Plains to Peaks
Colorado and the Rocky Mountains

Trip Report produced for the Merlin Trust

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Acknowledgements

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Thank you to Tom Freeth, Chris Moore and Martin Staniforth for your valuable Colorado advice.

Heartfelt thanks must go to all my hosts in Colorado: Nicola and Colin, Sara and Bryan, Brenda and Kevin, Kenton and Tori, Dickie, Emily and Ken, Phil, Jen, Meredith and all the gardeners who I met and worked alongside at DBG, Betty Ford and Montrose. The trip would not have been anywhere near as spectacular without all your generous hosting and kind hospitality. Thank you so much.

I am so lucky to have been able to undertake a trip like this, and there are many gardeners who are not as supported by their employers to access the resources required - or who cannot in fact access these resources at all.

NOTE

This document is slightly more visual and, perhaps, a little bit narrative in favour of scientific or technical. Hopefully, this guides any readers through from beginning to end in an enjoyable manner. All photographs included are taken by the author, unless specified otherwise. I have had to reduce their quality in order to upload this to the Merlin Trust report bank.

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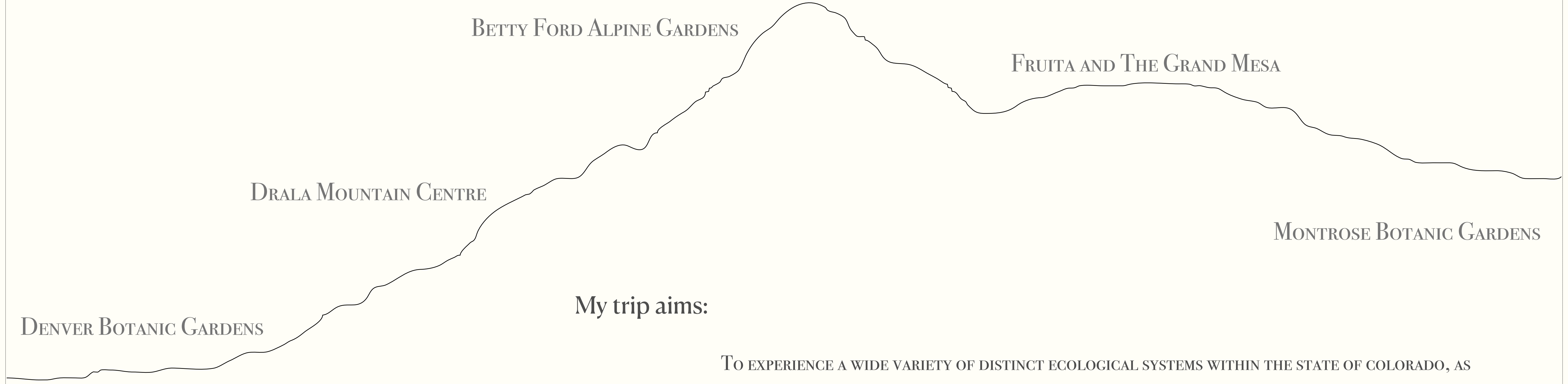
The Author, Vail

I am a second year Apprentice at The Royal Botanic Gardens Kew. Before I studied horticulture, I studied environmental science in Scotland. I also worked a little in landscape architecture, before pursuing plants in a more hands on way. I like plants that exist in the extremes: altitude, heat, salt, wind.



My trip aims:

To experience a wide variety of distinct ecological systems within the state of Colorado, as well as their associated flora.

To gain an understanding of public garden management at a range of scales.

To understand how public gardens in Colorado interact with, and work with native flora to achieve conservation goals.

To make professional and personal connections to other gardeners working with rock, steppe and alpine plants (to make friends, who like plants).

Part One
The City

External planting display, Denver Botanic Gardens

Denver, and the Denver Botanic Gardens

Denver Botanic Gardens was the first stop on my visit. The 23 acre central site hosts North Americas largest collection of plants from cold and temperate climates. It was founded 1951 within Cheeseman Park which, I found out on a local ghost tour, sits on the city's first and largest cemetary.

Denver was an easy first pick, they are an active collection which regularly contribute and collaborate with gardens internationally. Their home site in the middle of the city immediately felt comfortable and familiar, little balck labels indicating that I was on home ground in a botanic garden.

I began my trip with 4 days alongside the DBG Team.

Day 1: Tour of Gardens from Director of Horticulture Phil Douglas.
Meeting with Rebecca Hufft Director of Climate Resiliance.

Day 2: Working with Sonia and Meredith within the Steppe Garden.
Hike around Loch Lomond with DBG Team looking at native montane species.

Day 3: Hike around Loveland Pass with Jen Toews, Plant Records specialist.

Day 4: Meeting with Marissa Sterrett who leads on public planting projects for DBG.
Working with Laura and Quentin in the Grand Mesa garden.

Day 1

The site at York Street spills out onto the surrounding roads. Denver do lots of work with the city on street planting, and showcase some of their combinations on the roads surrounding the gardens. Much of the planting is designed to need very little water, as Denver averages below 400mm of rain each year.

