

Figure 1 *Alpine meadow in Armenia*

Wildflower Meadows of the Caucuses July 2006

Liz Halley (Travelling with Ruby Sweet)

e.halley@kew.org ~ lizziejhalley@hotmail.com

Diploma Student at Royal Botanic Gardens, Kew

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Preface

I have always been fascinated by wildflower meadows; the diversity of plants growing in many cases without the help of human hand that do not need to be 'gardened' and exist just for the sake of being, providing food and habitat for birds, mammals and invertebrates. Yet they perform the most beautiful shapes, patterns, textures and forms, which gardeners strive to reproduce. So beautiful, and yet so crucial to so many small and varied lives they seem to be as complete a garden as you could wish for.

I have been involved with the maintenance of meadows at National Trust properties and Kew Gardens and understand the huge, exhaustive effort needed to cut, collect and seed a meadow in land that has been 'improved'. Meadow loss in the UK is catastrophic and the species that survive only do so because of the intervention of conservationists holding back the tide of development.

The Caucuses region is one of incredible diversity, from mountains, to steppes, to lakes, with huge areas unchanged by humans. It felt like the perfect place to go to experience a truly untouched meadow, to experience the plant communities that have made a home there – perfectly suited to the soil, climate, aspect and crucial to that specific ecosystem, and yet producing beauty that the most skilled horticulturalist could only dream of recreating.

What can we learn from these plants? Are there plant communities that thrive together? Who are the people who are interested in their protection? This is what I set off to find out.

The objectives of the trip

- To record observations of plants that reflect on some of the species which tolerate heat and drought stress, but also able to tolerate sub-zero temperatures.
- To gain a greater understanding of the importance of species rich grasslands, culturally and environmentally by working alongside botanists who specialise in the native flora of the region.
- To improve identification skills in the field using identification keys, field guides and online resources
- To gain an understanding of the ways in which community projects can be used to create jobs and opportunities for local people which foster a drive for conservation and highlight the environmental assets of the region
- To meet people who are passionate about plants native to their region and learn the ways that they can be used, for example in food and medicine
- To visit a diverse range of habitats and environments to observe the plants in situ. This will enlighten the applicant to alternative ways of growing in a horticultural setting e.g. growing medium, irrigation etc.
- To experience the pure beauty of a natural wildflower meadow, with multiple species growing together
- To meet with botanists in both Georgia and Armenia and foster excellent connections

Monday 6th July

Tbilisi, Georgia

We were warmly welcomed by the staff of the Institute of Botany, Kosta and Archil who gave us a tour of the Herbarium and Seed bank. We learnt about the important work of recording the endemic species of the Georgian Caucuses and the challenges of conserving such a precious collection. The history of this herbarium demonstrates the importance of the flora of the Georgian Caucuses and the way in which it has grabbed the imagination and passion of important botanists, as far back as the 18th Century.





Figure 2 (left) Allium specimen at the herbarium in Tbilisi

Figure 3 (right) *specimen of Inula rhizocephala (syn. Inula haussknechtiana) collected by Joseph Bornmuller in 1892 which demonstrates the historic importance of collecting flora of the Caucuses and the long legacy of the herbarium*

In the afternoon, we met with Natia Samsonide from the Seed Bank who took us on a tour of the ex-situ endemic collection. The plants, such as *Campanula kachetica, Leptopus colchicus* and *Aspodeline lutea* are from in-situ seed collections that are threatened due to habitat loss. Under her guidance, we collected seeds from species that were ripe, such as *Cetaurea bella*, bringing them back to the laboratory. We then cleaned and tested them for viability. We discovered the importance of the ex-situ collections of the Botanic Garden and the role of the staff to collect, classify and save seeds of endemic plants. Ruby and I were able to reflect on the UK species rich habitats being lost to agricultural land or development and agreed that a national collection of native plants in the UK would be a welcome addition to our important botanic collections.



Figure 4 collecting seeds from Centaurea bella



Figure 5 Ruby cleaning seeds to prepare them for a viability check

Tuesday 7th July

Kumisi, Georgia

We headed to the south-west of Tbilisi with Tinatin and Nino, experienced botanists from the botanic garden in Tbilisi who took us to see some rocky scree vegetation.



Figure 6 Dianthus spp. growing out of the rocky scree

The rocky substate was of a high nutrient volcanic rock and despite the vertical drop, the crumbly texture allowed for plants to take hold with their roots.

