RHS Bursary Report
Spain 2019

The Gardens & Plants of Andalucía

Thursday 14th March – Saturday 23rd March 2019

RHS
Inspiring everyone to grow

RHS Level 3 Diploma, RHS Garden Wisley
Anna Mortimer | Lee Behegan | Sam Hoey | David Pearce | Daniel Jones

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Introduction

Andalucía is one of the most biodiverse regions in Europe with around 4000 species of native plants. Andalucía sits on the southern coast of Spain and is one of the hottest regions in Spain with an average yearly temperature of 16°C. The plants thrive in the hot dry conditions of Andalucía and after the exceptionally hot summer of 2018 and the ever-increasing evidence regarding how climate change will affect our gardens as well as how we garden within them, we chose to focus on the Mediterranean region of Andalucía.

We chose to focus on Mediterranean plants, looking more closely at how they grow, survive and even flourish in their natural environment where hot summers and a lack of water are regular occurrences in the hope that we can better understand those conditions and apply some of that knowledge back here in the UK to help make our gardens more resilient in the face of climate change. Visiting cultivated gardens in the region helped reinforce this knowledge and demonstrate how it can be applied in an ornamental setting whilst conserving water and reiterating a 'right plant, right place' philosophy.

We chose to examine more closely the work that botanic gardens in the area do to protect rare and native flora from a changing climate and how ex situ conservation work may be affected by increasing extremes of temperature. Visiting these botanic gardens will increase our knowledge of the native flora of the region as well as giving us a more in depth understanding of how plant conservation works in practice in a botanic sense. Botanic gardens are playing a more and more important role in plant conservation and, as horticulturists, it is important we have a solid understanding of this that we can then apply both in botanical and non-botanical garden settings.

The project aimed to give us a better understanding of Mediterranean plants, how they can be used ornamentally in gardens and how they are protected in the wild to ensure future generations can enjoy and benefit from them for years to come.

Stats

Total Distance Travelled:
600 miles
Total Walking Distance:
84 miles
Longest Walk:
13 miles (El Pinsapar)
Highest Point:
1900m (Hoya de Pedraza)
Lowest Point:
200m (La Concepcion)
Highest Temperature:
26°C (El Pinsapar)
Lowest Temperature:
-4°C (Overnight Hoya de Pedraza)

Authors

Anna Mortimer – Student, RHS Level 3 Diploma in Horticultural Practice

Before coming to study at RHS Wisley, Anna was working as a maintenance gardener in residential gardens in Bristol. Alongside this, she was volunteering at Bristol Botanic Garden, studying for her RHS Level 2 and working as a Horticultural Technician at a college supporting the delivery of RHS courses. Bristol Botanic Garden has a Mediterranean and arid/ semi-arid collection and plays an important role in the conservation of various species.

Lee Behegan – Student, RHS Level 3 Diploma in Horticultural Practice

Before coming to study at RHS Wisley, Lee Behegan was a horticulture apprentice at the stately home of the Devonshire's in a historic 7-acre Castle garden in the Republic of Ireland. Lee was exposed to variety of horticulture within the Castle's grounds. He was involved in tasks such as propagation, providing cut flowers for the Castle & Gallery, assisting in the kitchen garden, tree care, lawn maintenance, meadow management, border maintenance & development, container gardening, landscaping projects and maintaining plant collections. Lee holds an RHS level 2 and in early 2017 also embarked on a plantsperson's course to start building a good plant knowledge. The course is run by Jimi Blake held in his own garden with one of Ireland's largest collection of plant's, located in the beautiful Wicklow mountains.

Sam Hoey – Student, RHS Level 3 Diploma in Horticultural Practice

A current Horticultural student at RHS Wisley, Sam has a varied background in horticulture. He has previously worked in gardens in the Republic of Ireland and National Trust properties in Northern Ireland. These include Mount Stewart and Rowallane, all of which had extensive plant collections of which a large portion of these were made up of Mediterranean plants. Rowallane in particular utilised Mediterranean plants in its walled garden. Sam also spent time in Mount Stewart in the propagation unit until growing and taking care of rare and unusual species, many of which were from Mediterranean regions. Sam has spent time in Chanticleer

Daniel Jones – Student, RHS Level 3 Diploma in Horticultural Practice

After completing his A-levels, Daniel worked in the gardens at Madresfield Court in Worcestershire for a year before moving to the Royal Botanic Gardens, Kew to complete the 2-year apprenticeship program in Botanical Horticulture. During his time at Kew he worked in the Duke's Garden, Arboretum and Arboretum Nursery, the Rock Garden and Alpine Nursery, the tropical Orchid section of the Tropical Nursery and in the Palm House, and he helped with the final replanting of the restored Temperate House. He also completed a two-week Travel Scholarship to Switzerland to study botanic gardens, native Swiss flora and alpine flora, and undertook work experience at Chatsworth, Great Dixter, the Schynige Platte Botanical Alpine Garden in Switzerland and he helped with the planting on 'The Pearlfisher Garden' at the 2018 Chelsea Flower Show.

David Pearce – Student, RHS Level 3 Diploma in Horticultural Practice

Before starting at Wisley, David spent 2 years working as the apprentice horticulturist at Ventnor Botanic Garden on the Isle of Wight. During his time there, David worked with one of the UKs largest collections of rare plants containing a botanical focus on Mediterranean plants, including a large, naturalistically designed Mediterranean garden, inspired by the plants of southern Spain. As well as this, he undertook work experience at Tresco Abbey Gardens, including work with their extensive Mediterranean collections of Echiums and Aeoniums.

Aims & Objectives of the Trip

Gain a greater understanding of Mediterranean plants:

We have chosen Andalucía for this project as it has a Mediterranean climate and experiences extremely hot summers every year. Following on from the extreme summer of 2018, as horticulturalists, it has become clear that the effects of climate change will be felt more and more strongly within a garden setting. One way of preparing for this is to gain a greater understanding of plants that may be able to withstand such hot, dry summers i.e. those that have evolved in environments such as the Mediterranean. Botanising in the regions of El Torcal de Antequera, Los Alcornocales Natural Park, Sierra de Grazalema, Ronda and Sierra Nevada will give us a thorough insight into the various important botanical areas within the Andalusia region. For many of us it will be our first experience of identifying plants in the wild so, before visiting many of these areas, we will first be visiting the local botanic gardens that contain many of the specimens that we will be looking for to assist us in identifying them. Once we know what we are looking for we can focus on studying their wild environments to inform how we might use them ornamentally as horticulturalists back in gardens in the UK.

Figure 1 Olea europaea growing in El Castillejo Botanic Garden.

Figure 2 Patio de la Acequia, Alhambra.

Visit Spanish gardens to further understand stylistic features and water usage:

As well as understanding drought tolerant, Mediterranean plants in the wild, we also want to see how they are used in cultivated, ornamental gardens to achieve aesthetically pleasing and seasonally robust displays for the public to enjoy on a year-round basis. To do this, we will be visiting Jardines de Cuenca in Ronda, La Concepcion Historico-Botanico in Malaga, Alpujarra Gardens as well as the iconic Alhambra Palace and Gardens in Granada. These gardens represent a diverse array of styles of the Andalusian region and will give us a good overview of how Mediterranean and other plants are used ornamentally as well as how other garden features can be used to create beautiful and engaging gardens. It will also give us an idea of how different gardens manage their water usage during the summer and keep displays looking good in harsh conditions. This information and an insight into what plants are being used will help us in our later careers when planning and working on gardens designed to be resilient to the potential changes in our climate as well as informing our understanding as garden design and history as a whole.

Learn more about what Botanic Gardens do to protect native and rare flora:

Figure 3 Lupinus angustifolius, Sedella.

Plant conservation is a huge part of horticulture, whether it is the conservation of rare and native plants in the wild or of historically or culturally important cultivars in gardens, it greatly affects our horticultural landscape and will do for many years to come. To learn more about the role that botanic gardens in particular play in plant conservation, we will be visiting several botanic gardens in the region to look at what they do, in practice, to protect these plants as well as how this work is communicated to the general public. As well as this, these gardens will help us when we come to botanise in natural parks as we will already have seen collections of many of the important plants of that region. The botanic gardens we will be visiting are El Castillejo Botanic Garden which contains collections of the flora present in the Sierra de Grazalema region including the Pinsapar trail areas, Granada University Botanic Garden which works closely with other gardens in the Sierra Nevada region and the Jardin Botanico Hoya de Pedraza which holds collections of many of the rare and native plants of the Sierra Nevada region including an ex- situ conservation display of some of the plants we hope to see in the wild during our time in that region. As well as improving our knowledge of specific plants and how the botanic gardens are working to protect and conserve them, we will also be looking at how this is communicated to the general public. Interpretation is a huge part of working in any public garden. Looking at different methods and exploring how gardens engage the public with their work or their message will be fundamentally important to all of us hoping to pursue a career in a public garden setting. The stories we tell about plants, their importance and their uses inform, inspire and educate the public and, ultimately, may help protect them for future generations to enjoy.

Knowledge sharing:

We will share the knowledge and experience gained from this project with all of our fellow students and interested staff via a final report and series of presentations at RHS Gardens. The report will be kept as a resource for future staff and students to access to ensure the experience is of use to as many people as possible.