Phil Douglas met me and took me on a tour of the site. The garden is split up into distinct areas, however there are overarching themes of reduced water usage and native US plants. DBG collaborates with the State university on the Plant Select programme which seeks to take plants from the wild which might be suitable for low water, arid environments - and move them into commercial production. This involves a long process of selection, breeding and trialling. They have had some great success in introducing various cultivars which thrive in the conditions found in the Western USA, including *Bouteloua gracilis* 'Blonde Ambition' (pictured left).

The conditions found in Denver mean that the garden has particular strength in Arid, Rock and Alpine and Steppe displays. The garden also has a long history of collecting for plants of that profile.

The garden is undoubtedly beautiful. One particular feature which struck me were the pathways throughout the garden. Even in gardens which were primarily botanic collections, the arrangement of the plants, overflowing over the clean hardscaped pathways felt highly ornamental. Plantings were made for aesthetic value rather than pure taxonomy or phytogeography.

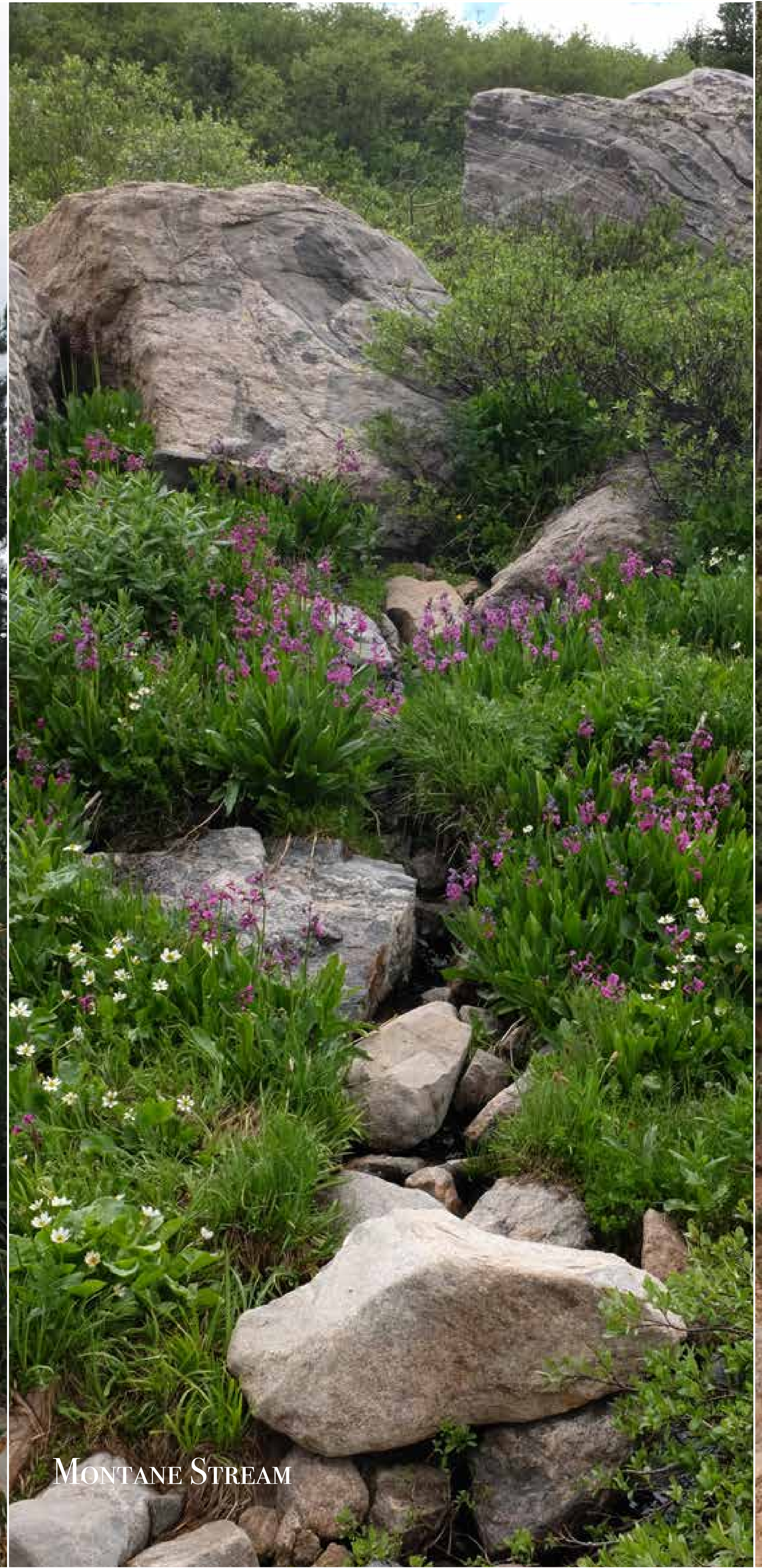
My conversation with Rebecca Hufft focussed on the ecology projects undertaken at the Chatfield Farm site. Rebecca talked about her work on meadow establishment, and the trials between the relative benefits of the use of glyphosate, solarisation, mowing and lightly harrowing. The technique which worked most efficiently was a combination of all four techniques in succession.