Wednesday 8th July

Tsqnet'l, Georgia

We had barely stepped out of the car when we were down on our hands and knees examining the rich diversity of plant life around us. To the left, an expanse of meadow with *Plantago media, Salvia verticillata, Sedum acre, Briza media, Euphrasia* spp.*, Veronicum multifida*. I was particularly smitten with the *Alllium* spp. dotted through the meadow, as though perfectly planned and planted to give a nodding splot of colour, but actually perfectly random. Kosta and Archil urged us on and we were excited to see and learn as much as we could from this field trip.



Figure 7 meadow at the side of the road with several different species of Poaceae, Amaryllidaceae and Fabaceae

On our hike, passing through different habitats, Kosta explained the concept of phytosociology that is used by the Institute of Botany to catagorise habitats which was a new and fascinating topic. The meadow steppe displayed a rich combination of plants growing on free draining, stony ground, including the tinest *Allium* flowers.



Figure 8 Ruby observing the steppe meadow landscape

At 1335m this area would see extremes of temperatures both in summer and winter. The colours and forms do not show up well in a photo as they are so delicate, but this area held a lot of textural interest. There was very little grazing in this area.



Figure 9 Sempervium spp. with their tiny, white flowers, Tragopogon porrifolium going to seed, Allium spp. dotting the meadow with dark purple inflorescence.



Figure 10 A new plant to me, and therefore a highlight Centaurea reflexa subsp. *reflexa which can only be found from Turkey to the Caucuses, and which has a bright yellow inflorescence.*



Figure 11 Orobanceaceae

While on our hike through the meadow steppe we came across a few Orobanchaceae a family I knew little about, it was a great learning opportunity.



Figure 12 Paliurus spina - christi

We saw many *Paliurus spina – christi*, a shrub growing on the edge of the forest. A member of the Rhamnaceae family we saw it both flowering and in fruit, showing its large and distinctive discus type fruits. We learnt from Kosta about the medicinal uses of this plant and how the fruit are harvested.

We entered the forest habitat. Full of lichens, ferns and fungi we found some plants new to us such as *Acer capadocicum*. It was shady and the soil continued to be stony and well drained but fertile. As we walked, we came across *Crateagus orientalis*. Endemic to the Caucuses Kosta and Archil discussed the medicinal properties of the fruit and how many wild herbs are still used in traditional medicines today.



Figure 13 Epipactus hellebore in flower on the forest floor



Figure 14 Crateagus orientalis

Thursday 9th July

We headed with Kosta to Qazbegi, to the north of Tbilisi, stopping off along the way at some sites of interest. I haven't space to put all the sites we saw in this report, but I will highlight a couple here.

Stepantsminda, Georgia

The first of these stops was Stepantsminda, an area renowned for diversity of flowering grassland species. At a height of 1995m above sea level the area was abundant with flora. We could walk into the meadows and sit and examine the plants. The experience was one of diversity and abundance in every direction with no one species dominating. It was fascinating to see the plants growing together with form and colour complementing one another in an unimproved meadow and it was an excellent opportunity to hone our identification skills, with our copies of Illustrated Field Guide to the Flora of Georgia (South Caucasus) at the ready. With Kosta for encouragement and support, we set about identifying plants that we had never encountered. One of my favourite plants growing in the meadow was *Onobrichis cyri* - native to the Caucuses, its purple and pink flower glowed in the sunlight. Also, *Campanula lactifolia* (native from northwest Turkey to northwest Iran) with racemes of light blue flowers.



Figure 15 Onobrichis cyri,



Figure 16 Campanula lactifolia



Figure 17 A section of sub alpine meadows of Stepantsminda

I gained much from the experience of seeing these meadows, which had evolved across millennia to become a species rich, diverse grassland, designed by nature to thrive in these conditions, from subzero temperatures to baking hot summers. I was able to

reflect on the meadows we are trying to recreate back in the UK, a different composition of flora but precious to the ecology that supports and is supported by them. It seemed to signal, not competition between species, but rather harmony – the vetch uses the support of the stronger stem to climb up to the light, countless species occupy different niches, each contributing to the health of the whole system. Together, they create balance, resilience and beauty.



