' tall with bright yellow flowers. *Geranium macrorrhizum*, with a strong pink flower, also grows in limestone rubble gully habitat, the one from Mt. Olympus being superior to many of the cultivated forms with smaller leaf and neater habit, not such a vigorous groundcover plant.

Blue-flowered *Campanula oreadum* (the species name means "of the mountain nymphs") is a rock crevice plant found on low cliffs and rock faces all over the high parts of Mt. Olympus and should be totally hardy. On the tundra-like high plateau grows *Lotus alpinus* with large deep orange and yellow flowers. You don't normally associate alpine gentians with Greece but a few like *Gentiana verna* subsp. *balcanica* do grow in the north part of Greece. It is only about 2" tall with really intense blue flowers. Growing in the limestone crevice just below the summit of Mt. Olympus is *Cerastium theophrasti*; it is probably the highest plant on the mountain and is endemic to Mt. Olympus. It is quite attractive for a *Cerastium* with large white flowers. In all Nick showed us a surprising number of wonderful plants from Crete and Greece that we can grow here. *Páei Grecian*! *Opa*! [Go Grecian and let's Party].

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