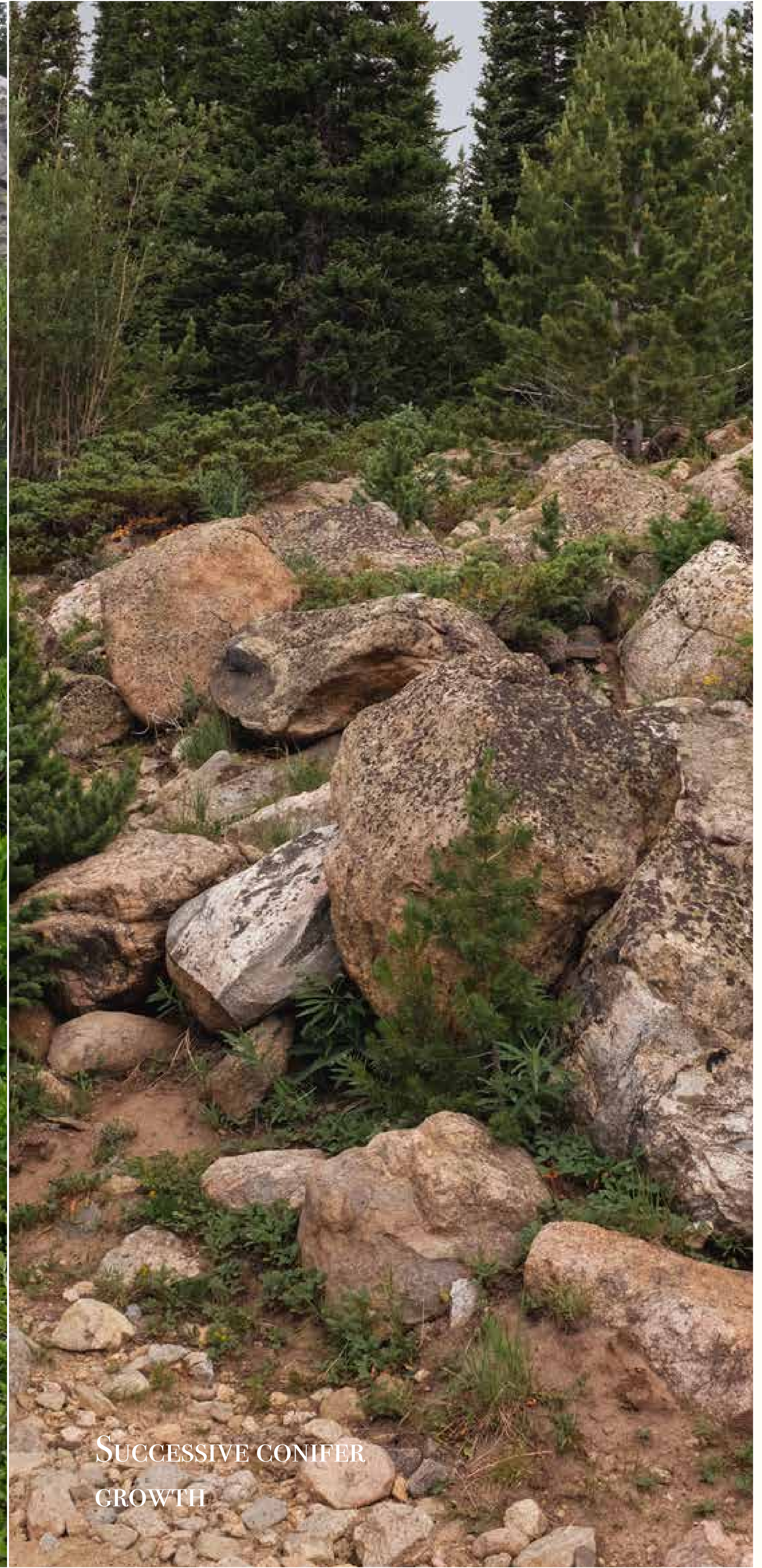
Water wise garden

Pollinators Garden

Blue Mesa Garden


Sonia and Meredith


Montane Stream


Successive conifer growth

Day 2

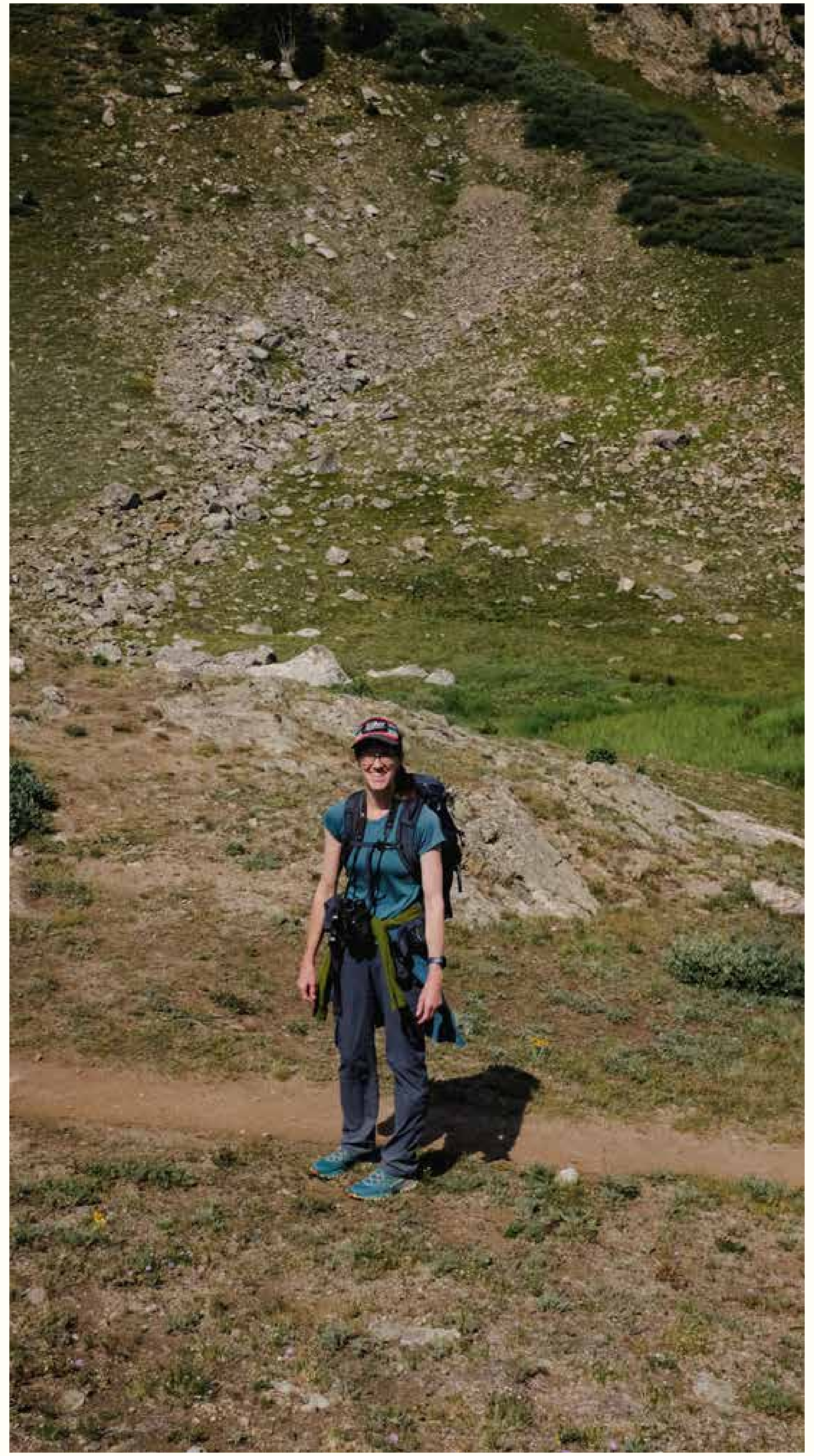
I spent the morning working alongside Meredith and Sonia in the Steppe Garden as well as in the pollinator garden. We talked a lot about their careers, how they had come to be at Denver. We also discussed the collections and how Denver had developed such a specialism in steppe, arid, rock and alpine collections. Part of the answer is, of course, that the climate in Colorado allows for them to be grown well. Sonia spoke to me about how Denver worked internationally to source 'wild' material for the collection, and how she saw the collection growing in the future.

Sonia showed me some of the work she had done on the habitat walls, including use old woolen cat beds as refuges for insects.

I had lunch with the team before heading out to a trailhead with Phil to see a montane environment and have my first experience of the Rocky Mountains.

We drove to a trail head near a man made lake called Loch Lomond. Here, Phil gave me some tips for walking in the American wilderness including what to do if you see lightning or wildlife. Luckily (or unluckily) the largest animals which we encountered were chipmunks. What we also saw were the graduations from coniferous forest, through to montane scrub and finally up into alpine tundra. Alongside mountain streams hosting a wide range of riperian species such as *Primula parryi* (pictured middle left).