Figure 18 Ruby and Kosta identifying flora

Friday 10th July

After an overnight stay in Qazbegi with a delicious Georgian feast and a lesson in the Georgian art of the toast, we set off back to Tbilisi.

We saw many small trees and shrubs of *Hippophae ramnoides* on the way back and Kosta explained to us that the fruit is commonly used to make vitamin rich tinctures that are said to help the body fight off colds and 'flu.



Figure 19 On the way back down the mountains we stopped for a break and noted a cluster of Campanula alpestris growing on some rocks

Armenia

On our arrival in Yerevan we picked up our hire car. Astghik at the Institute of Botany had recommended many places to see species rich grasslands so Ruby and I had planned a route with stops at Lake Sevan and Sevanavank, Dilijan – in particular the Semyonovka pass – and the final trip meeting Astighik and Sona for a trip to the Tavush mountains. What I hadn't expected was the pure abundance of flora at the side of the roads, for example a patch of land behind a petrol station, as shown in the photos and description below. The diversity of plants and habitats makes Armenia a paradise to any botanist of hardy plants.

Saturday 11th and Sunday 12th July

Lake Sevan, Armenia

When we arrived in Armenia, we drove to Lake Sevan to spend a couple of days botanising by the lake. We stayed in a small hotel on the shore of the lake and only had to step out of our rooms to see a wide variety of plants growing happily around rocks, right up to the shoreline.



Figure 20: Dianthus spp. amongst trifolium and hardy species at the side of Lake Sevan



Figure 21 Onobrychis cyri on the lake shore



Figure 22 Onobrychis cyri up

Whilst driving around the lake, we had trouble with the car tire pressure and popped to a petrol station to ask for advice. As we parked up at the side of the road, something incredible caught my eye- it seemed like someone had devoted their life to cultivating a small garden behind the petrol station. Textures and colour spilled into each other, and we hopped over a small wall to take a closer look. The diversity was incredible! So much colour and variation. I left this meadow reluctantly, it seemed we had stumbled across a treasure, almost like a forgotten garden.





Figure 23 (left) a diverse mix of flora, including a many species of Fabaceae

Figure 24 (right) Astragulus spp. and Asteraceae



Figure 23 Verbascum spp., Chichoria intybus, Papaver armeniacum

Monday 13th July

Sevanavank, Armenia

Sevanavank monastery stands on a rocky peninsula on the shore of Lake Sevan. It's popular with tourists but if you persevere past the trinket seller and crowds lining up to buy freshly squeezed pomegranate juice, you get to a patch of relatively untouched land, exposed to the light breezes blowing over the lake. We met people from around the world who were there to appreciate the flora and talk about favourite field guides. What struck us almost immediately was the microclimates of the peninsular - the south side of the lake had many more succulent species including various species of Crassulaceae whereas the cooler and more wooded north side was rife with hardier plants.

On the rocky banks of the lake there was a wide variety of plants growing in the well-drained, gravelly soil. Lake Sevan, like many of the locations we visited frequently gets down to subzero temperatures in winter.

We saw many plants, some familiar and others less so – including the huge, globed inflorescence of *Trifolium alpestre*. *The* Fabaceae family were well represented offering many chances for us to practice our identification skills.



Figure 24 Campanula latifolia



Figure 25 Vicia spp.



Figure 26 Trifolium alpestre



Figure 27 Centaurea cheiranthifolia



Figure 28 Stachys Macrantha



Figure 29 Papaver arenarium



Figure 30 Ruby botanising on the path

Tuesday 14th July

Semyonovka pass, Armenia

Inspired by the species of beautiful plants we had already discovered in the Armenian lowlands, we headed up the mountains in the hire car as Astghik had recommended the Semyonovka Pass (2,122m above sea level) as being one of the biodiversity hotspots for species rich grasslands.

We drove a little way into the pass, parked up and saw many plants just stepping a few metres from the car. This area is used for grazing by nomadic shepherds and in some ways the flora we saw reflected that. There were lower growing aromatic herbs such as *Thymus* spp. and *Origanum* spp.



Figure 31 Rosa canina



Figure 32 Ruby botanising

Wednesday 15th July

Mountains of Tavush, Armenia

Travelling from Yerevan, Astghik and Sona picked us up mid-morning to whisk us into the mountains of Tavush. We changed from car to Iranian minibus as we drove into the Lesser Caucuses. Our expert driver took us on off road terrain through the most remote mountain passes and Astghik and Sona knew the most fantastic spots to stop the van and jump out to see the diverse and spectacular alpine flora.