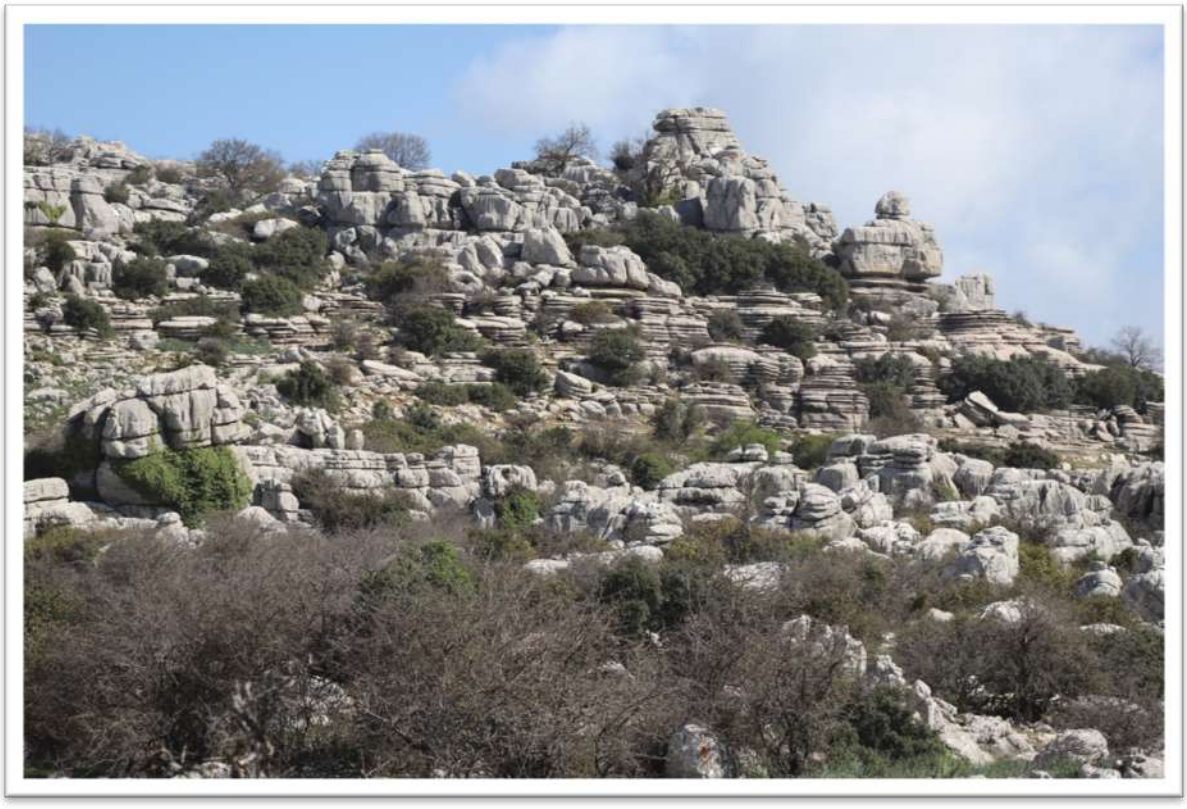

Figure 4 The rugged limestone landscape of El Torcal de Antequera.

Exploring the Sierra de Grazalema.

El Castillejo Botanic Garden & the Sierra de Grazalema

Day 1 | Friday 15th March 2019 written by Daniel Jones

Figure 5 The mountain village of Grazalema..

We started our trip in the small mountain village of Grazalema tucked in the mountains in the centre of the Sierra de Grazalema Natural Park in Cadiz province. The first area to be declared a Natural Park in Andalucía, a UNESCO Biosphere reserve since 1977 and an EU Special Protection Area (Williams, J. 2019), the 127,000 acre park (Williams, J. 2019) contains at least 1,400 plant species (Gibbons, B. 2014) with many, like *Abies pinsapo*, endemic to the park. The jagged limestone mountains range from 600m to 1654m at El Torreón (Williams, J. 2019) and are the first range of mountains that Atlantic weather systems hit making Grazalema one of the wettest parts of Spain with an average rainfall of 2,000mm (Gibbons, B. 2014). Thankfully the few days we were visiting the park the weather stayed dry and sunny!

El Bosque is a small village on the western edge of the park and home to the El Castillejo Botanic Garden. The garden is a member of the Andalusian Network of Botanic Gardens in Natural Areas. The network was set up to improve awareness, promote conservation and showcase Andalucía's rich flora (Red Andaluza Jardines Botánicos en Espacios Naturales, 2019). Each garden in the network is dedicated to exhibiting their local flora and vegetation found in their particular ecological region within Andalucía, paying particular attention to rare and endangered flora, for example the El Castillejo Botanic Garden showcases *Abies pinsapo* which is endangered and only found within Spain in the Sierra de Grazalema Natural Park (Red Andaluza Jardines Botánicos en Espacios Naturales, 2019).

Figure 6 Abies pinsapo and the view beyond from the El Castillejo Botanic Garden.

The El Castillejo Botanic Garden is divided into 12 different habitat zones that are found in the local region, including wild olive tree woodland, cork oak woodland, holm oak woodland, oak woodland, summit vegetation, Pinsapar woodland and serpentine vegetation (Red Andaluza Jardines Botánicos en Espacios Naturales, 2019). The garden displayed many characteristic plants of the region that we would go on to see as we travelled around including *Asphodelus ramosus, Vinca difformis, Narcissus fernandesii, Cistus albidus, Olea europaea, Rosmarinus officinalis, Centaurea pullata, Lavandula dentata, Lavandula lanata* and *Ceterach officinarum* that we often saw growing in cracks in the damp shade of rocks and was cultivated successfully in the fern 'corner' of the botanic garden.

Figure 7 Exploring the El Castillejo Botanic Garden.

It also showcased many species of terrestrial orchid including *Orchis italica, Ophrys tenthredinifera, Ophrys bombyliflora* and *Barlia robertiana* in the orchid 'corner' section of the garden. During our trip we saw 9 species of orchid in the wild and the limestone-based soil of the Sierra de Grazalema is ideal for many orchids to thrive. The garden also cultivated rarer plants found in the region including *Erysimum nevadense* subsp. *rondae* which is very similar to the yellow wallflower found in the Sierra Nevada, but this subspecies is found at lower altitudes in the mountains around Ronda including in the Sierra de Grazalema. There were numerous other plants in flower in the garden including *Pyrus bourgaeana, Paeonia broteroi, Glandora diffusa*

Plants of Interest

Genista hirsuta subsp. *lanuginosa*

Erysimum nevadense subsp. *rondae*

Cistus albidus

Ulmus minor

Figure 8 The beautiful landscape of the Sierra de Grazalema.

Driving back through the Natural Park from El Bosque to Grazalema we stopped off at 1103m at the Puerto del Boyar viewpoint. Here, with Griffon Vultures (*Gyps* fulvus) overhead we were lucky enough to find many interesting species.

The limestone rocks of the Sierra de Grazalema mean that we found *Rhamnus alaternus* subsp. *myrtifolius* scrabbling over the rocks. It is a small, low growing dioecious evergreen shrub with small, leathery oval leaves and tiny green-yellow flowers in the early spring. It was in flower when we saw it in Grazalema however it also produces reddish fruits later in the season (Hall, T. 2017). The *Cistus albidus* that we saw growing in El Castillejo botanic garden earlier in the day was also growing successfully and flowering in cracks in the limestone rock. In damper, shadier areas tucked in at the bases of the limestone rocks we found *Ornithogalum umbellatum* and *Romula bulbocodium*. The grassland was full of *Asphodelus albus* and looking-closer the delicate pink flowers of *Erodium primulaceum.* We also saw *Lavandula stoechas* with two forms of *Orchis olbiensis* growing through the Lavender. Along with *Orchis olbiensis* we saw two species of bee orchid, the pink *Ophrys tenthredinifera* and the yellow *Ophrys fusca*. These species along with other bee orchids have highly adapted flower parts to mimic bees and attract them as pollinators (Hall, T. 2017). But perhaps our biggest surprise was to see the unusual seed capsules of *Ulmus minor* by the side of the road just above Grazalema.

Figure 9 The sun setting below the limestone hills above Grazalema.

El Torreón (1654m), the highest peak in the Sierra de Grazalema.

El Pinsapar Trail, Sierra de Grazalema

Day 2 | Saturday 16th March 2019 written by Lee Behegan

Figure 10 Pausing for a photo!

Whilst we were staying in the picturesque mountain village of Grazalema, one of our objectives, along with searching for native plants, was seeing the critically endangered *Abies pinsapo*. The Sierra de Grazalema Natural Park contains one of three single forests of *Abies pinsapo* left in Andalucía today.

Abies pinsapo is a conifer which survived the last glaciation. This is a very elegant tree with a typical conical shape, its growth is dense and a rich green, with hints of blue colouration. The needles on this conifer are flat which is a typical feature of *Abies* species and rigid and sharp to touch. These trees are Hermaphrodite, meaning the tree bears both male and female cones on the same plant. To prevent self-fertilisation the female cones are found on the top of the tree and the male cones in the middle. These trees require high humidity and shady slopes with soil that can retain a certain amount of water.