Phil explained how you can moniter the elevation or landscape type based on the dominant conifer. *Pinus ponderosa* gave way to a number of willow species at a higher elevation. It was interested to see the natural landscape succession of smaller pines establishing naturally which felt so different from the pine forests which are typically farmed monocultures in the UK.



Day 3

Day 3 was spent with Jen Toews in the Loveland Pass area which sits at just over 3,600m. Jen is an alpine specialist who is working to make a comprehensive list of all alpine occuring plant species in North America alongside Emily Griffoul at Betty Ford Alpine Gardens. We discussed her methodologies for collecting and accessing the necessary data for this project, including employing GIS to plot data points gathered from both community and traditional scientific sources.

Jen and I drove up to a trail that would enable us to hopefully see some of the poster species for high elevation Colorado. One of the genera which I was particularly keen to see was the *Castilleja* or 'Paintbrush Plant'. Luckily, the area that we were in had an abundance of these, growing on open rocky fields which slid down from screen slopes. Even in late July, there was a visible snowline above the scrubby willows.

Colorado has an enormous variety of Buckwheat (*Eriogonum*) species. Often the Paintbrush was sitting alongside the Buckwheat, in vivid shades of yellow and red against the scrubby grass or shattered rock.

Although a little late in the season, we did manage to see the state flower of Colorado - *Aquilegia coerulea* or Columbine Flower. They were few and far between as they tend to flower a little earlier in the year. Even at the high altitude we were walking at, it was around 22 degrees centigrade and very dry.