We started on our journey from the village up to the slopes of the mountains, passing through wooded areas and lower lying meadows. The diversity of colour, shape and form were outstanding. This was meadow that was barely grazed and not managed by human hand. We jumped out of the van to take a closer look and to scribble some notes

in out books. Getting the diversity of flora into photos was futile, we didn't have long to stop as there was much to see.





Figure 33 (Left) Soviet era Iranian van built for the mountains

Figure 34 (Right) Gladioli spp. Rhinanthus major, Poaceae and Asteraceae





Figure 35 (Left) We saw meadows rich with Arnica montana amongst Achillea spp. Campanula spp. and Trifolium spp. Astrantia spp. Veronica spp. the mountain fog gave the impression that they were glowing in the light, all the way down the slope.

Figure 36 (Right) This Platanthera chlorantha was one of many on the slope, we could have stayed all day examining the various flora on this one slope alone.



Figure 37 The landscape at 2000m, rolling hills with rocky outcrops.



Figure 38 Astrantia maxima



Figure 39 Pulsatilla spp.



Figure 40 a patch of grassland. there was repetition in species but the flora was widely diverse and could be the topic of a wider study



Figure 41 Orchidacaea



Figure 42 Gallium verum

We were lucky to see a late growing *Lillium martagon*, glowing yellow in the late afternoon sun. We cautiously hopped out of the van as a pair of breeding mountain tigers had been spotted in the region. It was well worth the risk to see this beautiful plant up close.



Figure 43 Lillium martagon



Figure 44 taking a moment to appreciate the meadow

Thursday 16th and Friday 17th July

We made the long journey back to Yerevan to drop the car back and then onto Tbilisi where we flew back to London.

Conclusion and Benefits to Future Career

The objectives I set out at the beginning have been mostly achieved on this trip. I feel that I would like to return and spend more time working closely with communities as this was something I did not have time to achieve. I am interested in how plants can be used for foods and traditional medicines, and I feel that this could be part of a wider study. The aims of improving plant identification knowledge, record making, habitat observation, and linking with an international community of botanists were all successfully achieved.

When thinking of designing, planting and maintaining a garden, there are many challenges to overcome. The concept of what we think of to be a 'garden' is constantly challenged, traditionally we have looked to create a space to show off the plants that others may struggle to grow, but increasingly we are moving towards planting in a more naturalistic style, looking for plant combinations that work together aesthetically and are more in tune to the ecology of a site. Climate change is adding another challenge to

the long-term sustainability of gardens, and it is up to us, as horticulturalists, to think of solutions.

This trip has allowed me to consider all these issues in more depth. I set out at the beginning of the trip to visit some diverse and beautiful sites, but I did not expect to feel so emotionally connected to the places I had visited. The range of different meadows we were able to see just on one mountain, show the delicate balance of these habitats where all species seem to thrive together, as a plant community rather than as competitors for light, nutrients and space. In my mind, these are the most beautiful gardens, and this takes observation and patience to notice how and where the plants want to grow.

I would like to 'pay back' my learning by teaching and inspiring younger generations of horticulturalists. In November, I hope to teach a session with the Youth Council at Kew, giving insight into medicinal and edible plants and I will be using some of the knowledge and experience I have learnt on this travel scholarship. I hope to have more opportunities to support young people in their learning.

I am inspired by the passion of the people that work to protect the wild and important places. I wish to return to the Caucuses, as I feel that there is still so much to learn about hardy and temperate plants in this region. Astghik, Kosta, Sona, Archil and Ruby helped improve my plant identification skills while out in the field, something that will prove very crucial in the future, as I hope to work in conservation and will be venturing into spaces where the plants have no label!

Much work has been done on the future planting of trees, looking to the Caucuses for species that can withstand sub-zero winters and very hot and dry summers. Perhaps we also should look to this region for species that will not rot in the cold, wet UK winters and also with the cooling strategies that can withstand the hotter summers.

Working alongside and learning from botanists in Georgia and Armenia I learnt that we are facing similar challenges worldwide and that we can gain inspiration from each other to secure the future of these important places. I will continue to foster these relationships and hopefully will return to the region to further these studies.