Figure 11 An Abies pinsapo on the steep hillside of the Sierra de Grazalema.

We set off early this morning to try and beat the hottest part of the day. The El Pinsapar trail we walked requires a permit. Obtaining the permit involved a trip to the Visitor Centre in El Bosque. This is another serine mountain village not far from Grazalema and is considered to the gateway to the immense nature reserve that we were about to explore in search of all its hidden botanical treasures. With all relevant paperwork in place, we finally embarked on our 6-hour trek and within the first 50 feet of beginning our walk, we came to our first standstill all knuckled down on hands and knees in awe of our first bee orchid. There are at least 14 different species of bee orchid (*Ophrys*) found in Andalucía. These orchids are quite distinctive to others because of their mimicry of insects that attract pollinators. Clever little plants and were such a joy to find these growing alongside the mountain track, fortunately still intact and not damaged considering the amount of foot fall this popular mountain trail receives on an annual basis. A small lone *Narcissus* flowering welcomed our arrival and made us all hopeful of seeing more as we climbed altitude. The vegetation was breath taking and inspiring with natural communities of *Phlomis herba* making most use of the south facing slope travelling right through the landscape until we reached the peak. Let's not forget to mention, the other orchid that graced our path whilst botanising on these slopes.

Figure 12 Helleborus foetidus

We began our ascend through Pine wood meandering up this south facing slope aiming for the northern flank of the mountain range, where the view was incredible looking back down towards Grazalema. The journey upward was spectacular around each corner opened out another vista and view of what's to come. As we increased in altitude the vegetation slowly started to change. I stumbled across some *Stachys byzantina* spreading at my feet in the dappled shade of the Pine trees. The transition from dappled shade lead us into the most incredible limestone bank baked in full sun, with standout plants such as *Cistus*

albidus happily growing in the calcareous limestone cracks. This shrubby Mediterranean bank brought us to yet another holt to look in every little crack and cranny studying the different vegetation.

Figure 13 The spring colour of the Sierra de Grazalema set against a bright blue sky.

The highest peak El Torreon was just in the distance and this meant that we were getting closer and closer to the highlight of the walk. Excitement was building amongst the group the North facing slopes had lots to offer in terms of seeing a drastic change in vegetation. The walk began to feel like meditation treading the cool north facing slopes was something special, we were beginning to get to know this landscape better each time entering a different zone. We took another pausing moment to fully understand this change in landscape. One thing that really struck me was the delicate textures that now began to stand out, such as the lichens on the rocks in acid green, rust and silver. The forest floor beneath the *Abies pinsapo* began to look almost like a British woodland floor green from moisture and *Helleborus foetidus* peppered through this intimate landscape.

This environment was incredible, I was amazed at the sheer size of the Spanish fir once stood beneath gazing upwards. Some of the oldest had lost their straight conical shape and had become these wonderful gnarled old specimens that held great character. The half-light from the dense canopy revealed split leaders travelling in different directions offering a momentary pause. This experience began to truly unfold when the juxtaposition of the younger generation and the ancient gnarled generation side by side became apparent, a special moment that I will never forget.

Figure 14 Walking through the woodland.

Once we left the cool north slopes, we were quickly reminded of how hostile the Mediterranean climate can be. The area we were exploring has been noted as once of the wettest areas of Andalusia and we came to a stark realisation the impact climate change was having on this once extremely diverse landscape. Conversations with local people from this area revealed that they were without rain for almost two months and it was only March. The temperatures were soaring above average and we became familiar with death throughout this landscape and the dried up river beds at the foothills of this beautiful mountain range was concerning for the future of this environment.

Our 6-hour adventure was coming to an end, but literally 50 metres before the finish line, a group of eagle eyed plantspeople stumbled across natural communities of bee orchids growing on a north facing grass bank slope. What a joy to see growing wild!

The Hummingbird hawk-moth pollinates *Echium creticum* on the clifftops of Ronda.

Ronda

Day 3 | Sunday 17th March 2019 written by Sam Hoey

On the 17th of March, we left Grazalema with the final intended destination being Malaga with a stop via Ronda. Ronda is a small city located on a mountain approximately 100km away from Malaga. It is roughly 750 metres above sea level and is bisected by the Guadalevin river.

Figure 15 Quercus suber.

Before reaching Ronda, we stopped in an area 30 minutes outside Grazalema to see a Cork Oak, *Quercus suber*, plantation. The trees were fenced off, but it was very easy to see the stripped bark of the trees. Shortly after we were on our way to Ronda. Although Ronda is still in Sierra de la Nieves, it was significantly lower down compared to Grazalema which was reflected in the plants that were growing there.

Chamaerops palms were being gradually replaced by *Washingtonia* and succulents such as *Opuntia* and *Agave americana* appeared to self-seed on the rocky cliffs. A sign of warmer and drier conditions to the famously cool and damp Grazalema.

The city itself seemed to have a moderately keen interest in horticulture made evident by numerous beds with irrigation systems. Almonds/Cherries and *Wisteria* were blooming prolifically. In rocky outcrops and in walls all over the city were snap dragons blooming. After a brief sightseeing session, we headed out to our first destination of the day, The Jardins de Cuenca. The Cuenca Jardines is located at the edge of the El Tajo canyon cliffs.

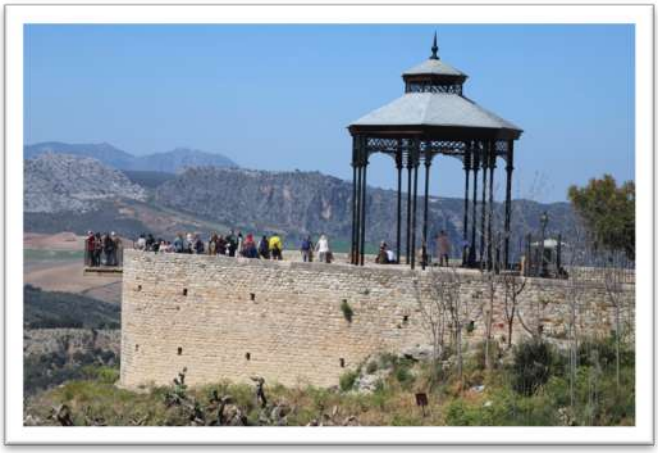

Figure 16 Mirador de Ronda.

The gardens were created as recently as 1975 to symbolise the special relationship Ronda has with Cuenca, another Spanish town. The gardens are a little over two and a half hectares and are terraced and tiered with many staircases and levels.

The garden itself was an impressive design with a stunning view and scenery although was lacking a little in plants. The gardens main draw along with the breath-taking views is the Rose collection of which there are nearly one thousand plants of 61 different varieties. Other plants which featured were Palm trees, some Mediterranean shrubs and *Opuntia* and *Agave* which seemed to grow without any human intervention on the cliff faces. The roses were not out in bloom which was a shame.

To come back a month later would undoubtably have been spectacular. Across the canyon we glimpsed what appeared to be another garden that contained a magnificent specimen of *Pinus pinea* along with *Cupressus sempervirens*. We saw that this garden had a staircase that led down to the river. We decided as a group that we would grab some lunch then try to find a way to get into this garden.

The Gardens & Plants of Andalucía

Figure 17 Wisteria coming into flower.

After having some lunch, we found that the garden we wanted to gain access to, was a public attraction called Casa de Ray Moro. We went in and were pleasantly surprised by the garden which contained a couple of impressive tree specimens and an aesthetically pleasing formal/Islamic style garden.

The garden and the water mine systems were built in the 14th century which was around the time that the Castilian Spanish army began to take the country back from the Islamic Caliphate of Granada. The water mines and cave systems were built by Christian slaves and were designed to take drinking water from the river up to the city. After the city was captured by Spanish forces the mines were abandoned due to superstition that they were once torture chambers or prisons. They were restored in the 20th century by Trinidad von Scholtz Hermensdorff who hired prominent French gardener Jean Claude Nicolas Forestier to create the gardens which we see today. Jean Claude Nicolas Forestier also designed the Maria Luisa Park in Seville and the Gardens of Champ de Mar under the Eiffel Tower.

We decided to descend into the garden via the numerous staircases. Before heading into the mountain to descend to the river we saw plantings in beds and in pots, *Nephrolepsis exaltata*, the straight species of the commonly cultivated Boston fern. It never ceased to amaze seeing plants that we cultivate in Britain indoors, growing happily outdoors with no protection at all in Spain. After what appeared to be an age of descending into the mountain with stalactites overhead and steep, slippery stairs, we arrived at the bottom of the mountain to see a spectacular view of the river and the cliffs that make up Ronda. The water was Crystal Clear. Soon after we ascended back up through the stairs and then said our farewells to Ronda before making our way towards Malaga.

Figure 18 "The waters are crystal clear my friends!"

Figure 19 The terraced gardens of Jardines de Cuenca.

The drive to Malaga was interesting as we were slowly over the 100km of driving, descending towards sea level. With the decrease in altitude saw the emergence of a different palate of plants, many of which were tropical or subtropical in origin.