Jen spent some time explaining the outline of her project to have a funtional map of the alpine occuring species in Colorado, and how this would help with conservation efforts. As the United States is such a large, connected landmass there is a degree of species drift from one state to another. We discussed how a changing climate might cause lower elevation species to move to higher elevations as they beome warmer.

Columbine

Castilleja on slope with snowline over head

Castilleja and Ericonum

Water wise garden

Blue Mesa Garden

Mahonia freemontii

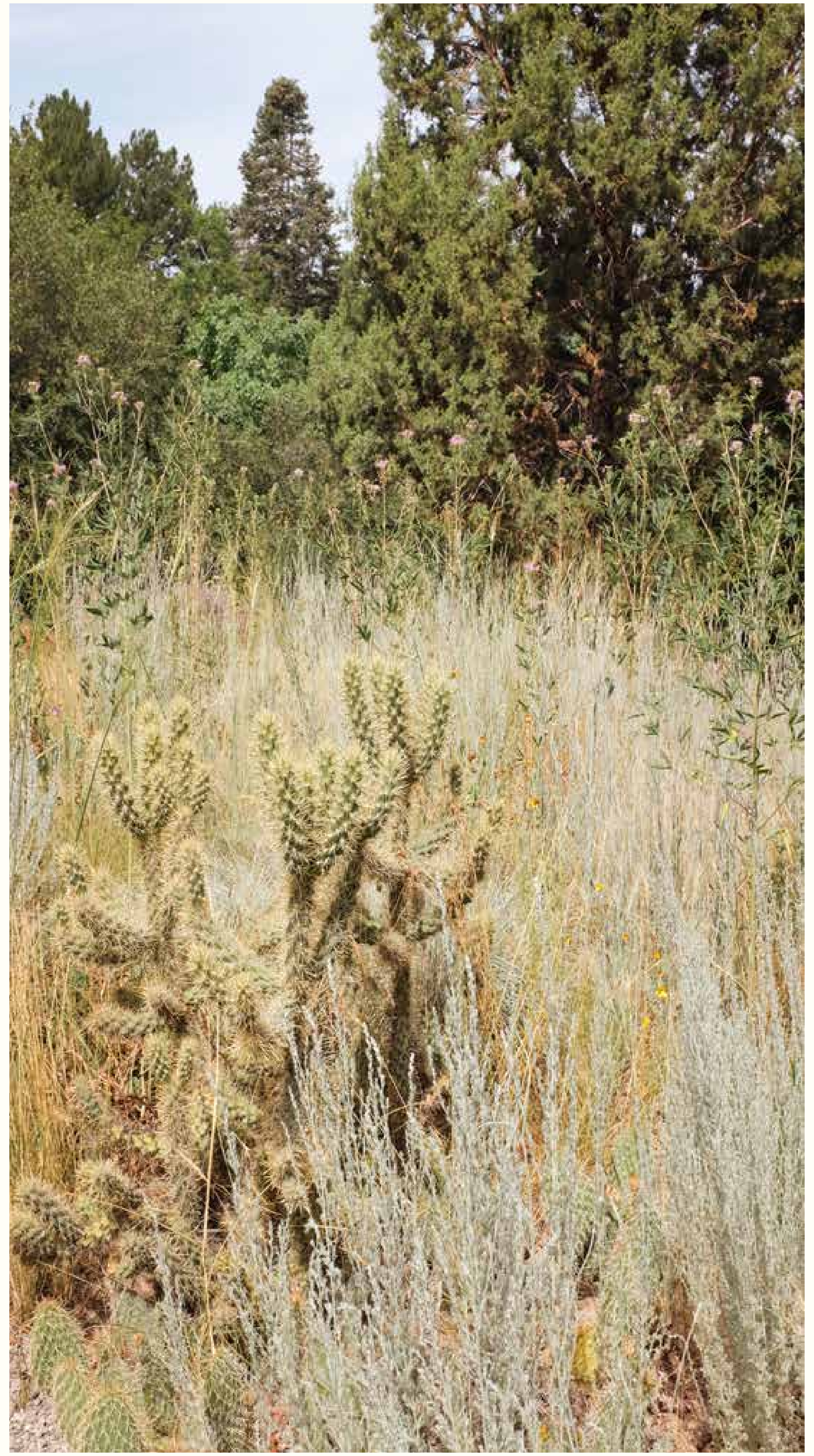
Day 4

For my final day at Denver Botanic Garden I tried to take in some of the other projects which Denver undertakes. This includes their work with the City of Denver on public planting projects and the Plant Select Programme.

Denver, like a great deal of the Western United States, struggles with water shortages. There has been a push to move public planting away from highly irrigated lawns or bedding planting towards more native, xeric species. Denver has been at the forefront of encouraging domestic gardeners to consider more plants which thrive in the conditions of the Western US. I spent some time with their in house landscape architect, Marissa Sterrett, who explained how the garden helps to support public landscape projects encouraging the use of 'water-wise' plants. This includes collaborating with the City of Denver to bring a more varied planting palette to the city's streetscapes. Many of the plants used in these schemes are part of the 'Plant Select Programme'.