It also became evident that certain plants that grew closer to sea level in Spain needed access to water bodies such as lakes whereas they would not have been situated so close in Grazalema. A lot of native plants were also a couple of weeks ahead in Malaga. Malaga city had a rich range of flora lining its streets and roads including *Austrocylindropuntia*, *Jacaranda*, *Strelitzia*, *Ficus* both tropical and temperate, *Ceiba* and many more. The city of Malaga as many interesting street plantings with a wide variety of plants including citrus and palms which make the public spaces very green and after a long day of travel and visiting gardens, we enjoyed the festivities of Malaga on St Patricks Day!

The rugged limestone landscape of El Torcal de Antequera.

El Torcal de Antequera

Day 4 | Monday 18th March 2019 written by David Pearce

Figure 20 A Spanish Ibex relaxing in the sun!

On Monday 18th March, we set off for El Torcal de Antequera, a 60-minute journey from our base camp in Malaga. An idyllic, winding road through picturesque olive groves slowly ascending until we reached our destination at 1100m. It is said that on a clear day, one can see Morocco from the top!

The first thing that caught our eye was, of course, the gigantean, karstic pillars of limestone of which El Torcal is famed for. We later learned that these pillars were formed 100 million years ago when tectonic plates pushed limestone rock up, followed by karstification calcification to form the other-worldly wonder that is the 17km2 of El Torcal. It wasn't long before we found ourselves admiring the fauna and flora. As we sat, waiting for our guide, we noticed a Spanish Ibex (*Capra pyrenaica* subsp. *hispanica*) enjoying a lazy Wednesday morning, as well as several Griffon Vultures *(Gyps fulvus*) soaring over the towers of rock.

Figure 22 The tour of El Torcal de Antequera.

Firstly, we met our tour guide; José. His tours usually consist of geology, zoology and speleology but specially for us, threw in some botany and ethnobotany. As we trekked around some of the more tourist friendly parts of the 17km2 natural park José pointed out the *Asphodelus albus* which were near an important source of food for the wild boars. The *Asphodelus* dominated most of the landscape, however, there was also *Verbascum giganteum* (described by José as 'nature's toilet paper'), *Paeonia broteri*, *Helleborus foetidus* and a few wind-battered *Quercus ilex* which José pointed out that the cupule was historically used by shepherds as a whistle. Of special interest was a specimen of *Linaria anticaria*, which we found growing directly in the middle of one of seven sacred stones used to meditate on, which undoubtably added to the allure and spiritualism of the place. Towards the end of our tour it proceeded to get very cold, completely unexpected to us as we had enjoyed temperatures in the 20's for the past 4 days. Jose that the general climate of El Torcal is quite cold and it is very susceptible to extremely thick fog. In comparison to other places we had visited, the flora was relatively late with the *A. albus* only begging to come into flower.

Figure 23 Linaria anticaria

Figure 21 An ammonite fossil.

The Palm Avenue,
La Concepcion Historic & Botanic Garden.

La Concepcion, The Malaga Botanic Garden

Day 5 | Tuesday 19th March 2019 written by Sam Hoey

Figure 24 Casa-Palacio in the historic centre of the garden.

La Concepcion is a large botanical and historical garden situated ten minutes outside the confines of the city. It has a south to south east facing aspect which gives the garden a warm microclimate in winter for tender plants but also a blistering hot summer. The garden is blessed in that it is situated next to a dam called the Embalse de Limonero or the Limonero Resevoir, which supplies the garden with a supply of water that becomes part of the system of streams which feed the heart of the garden and thus creates a lush and green jungle like appearance.

The gardens were only officially recognized as a garden of importance in 1943 and has only been open to the public since 1994 but the history of La Concepcion goes back a lot further than this. The oldest sign of settlement in the area that is now La Concepcion is the remains of ancient Roman settlements from as far back as 80 AD. It was only in 1911 that the owners of the property began to plant it into a garden. Therefore, La Concepcion is known as a Historical and Botanical Garden of Malaga.

The garden is quite large with many different routes to lead you around. We decided to take the longest possible route to get the most comprehensive experience possible. We first came across the fruit garden which had apples, pears and mainly quince trees which were in flower. The avenues were lined with the date fig (*Phoenix dactylifera*) and the canary island date palm (*Phoenix canariensis*). In the areas that appeared to be left to grow wild beside the paths in verges were multitudes of *Echium* and *Anthemis* growing wild and blooming profusely. Nowhere else on the trip had Echiums blooming in such numbers.

Plants of Interest

Solandra maxima

Araucaria heterophylla

Agave sp.

Phlomis purpurea

The next area we came across was the cactus and succulent beds which grow numerous species of Cacti and succulents such as *Aloe*, *Agave* and *Euphorbia*. We got to see many *Agave* in flower which is a sight not

commonly seen in the UK. This area of the garden was located quite high in the garden which gave a great view of Malaga and the surrounding countryside.

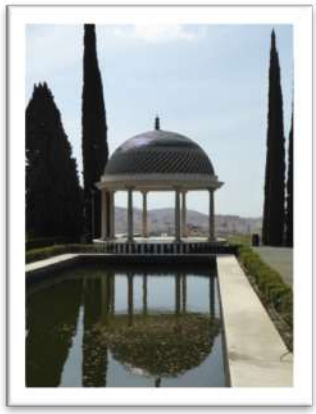

Figure 25 Mirador histórico at the top of the garden.

We next walked around the garden trail route which took us around the perimeter of the garden which was where a lot of native plants, such as *Phlomis*, *Genista* and many different colours of *Cistus* were located. Even though it was only March the ground seemed to be quite parched with no sign of moisture at all yet seemingly having no effect at all on the plants. This shows just how efficient and adapted plants in this region are to handling periods of little to no water. Like Wisley, the garden also had a bird hide which is a great location for spotting many of the regions indigenous birds.

Figure 26 Into the jungle!

The next feature was the centenary olive tree and the vineyard which houses grape varieties endemic to Malaga alone and is regulated by Malaga wine producers. Just after was the palm tree collection which contained many different genera of palm tree including *Brahea*, *Sabal*, *Roystonea*, *Phoenix*, *Chamerops*, *Washingtonia* and *Bismarkia* to name a few. After a quick lunch break, we saw the aptly named around the world in 80 trees which contains trees from all over the globe including *Schotia*, *Jacaranda* and *Ficus*.

Finally, we came across the piece de la resistance. The heart of the garden which was lush and green due to the numerous streams which flowed throughout and into small channels and ponds. This which along with massive mature runner figs, palms and the spectacular *Auricaria heterophylla*, created a shady and humid microclimate which made it ideal for growing *Monstera*, *Phyllostachys* of immense sizes, *Nephrolepsis*, *Cyathea*, *Clivia* and many other tropical plants.

Figure 27 Phoenix canariensis

Figure 28 The lush foliage of the historical garden.

The garden also contained an impressive Wisteria tunnel which covered the structure completely and was in full bloom. As of writing this report in early May the Wisteria in Wisley are just in full bloom now, highlighting the extended season and different climatic jones of Southern Europe.

The last area of the garden we visited were the Mediterranean rockeries. These beds were divided up into zones and had plants from South Africa, Australasia, South America and Mediterranean Europe. Just before the exit was an impressive collection of Cycads and a small insectivore house.

Although we spent hours at La Concepcion, we did not see everything there is as like Wisley it is almost impossible to see everything in a single day. Another visit is required in the future to see the shade tunnels, *Acanthus* banks, *Hibiscus* avenues and *Citrus* collection. The rest of the day was spent relaxing, playing cards and going for a swim in the sea!

Figure 29 The Wisteria arbour

The Palace of the Alhambra with the mountains of the Sierra Nevada behind.

La Alhambra y el Generelife, Granada

Day 6 | Wednesday 20th March 2019 written by Anna Mortimer

After arriving in Granada and settling into our accommodation, we headed for the gardens of the Alhambra and Generalife. The Alhambra and Generalfe gardens are excellent examples of late- mediaeval castle gardens and are perhaps the best surviving examples in Europe. The Moorish architecture of the Nasrid Palaces and the Generalife is complimented perfectly by the tranquil paradise gardens that we were lucky enough to wander though.

Figure 30 The beautiful architecture of the Alhambra.

We arrived at the Partal Gardens and were met with a vast area of terraces filled with angular pools, orange trees and tightly clipped *Buxus* hedging marking out geometric beds containing a mixture of brightly coloured annuals and roses. The gardens wind through relatively recent archaeological finds including walls and pavements and connect the Partal Palace to the fortified outside walls.

Winding our way through these gardens we walked along the outside wall of the Monumental Complex of the Alhambra and saw many more beds of brightly coloured annuals such as *Antirrhinum* mixed with standard roses. Terracotta pots of variegated *Euonymus* punctuated the rhythm of the long walkway and mirrored the fortifications of the external walls. It was from this walkway that we caught our first glimpse of the Gardens of the Generalife and saw the mass of Cypress (*Cupressus*) trees that mark out the structure of the lower garden.

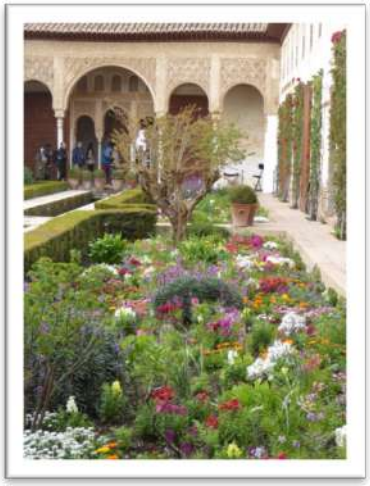

Figure 32 Colourful planting in the Patio de la Acequia.

As we approached the Generelife Gardens (a UNESCO World Heritage Site), the planting became more ornamental and we were able to take in the fantastic views across Granada and out to the Sierra Nevada mountains beyond. The Generelife was originally built in the 13th century as a place of rest and respite for the sultans and emirs who lived at the Alhambra Palace and today it is one of the best-preserved Moorish gardens in Spain, if not Europe.

Figure 31 The water features of the Jardines Bajos.

The first garden that we came to in the Generalife complex was the 'Sultana's Garden' or 'Courtyard of the Cypress'. A channel of water runs down the centre of the garden, flanked by clipped *Buxus* and punctuated by a series of circular fountains framed by towering Cypress trees. The garden is split into a series of more private spaces or 'rooms' by large hedges which create shade and these garden rooms contain more roses and colourful bedding as well as orange trees. Underfoot is a floor of pebbles collected from local rivers that had been arranged into patterns that change throughout the different spaces and create an artisanal feel. Despite the fact the site was very busy, it was possible to find peace and quiet amongst these garden rooms and the sound of the babbling water further added to the tranquil atmosphere. Every so often a hedge would open up, allowing you back onto the upper terrace to take in the expansive views

over Granada and the Alhambra complex opposite which gave contrast and made the Cypress garden feel all the more secluded and special.

One of the most interesting things about this garden was watching how the gardeners irrigated the beds. Each bed was sunken slightly and contained a pipe with a metal bung at one end and a sheet of curved metal with a handle sticking up from the soil. After talking to one of the gardeners we found out that the whole garden (both Generalife and Alhambra) was irrigated using water from the 'Acequeia Reial', a 6km long water canal fed from the river above. To irrigate each bed, the metal stopper is simply removed and the curved metal sheet deflects the water around the bed, giving all the plants a good soak, even on the hottest days. An ancient and very clever piece of horticultural engineering!

Plants of Interest

Clematis armandii

Iris x hollandica cv.

Rosa banksiae with *Wisteria* sp.

After soaking up the atmosphere and calm of the Cypress Courtyards we joined the queue to see the centrepiece of the Generalife, the Water-Garden Terrace (Patio de la Acequeia). Growing over one of the areas outside the entrance was a beautiful combination of *Rosa banksiae* and *Wisteria grandiflora,* tumbling over a pergola. After passing through a small, enclosed herb garden, we climbed some steps up to the main terrace. Unfortunately, the central canal and fountains had been drained so we perhaps didn't get to experience the full effect of this garden but the combination of the Moorish architecture, inscribed with Arabic calligraphy and art and the colourful plantings next to the empty canal still left us with a sense of the place.
The garden was enclosed by whitewashed walls and split into four large planting sections with the canal running down the centre and smooth paved walkways along either side. Designed as a Paradise Garden, the beds were lined with clipped box and filled with a riot of colourful annuals and perennials including *Iris*, *Erysimum*, *Antirrhinum* and *Calendula.* Olive trees gave height to the planting and a series of climbing roses were trained against the walls. The vivid, bright colours of the flowers were balanced by the whitewashed stone walls and the effect was very pleasing.

Figure 33 Iris cv. with Granada behind.

As more groups of people flowed into the terrace area, we took our leave and carried on through another series of terraces and courtyards with water and clipped box before winding our way towards the exit and down the hill back into Granada town.

A lone flower of *Crocus nevadensis* found under a rock in the Sierra Nevada.

Jardin Botanico Hoya de Pedraza, Sierra Nevada

Day 7 | Thursday 21st March 2019 written by Daniel Jones

Figure 34 The snow-capped peaks of the Sierra Nevada provide a spectacular backdrop to the Jardin Botanico Hoya de Pedraza.

The Jardin Botanico Hoya de Pedraza is a botanic garden founded in 1995 and located at 1900m in the mountains of the Sierra Nevada (de Dios Rodríguez Cáceres, J. 2019). Surrounded by high mountains to 3482m altitude (Hall, H. 2017), that were still covered with snow when we visited, the garden gets its name from Hoya, which is a name given to an area of land which is good for cultivation as there is a depression in the mountainside that has desirable water retention (de Dios Rodríguez Cáceres, J. 2019). The garden is open from April to December each year and is also a member of the Andalusian Network of Botanic Gardens in Natural Areas and we were very lucky to be shown around the garden by the garden manager, botanist and founder of the garden and the two full-time gardeners.

The Sierra Nevada contains 2,354 plant species, more than 80 of which are endemic to the Sierra Nevada (Junta de Andalucia, 2019). Many of the Sierra Nevada's plants were discovered and named by Swiss botanist Pierre Edmond Boissier who travelled to the country from Geneva 9 times (JSTOR, 2019) and was responsible for describing *Abies pinsapo* in 1838 (American Conifer Society, 2019), among many others.

Figure 35 Being shown a newly-planted Pinus sylvestris subsp. nevadensis by one of our guides, Mario Ruiz Girela.

There are new plants discovered in the Sierra Nevada each year, and Mario Ruiz Girela, botanist and founder who showed us around the garden has discovered many including *Ranunculus cherubicus* subsp. girelai which we saw growing in the garden and was named after Mario. It was discovered in 2014 and is endemic to the Sierra

Figure 36 Looking down across the garden.

Nevada. It grows on silicate meadows from 2200m to 2300m and is rated as endangered due to its limited distribution (Almeri Natura, 2014).

However, the Sierra Nevada is not surrounded by other high mountain ranges, meaning the Sierra Nevada acts as an island for the plants that have adapted to grow there. As the climate changes these plants cannot move to mountains at a different latitude so instead, they move up the mountain to a higher altitude (Ruiz Girela, M. 2019). These two factors explain why the Sierra Nevada is home to many endemic plants and also why many plants found in the Sierra Nevada are endangered. These include *Naricissus nevadensis* which we saw growing in the botanic garden and *Crocus nevadensis* which we were lucky enough to spot close to the side of the road as we travelled back down from the garden.

Being at a higher altitude than Grazalema meant the nights in the Sierra Nevada were much colder. The night before we visited the garden the overnight temperature dropped to -4°C (de Dios Rodríguez Cáceres, J. 2019). This meant that the plants were much further behind in their growth however we were still able to learn about the different habitats of the Sierra Nevada and the plants found in each and the challenges that come with managing a garden at 1900m altitude.

Figure 37 A path leading us through the garden.

The majority of the plants grown in the garden are propagated from seed collected in the Sierra Nevada and the surrounding areas to maintain genetic diversity and being a member of the network of botanic gardens means that the collected seeds are stored in silica gel and also propagated at the University of Granada Botanic Garden (de Dios Rodríguez Cáceres, J. 2019). The young plants are then transported up to the garden to be planted out. When they are planted out in the garden the plants are covered with a layer of straw for a few days following planting to protect them was the strong sun and exposure on the mountain and to prevent them from scorching and allow them to acclimatise to their new environment (de Dios Rodríguez Cáceres, J. 2019).

Figure 38 The brown landscape waking up from a winter covering of snow.

Each Andalusian botanic garden works in their own ecological area which the botanic garden represents, and the Jardin Botanico Hoya de Pedraza works cataloguing species populations in the garden and also in ex-situ sites. The garden is divided into 7 habitat zones mirroring those found in the Sierra Nevada; these are gallery forests, calcicole pine and Spanish juniper groves, holm aak groves on chalky soil, silicole holm oak groves, Pyrenean oak groves, juniper-adenocarpus plants and alpine grassland (Red Andaluza Jardines Botánicos en Espacios Naturales, 2019). The garden also has areas dedicated to endangered species and traditional crops.

One of the only plants not to be grown from seed in the garden is *Pinus sylvestris* subsp. *nevadensis*. This is because it hybridises too easily with the species *Pinus sylvestris* so it is grafted instead to maintain its alternative characteristics of a more dwarfing, horizontal habit and lower branching down the trunk (Ruiz Girela, M. 2019).

During our visit we learnt about troublesome pests found in the garden. The wild pig is the biggest pest in the garden through digging and causing damage to the irrigation system that runs around the garden. Also visible in the garden, as it is throughout Andalucía is the Pine Processionary Moth, *Thaumetopaea pityocampa*. This processionary moth is closely related to the Oak processionary moth and thrives in dry conditions (de Dios Rodríguez Cáceres, J. 2019). During our visit we were told how dry the season had been with little snow so this may explain why the Pine Processionary Moth was so numerous and visible throughout Andalucia.

Walking the PR-A 69 circular trail from Capileira (1436m) to the abandoned dam workers village of La Cebadilla (1540m).