The Plant Select programme is lead by the University of Denver, but DBG is a frequent collaborator. The programme takes wild plants which are naturally adapted to suit the dry and severe climates of the Western US, and develops them into comemrcially available cultivars. These cultivars are bred to be useful to the domestic gardener, with ease of growing and resistance to pests and diseases.

I spent my afternoon with Laura and Quentin looking around the areas which they have worked on together. Laura spends a great deal of time looking after the Mesa garden, which holds a number of species found in the blue sage scrub further south in the state. Laura has a particularly beautiful *Mahonia freemontii* with glaucous foliage and coral coloured fruits alongside many cacti and arid plants. This was another plant which had been found in the wild and brought into cultivation for its ornamental or domestic value. Her approach to her work was one of working with the landscape, and spending lots of time in the wild ecologies she was emulating. I noticed a stark difference in working within a botanic garden where the plants and landscapes are native to you, as opposed to the plants and landscapes at Kew which are so often based on ecologies a very long way from London. The connection between the garden and conservation felt much more natural because of this



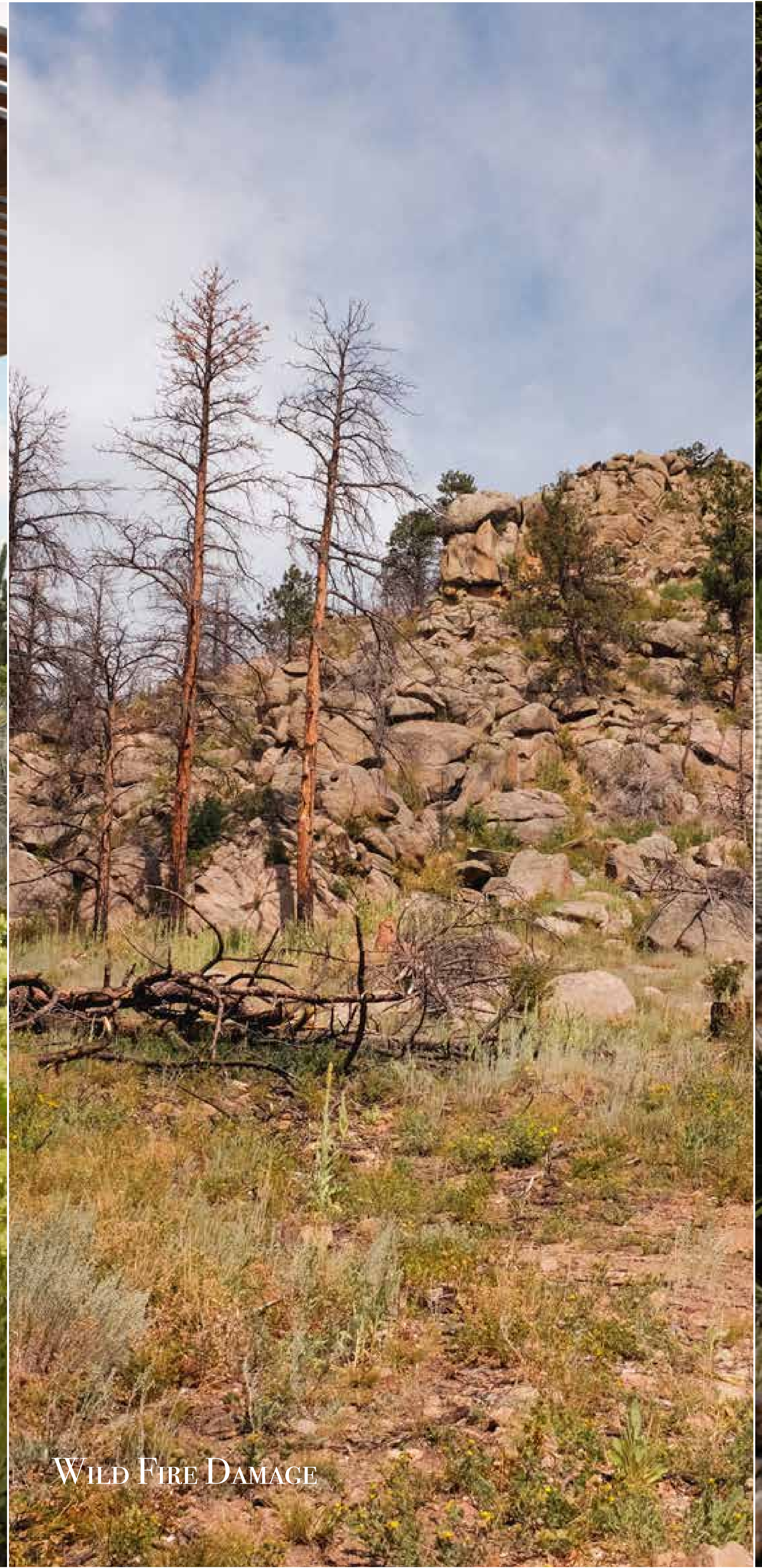
Day 5 & 6

I headed towards the North of the state. Driving along the vast interconnecting highways which carry people from state to state. I stopped in the college town of Fort Collins, to a small botanic garden called The Gardens on Spring Creek. Their curator Bryan Fischer showed me around their collection, talking in detail about the development of the garden from a small city scale project to a major hub for local gardeners and planstpeople. We also discussed various methods of the garden funding itself, including via events. We repeatedly had to move inside due to rolling thunderstorms. In Colorado, being outside during a thunder storm presents a genuine hazard owing to the high elevation.

After leaving Fort Collins I made my way to the far north of the state, only around 30 miles south of Cheyenne, Wyoming. Here I took a turning off a single track road onto a dirt track, driving 30 minutes to finally arrive at the Drala Mountain Center. Drala is a Buddhist retreat centre which is home to the largest Stupa in the continental US (pictured left). I was here to see Dickie Bird, a resident at the centre for spiritualism for almost 30 years. Dickie has been recording and analysing the living beings on the property, becoming a self taught expert on the ecology of the site. He aided immensely in forestry work undertaken to restore the Ponderosa Pine wood and scrubland which fills the site. This forestry work aimed to reduce the fireload of the forest, by thining some of the pines to create more of a 'Ponderosa Savannah'. This has the trees more sparesely grown, with herbaceous material inbetween them.

This work was put to the test in 2020 when some of the most devastating fires the state has seen raged through the property in the Cameron Peak Fires. The centre lost buildings and a huge amount of damage was done to trees. There s a movement in fire prone areas of the United States to encourage smaller, more regular controlled burnings as a way of reducing the fire load available within a given area. This in turn, encourages more of a matrix of plants and prevents the large scale devastating fires which have been seen in recent years.

The Gardens on Spring Creek



Wild Fire Damage

Pinus Ponderosa

Part Two
The Mountains

Juniper communis at the top of Uneva Peak.

Vail and The Betty Ford Alpine Garden

The state of Colorado houses a portion of The Rocky Mountains. In the winter, many of the high elevation towns are havens for ski and snow sports. I came to Vail not only to sample the air at almost 4,000m up, but also to come to the world acclaimed Betty Ford Alpine Gardens and to meet some of their team. I spent a great deal of time with Colin Valazquez Lee and Emily Griffoul. Colin is the Curator of Betty Ford, where he initially trained as a plantsman and horticulturist. Emily Griffoul is the Conservation Scientist for the garden, leading the work which Betty Ford undertakes in the conservation of native alpine species. Emily works frequently with Denver Botanic Garden, particularly on work with alpine plants.