Alpujarra (Capileira to La Cebadilla)

Day 8 | Friday 22nd March 2019 written by Lee Behegan

The Alpujarra is a natural and historical region in Andalucía, Spain. It is located on the south slopes of the Sierra Nevada and is 1,200 metres above sea level. The Sierra Nevada is covered with snow in winter and the snow melt in the Spring and Summer allows the southern slopes of the Sierra to remain green and fertile throughout the year, despite the hot dry Mediterranean climate. This attracted us to explore the foothills of the south facing slopes to see if we could find any new plants that we had not previously seen. The Sierra Nevada is a hotspot for many of the region's endemics. Many species found in these mountain ranges carry the name of the mountain range in which they grow. Such as, *Arenaria nevadensis*, *Crocus nevadensis* and *Narcissus nevadensis*. There have been 70 recorded endemic species which are found mainly in the higher areas of the Sierra Nevada.

Figure 39 Walking up the valley from Capileira.

Figure 40 Spring blossom above La Cebadilla.

Nestled in the Poqueria valley sit three picturesque mountain villages, Capileira, Pampaneira and Bubion with the backdrop of the snow-capped Sierra Nevada. Each little village had its very own unique personality, despite being dressed the same with the typical white-washed walls and brown tiled roofs. The walk we chose began in Capileira walking up one side of the Poqueria Gorge, and back down the other side landing in Capileira.

For most of the walk we had wonderful views of the Sierra Nevada along with the melodies of sheep and goat flocks "clinking sheep bells" one of the most representative features of a pastoral landscape. Marching through a now very familiar Mediterranean scrubland, that quickly transformed by the hand of man. The milder climate and plentiful water from innumerable springs, irrigation channels and fertile land gave farmers opportunity for the cultivation of crops such as grapes, citrus and other fruit. As we familiarised ourselves with this new landscape, we soon realised the extent of human intervention, embedding the landscape with channelled terraced plots engraving this ancient site.

As we approached the halfway mark of our walk, we reached an abandoned village with a small hydroelectric power station. Along this route we also got to see 'the acequias', traditional irrigation channels. In terms of botanising, unfortunately we did not come across any new species. As we made our journey towards Capileira we could see woodland in the distance.

Figure 41 Irrigation channels show us the human impact on this landscape.

Figure 42 The abandon village of La Cebadilla.

The meeting points between different habitats are always the most dynamic, Mediterranean scrubland shifting into shaded woodland, the relief of dappled shade and shiny harts-tongue ferns marking the change in environment. Underneath the sheltered canopy were groups of *Helleborus foetidus*, thriving and luminous in the captured leaf mould underfoot. Seeing common garden plants growing naturally like this, is a real special moment for any gardener. It makes you understand what the plant needs, and it becomes a real lightbulb moment in time.

Once your eye becomes attuned with this new environment, you start to understand everything much clearer. In other places, local materials had become an integral part of the landscape. A dry-stone wall directing you on a new journey, fallen logs acting as seats. When you stop, your eye can appreciate the richness of colour and texture. Wind-twisted oak branches, pale sculptural driftwood and animal remains painting another picture of this harsh landscape. Dagger like *Anacamptis collina* cut through mud here like a fresh sapphire and sweetly scented *Lobularia maritima* nestled in limestone cracks, all very inspiring moments.

The walk had been a string of experiences, each connected and easily pulled far away, but collectively a journey that held us completely in the moment, allowing us to be part of this place.

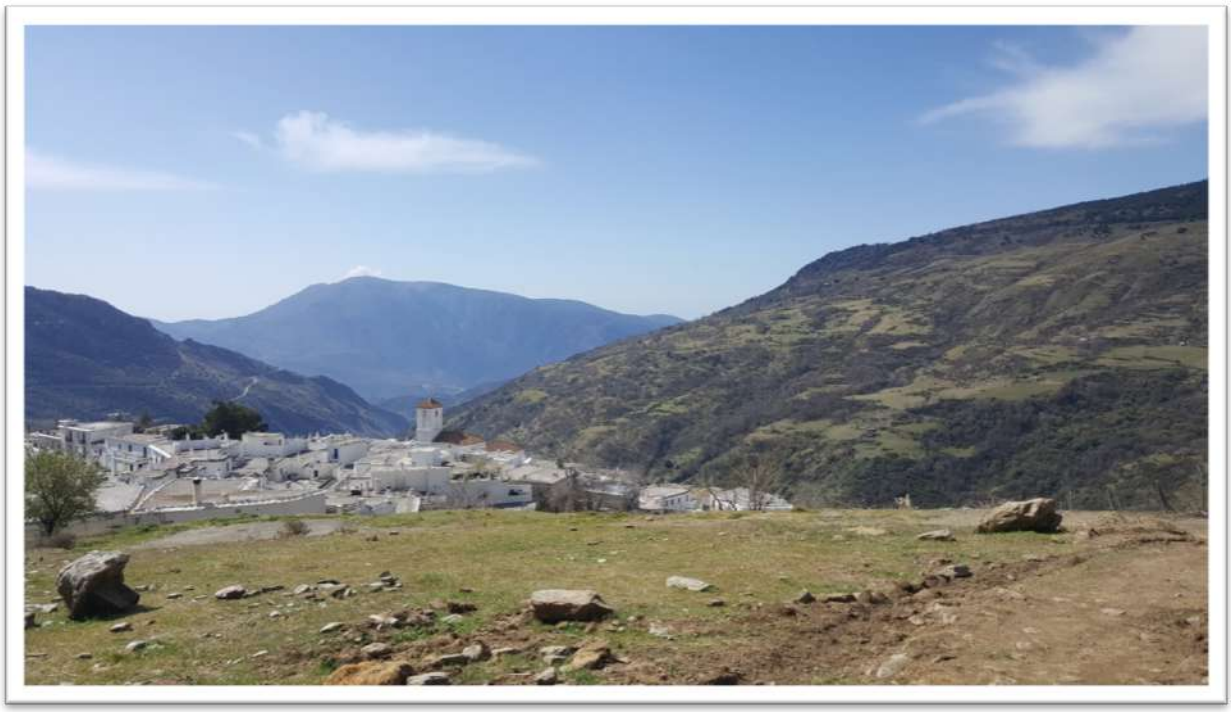

Figure 43 The beautiful white-washed mountain village of Capileira.

The rich meadows of Sedella containing hundreds of *Anacamptis papilionacea*.

Sedella, Sierras de Tejeda

Day 9 | Saturday 23rd March 2019 written by David Pearce

Our last day's activities were undecided, we had a couple of hours spare in-between leaving our apartment and catching our flight. So, we elected to visit Sierras de Tejeda, a small sierra not far from the Mediterranean. We didn't really know what to expect as the area was not well documented, but what we found when we got there was nothing less than astonishing. Driving along the coastal road, we instantly noticed a stark contrast to the cool, dormant Sierra Nevada. There were miles of polytunnels filled with tomato plants, plantations of Avocados (*Persea Americana*) there was little to be seen for wild vegetation, just bare, arid conditions.

But as we began to ascend into the national park, we began to see more and more interesting flora. There were plantations of citrus and olives and new selection of plants previously unseen on the trip. The road sides were filled with *Echium plantagineum,* several unidentified Broomrapes were spotted (*Orobranche* spp.). There was a real feeling of how the sun affected the environment and caused microclimates, with south facing slopes being almost completely arid and baron of life, whilst the north facing slopes were teaming with life and biodiversity. Around this area were clumps of naturalised *Opuntia* and *Agave americana.*

It was next to one of these north facing slopes that we decided to stop in a lay-by to do some 'road-side botanising'. It wasn't long before we spotted some *Cistus albidus*- quite a common find. Growing out of the top of it, however, was something a bit more unusual; *Aristolochia baetica.* It was then that we spotted a speck of purple on the side of a steep cliff above us, I scuttered up as high as I could to get a better view. It was a rather weedy looking specimen of *Anacamptis papilionacea*, but none the less, a new species of orchid to add to the list. It was at this point that I thought I should try and check out the top of this cliff. Often, where one orchid has the suitable environment to survive, others will too. What greeted us at the top of that hill was nothing less than spectacular. Swathes of *Anacamtis,* beautifully contrasting *Lupinus augustifolius,* the light feathery foliage of wild *Asparagus* and many, many more species. The biodiversity was astonishing, one 200m^2 niche had at least 40 plant species, all arranged to demonstrate the splendour of nature. Spain had saved the best till last.

The Orchids of Andalucía

Orchis italica
El Castillejo Botanic Garden

Ophrys fusca
Sierra de Grazalema

Ophrys tenthredinifera
Sierra de Grazalema

Orchis olbiensis
El Pinsapar

Cephalanthera longifolia
El Pinsapar

Ophrys lutea
El Pinsapar

Anacamptis collina
Capileira

Anacamptis papilionacea
Sedella

Financial Report

Income & Expenditure Statement

RHS Level 3 Diploma, RHS Garden Wisley - RHS Bursary - March 2019 - Andalucia

POUNDS (£)

Income Receipts

Date	ITEM	Amount	Total
06/02/2019	RHS Bursary	£ 2,990.00	£ 2,990.00
15/02/2019	RHS Gardens' Club	£ 1,000.00	£ 3,990.00
	Haley Plants Society	£ 600.00	£ 4,590.00
			£ 4,590.00
			£ 4,590.00
			£ 4,590.00
			£ 4,590.00
			£ 4,590.00
			£ 4,590.00
			£ 4,590.00
			£ 4,590.00
			£ 4,590.00
			£ 4,590.00
	Total Income £		4,590.00

Expenditure Receipts

Date	ITEM	Amount	Total
18/02/2019	Return Flight (Luton-Malaga) (Ryanair) (x6)	£ 759.24	£ 759.24
14/03/2019	Taxi to and from airport (Network Cars)	£ 300.00	£ 1,059.24
21/02/2019	Malaga Apartment (6 nights) (booking.com)	£ 384.09	£ 1,443.33
13/03/2019	Ryanair seat reservation return (x3)	£ 42.00	£ 1,485.33
21/02/2019	Granada Apartment (3 nights) (booking.com)	£ 439.54	£ 1,924.87
26/02/2019	Alhambra ticket (Gardens) (x6)	£ 44.52	£ 1,969.39
26/02/2019	El Torcal Guided Walk (x6)	£ 54.10	£ 2,023.49
26/02/2019	Car Rental Deposit	£ 221.87	£ 2,245.36
12/03/2019	Post Office Travel Insurance (x4)	£ 124.74	£ 2,370.10
			£ 2,370.10
			£ 2,370.10
			£ 2,370.10
			£ 2,370.10
			£ 2,370.10
			£ 2,370.10
	Expenditure in Pounds (£) £		2,370.10
	BALANCE £		2,219.90

CONVERSION OF BALANCE TO EUROS

12/03/2019	Cash	£ 1,000.00	= € 1,130.00
13/03/2019	Travel Money Card	£ 800.53	= € 907.00
21/03/2019	TMC Top-up	£ 300.00	= € 330.90
	TOTAL	**£ 2,100.53**	**= € 2,367.90**
	BALANCE OUTSTANDING	**£ 119.37**	

EUROS (€)

Income Receipts

Date	ITEM	Amount	Total
12/03/2019	Cash	€ 1,130.00	€ 1,130.00
13/03/2019	Travel Money Card Load	€ 907.00	€ 2,037.00
21/03/2019	Travel Money Card Top-up	€ 330.90	€ 2,367.90
			€ 2,367.90
			€ 2,367.90
			€ 2,367.90
			€ 2,367.90
			€ 2,367.90
			€ 2,367.90
			€ 2,367.90
			€ 2,367.90
			€ 2,367.90
			€ 2,367.90
	Total Travel Money in Euros €		2,367.90

Expenditure Receipts

Date	ITEM	Amount	Total
14/03/2019	Car Hire (Wheel)	€ 370.70	€ 370.70
17/03/2019	Granada Hotel	€ 378.00	€ 748.70
	Fuel (Total)	€ 92.00	€ 840.70
	Evening Meals (Total)	€ 682.06	€ 1,502.76
	Lunches (Total)	€ 410.95	€ 1,913.71
	Breakfasts (Total)	€ 93.95	€ 2,007.66
	Car Parking (Total)	€ 146.70	€ 2,154.36
16/03/2019	Taxi - El Pinsapar Walk	€ 25.00	€ 2,179.36
18/03/2019	La Concepcion Entrance Ticket	€ 15.50	€ 2,194.86
	Packed Lunches (Total)	€ 150.00	€ 2,344.86
			€ 2,344.86
			€ 2,344.86
			€ 2,344.86
			€ 2,344.86
			€ 2,344.86
			€ 2,344.86
	Expenditure in Euros €		2,344.86
	Balance outstanding in Euros €		23.04

Have Our Aims & Objectives Been Met?

Gain a greater understanding of Mediterranean plants:

During this bursary trip, we saw a huge variety of Mediterranean plants, growing in their natural habitats. Seeing plants growing in the wild this way informed our understanding of the requirements of a wide range of common garden plants from this region and, in some cases, inspired us to potentially use them in different ways. for example, the *Euphorbia* that we saw growing in the karst landscape at El Torcal was not woody or leggy as the lack of nutrients had checked its growth. This compact habit could be preferable, and it opened the plant up to potential rock garden usages, a place that we had not considered for it before now. We have all benefitted from this and can now confidently say that we have a greater understanding of Mediterranean plants. The harshness of some of the environments also demonstrated how hardy these plants are and how they can tolerate much more extreme conditions than they would encounter in an everyday UK garden. A comfort of sorts in the face of climate change and a potentially different growing environment for us to manage as gardeners and horticulturists of the future.

Figure 44 Paeonia broteri, El Castillejo Botanic Garden.

Figure 45 Irrigating the beds of the Jardines Bajos, Alhambra.

Visit Spanish gardens to further understand stylistic features and water usage:

During our trip we visited several gardens, both historic and botanic with a variety of styles and feelings. Our visit to the Alhambra demonstrated perhaps the best example of Moorish architecture and gardens that is present today and informed my ideas on the relationship between buildings and gardens as well as on paradise gardens and the importance of using gardens to create atmospheres such as the calm experienced in the Sultans garden. Seeing the ancient methods of irrigation used in this garden, fed from the local river, was a fantastic eye opener, especially considering they were built so long ago. A combination of this and the plants we saw during our trip provided further understanding in how to use drought tolerant plants in a garden design to conserve water.

Learn more about what Botanic Gardens do to protect native and rare flora:

We visited several botanic gardens and learned that the Andalusian Network of Botanic Gardens in Natural Areas is split into habitat zones, each garden looking after a specific habitat and the plants within it. Having a tour at Hoya de Pedraza Botanic Garden proved very insightful both in terms of the conservation work they were doing within the garden and the work they were doing to protect plants and plant communities in the wild. It seemed in the case of this particular garden that funding and gaining public support was the main obstacle to their work and that the area would benefit from the implementation of an education programme focusing on the importance of conserving rare and native flora to engage the public and encourage them to feel shared ownership and pride for the biodiverse area of the Sierra Nevada. We learned that the Network of Botanic Gardens share seeds and work collaboratively to ensure important information and plant material is preserved throughout the region.

Figure 46 The landscape of the Jardin Botanico Hoya de Pedraza, Sierra Nevada.

Knowledge sharing:

During our trip we met with local guides at El Torcal de Antequera and Jardin Botanico Hoya de Pedraza. We found it challenging to get contacts in the region to show us natural areas, plants and gardens. Throughout our trip we worked together to identify plants using written resources and field guides.

Concluding Thoughts

Anna Mortimer

Figure 47 The beautiful landscape of the Sierra de Grazalema.

There are almost too many learning points for me to list! I discovered the joy that botanising in the wild can bring. Finding interesting plants in the most unexpected places such as roadside verges and reaching for our field guide to look up what it might be was really exciting. I feel that it made me see some plants in a totally new light and felt, in some cases, that seeing them in their natural habitat in some way made them make more sense. A garden (in most cases) is a highly abstracted selection of plants and to see plants growing wild, among their natural neighbours helped me to get some initial insight into plant communities and also into potential combinations that I might use in the future at some point. I learned a lot of new plants. We saw many of the same plants several times whilst away and this really helped me to learn and remember them. As well as this, in El Torcal, our guide shared a lot of local knowledge with us about how various plants were traditionally used. Understanding the social importance of the plants we were seeing gave them a new dimension and helped me understand the connection between the local, native flora and the people that live surrounded by it. Learning more about these uses acted as a form of 'nod' to the work of the botanic gardens and the importance of preserving these plants and their stories for future generations. I leaned that, although horticulture is still regarded as an underfunded and underappreciated sector in the UK, we are lucky to live in a country where a lot of people do appreciate the importance of botanic and non-botanic gardens enough for them to survive and contribute to scientific research, education, social wellbeing and habitat creation and maintenance.

I would like to return to the Sierra Nevada later in the season and to visit areas higher up to see the alpine plants and a higher diversity of flora. We were there slightly too early in the season so a return visit would be nice. This trip inspired a group of us to go to Scotland to visit gardens and see native flora in the coastal Machair which has further broadened our horizons concerning natural habitats and the native flora of the UK. We were particularly happy to find wild *Drosera rotundifolia* and a host of orchids growing on the Isle of Skye!

The climate varies hugely across Andalucía depending on the altitude and topography of the region, do your research before planning an itinerary to make sure that you are visiting areas as the best time to see the most that you can. Just pull over and have a look! We found loads of really great stuff by just pulling over in random areas to see what was there. Give yourself time to do this on the way instead of going direct to where you're heading to. Don't expect to understand restaurant opening hours right away...it's different in each town! Grazalema was fantastic!!

Lee Behegan

This bursary trip to Andalucía has helped my understanding of wild landscape and fuelled me with Mediterranean planting design inspiration. Throughout the trip we looked for plants growing in the wild which has improved my botanising skills and I feel more confident to identify Mediterranean plants. Through our botanising in the wild, I discovered a new range of plants, such as *Echium creticum* that in the future I hope to introduce into gardens I work in. I would find it interesting to visit the region again at a different

Figure 48 Looking across the Sierra de Grazalema from the El Pinsapar trail.

time of year to explore a different palette of plants and I would recommend to others to potentially visit Andalucía in April/May to see a wider range of plants. I really enjoyed our time spent in the Sierra de Grazalema and if I was to visit again, I would spend more time in this breath-taking landscape. I would also aim to visit various environments from Coastal to Alpine, to see a wider range of plants.

Daniel Jones

I really enjoyed our trip to Andalucía. At every location we visited we were surrounded by plants and gardens, with each place that we visited adding further understanding and context to the regional flora and the gardens of Andalucía. I enjoyed visiting the botanic gardens at El Castillejo and Hoya de Pedraza. It was very interesting to see botanical gardens in a natural environment that were set-out by habitat and had a focus on the local flora found around each garden. This can be useful for UK botanic gardens that often have a focus on foreign flora. I was surprised by the diversity of plants that were in flower so early in the year although a little disappointed not to see more *Narcissus*. However, this was made up by the number of terrestrial orchids we found! I would like to explore the area again to see if I could find a few more daffodils and it would be beneficial to visit the Sierra Nevada later in the year to see how the flora changes and develops throughout the season. I learnt a lot about the Mediterranean flora and the conditions that the plants grow in which is particularly interesting given how the climate is changing and will be useful when it comes to cultivating Mediterranean plants in UK gardens.

David Pearce

On this bursary we really saw the impact of climate change, less snow of the mountains which is already starting to impact alpine plant species. We explored the microclimates and how they affect plant growth in such a hot environment. We got an understanding of drought tolerant plants which are more suitable to our changing climate. We networked and expanded our contacts overseas. We documented plants in their natural environment and the growth patterns and ecosystems associated with them.

Figure 49 Mirador histórico, La Concepcion Botanic Garden, Malaga.

Sam Hoey

One of the main objectives of this trip was to see plants in Spanish gardens and native plants in the wild both of which were an immense success. The gardens which we encountered were all planted with a wide variety of native plants and other drought tolerant plants that must cope with the intense Spanish summer heat. It was great to see native Spanish plants in the wild, especially the many orchid species! Seeing a meadow full of *Anacamptis papilionacea* is a highlight and will be remembered by the group for many years to come. It was also amazing to see the endangered *Abies pinsapo* growing throughout Grazalema and being immersed in a forest of these threatened conifers.

One of the main points I took away from this trip was to appreciate that water and how a plant gains access or copes without it in this sun-baked country. Many of the ferns we saw were growing on north facing slopes or in forests that also had streams running through. This was especially evident at the subtropical displays of La Concepcion in Malaga were access to water has helped create a lush rainforest like jungle in such a parched landscape. One of the points made by Daniel about how the *Abies pinsapo* grows on the north facing, cooler, moister and shadier sides of mountains where as the Pine species seemed to prefer the sunny south facing slopes, helped to hammer home a point of how important microclimates are to different colonies of plants.

My advice to people wanting to visit the flora of Andalucía, would be to go at a similar time to our group and maybe spend more time in an area. My other tip would be that if you see an orchid growing somewhere then the chances are there are more nearby. My final tip would be to stop the car at the side of the road, (whenever safe and legal of course!) and botanise any area that catches your eye. Many of our best finds were discovered this way.

It is a trip I will never forget and has really helped me to see how plants grow in the wild and how varied an area can be in terms of flora. It has also helped inspire me to revisit everything I think I know about wildflower meadows. My sincere thanks to everyone involved in what has been the trip of a lifetime.

Figure 50 A potted Nephrolepsis exaltata fern at the Alhambra.

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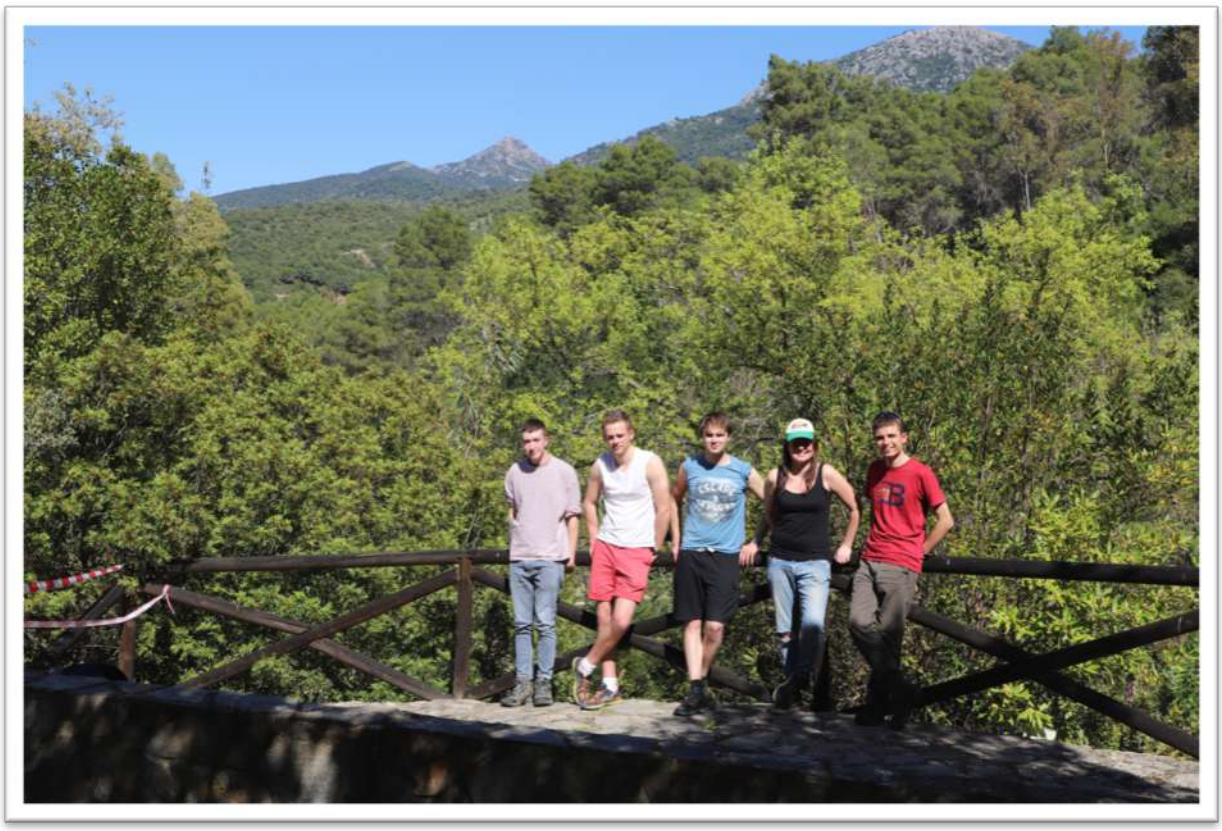

Figure 51 The group at El Castillejo Botanic Garden, El Bosque, Sierra de Grazalema.

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Appendix

The Traditional Uses of Plants in El Torcal de Antequera

Figure 53 Phlomis purpurea

El Torcal de Antequera has a rich history and there is evidence that some of the more than 1000 caves were inhabited 8000 years ago in Neolithic times. During the time of Franco, two people lived in the caves for 18 years to avoid capture. They lived off the land and took advice from local shepherds with their vast knowledge of the area and the plants that grew there. The knowledge of these shepherds has been passed down for generations and the connection that local people have to the plants of El Torcal is still very strong today.

During our tour of El Torcal de Antequera, our guide José pointed out a number of plants that have traditional uses in the region.

- *Phlomis purpurea* has many traditional and historical uses. It is known as 'Cock-killer' as its flowers are shaped like a cockerel head. Its leaves can be used as a tobacco substitute and can also be used to preserve meat. Animals hunted in El Torcal would be stuffed with the leaf of *Phlomis purpurea* and carried down to the village below. The leaves also have a slight anti-bacterial property and a coarse texture so can be used to clean dishes. The light purple flowers contain a sweet nectar that was used as a sweet in Roman times.
- The Shepherds of El Torcal refer to *Crataegus monogyna* as 'Shepherds' Bread' because of the many edible properties of the plant. The berries are very high in vitamin C, and the flowers are edible and can be used as a cardio-tonic as they are good for the heart and circulation. The young leaves can be eaten in salads and the thorny branches were used to protect homes from black magic. The plant is also referred to as 'Jesus Christ's Thorns' as it is thought to be the plant that the crown of thorns was made from during the crucifixion of Jesus.
- We also saw Marjoram growing in El Torcal. It has antibiotic properties and is said to aid digestion and reduce stress. When left under a pillow, it is said to aid sleep and encourage good dreams.
- Throughout the landscape of El Torcal, we saw *Verbascum giganteum* growing amongst the rocks. Although not in flower, its leaves have anti-haemorrhoid and anti-inflammatory properties and can be used to treat bronchitis. The yellow flowers were used in ancient times as a form of hair dye.

Figure 52 Crataegus monogyna at El Torcal.

Figure 54 Verbascum giganteum