Day 7 Hike with Emily, Ellis and Colin

Day 8 Betty Ford Alpine Gardens with Colin

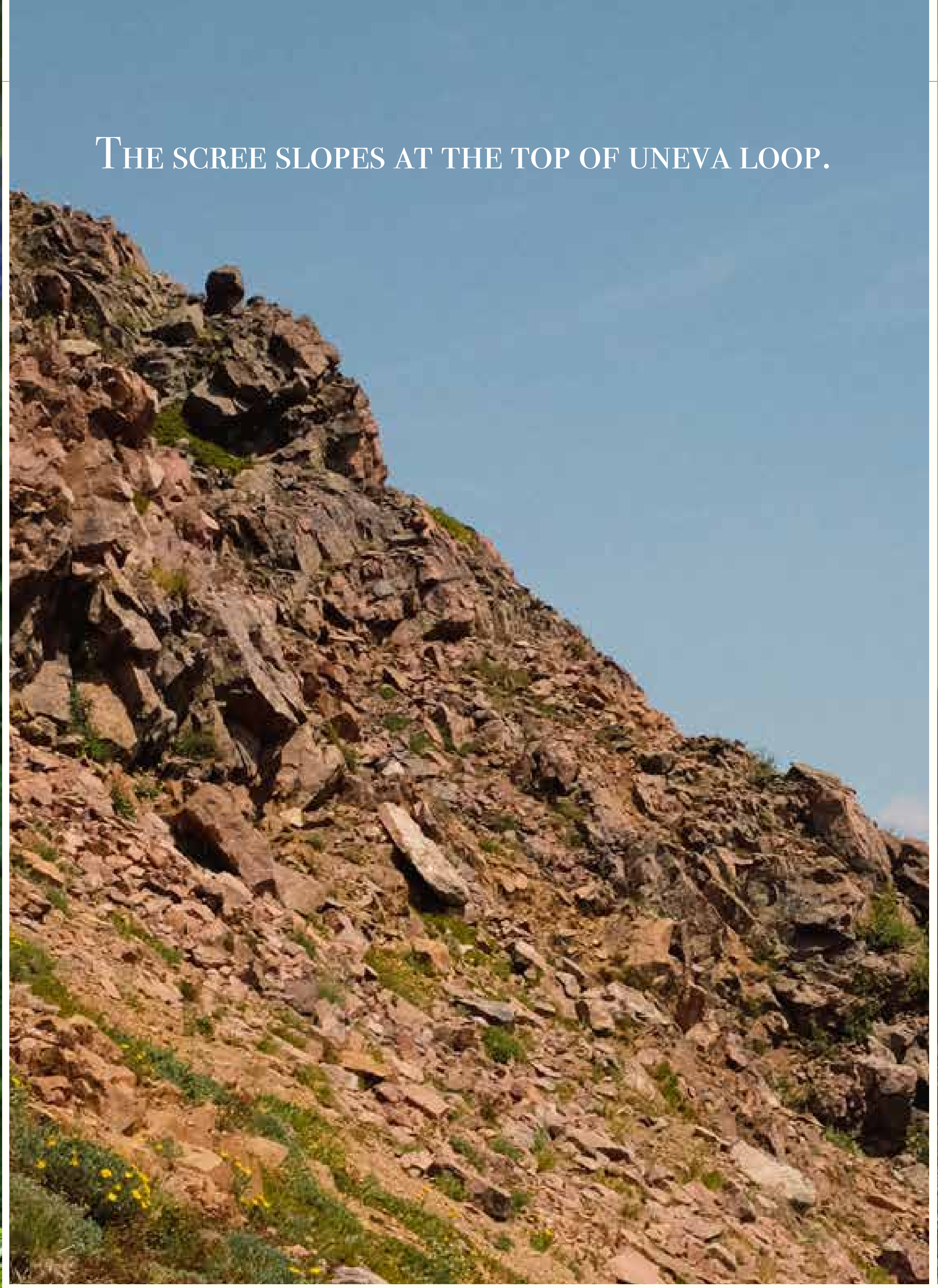
Caltha leptosepala

Ranunculus adoneus

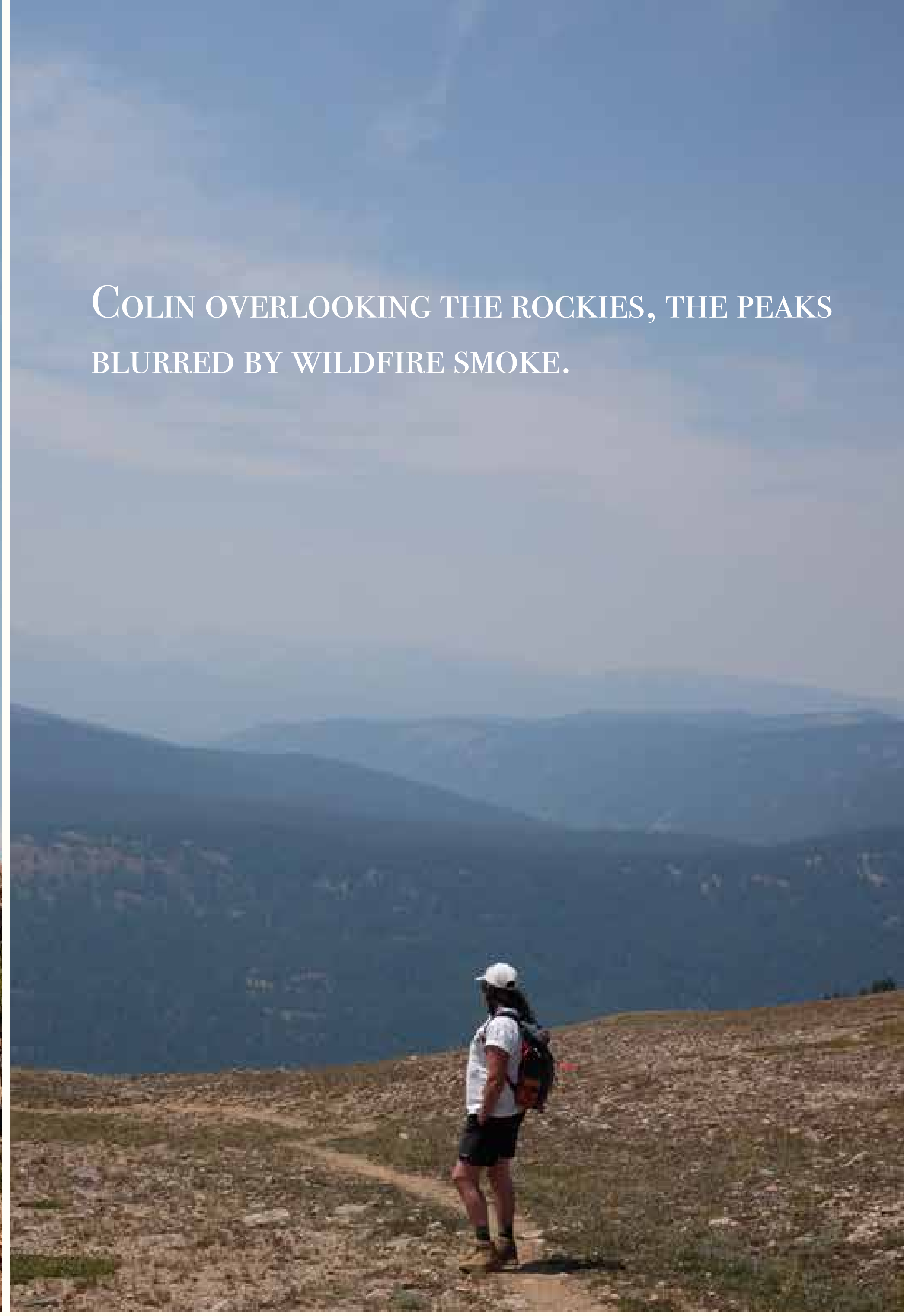
Colin, Ellis and Emily on the Uneva trail.

Day 7

Lupins in the lower montane woodland.



The scree slopes at the top of Uneva loop.



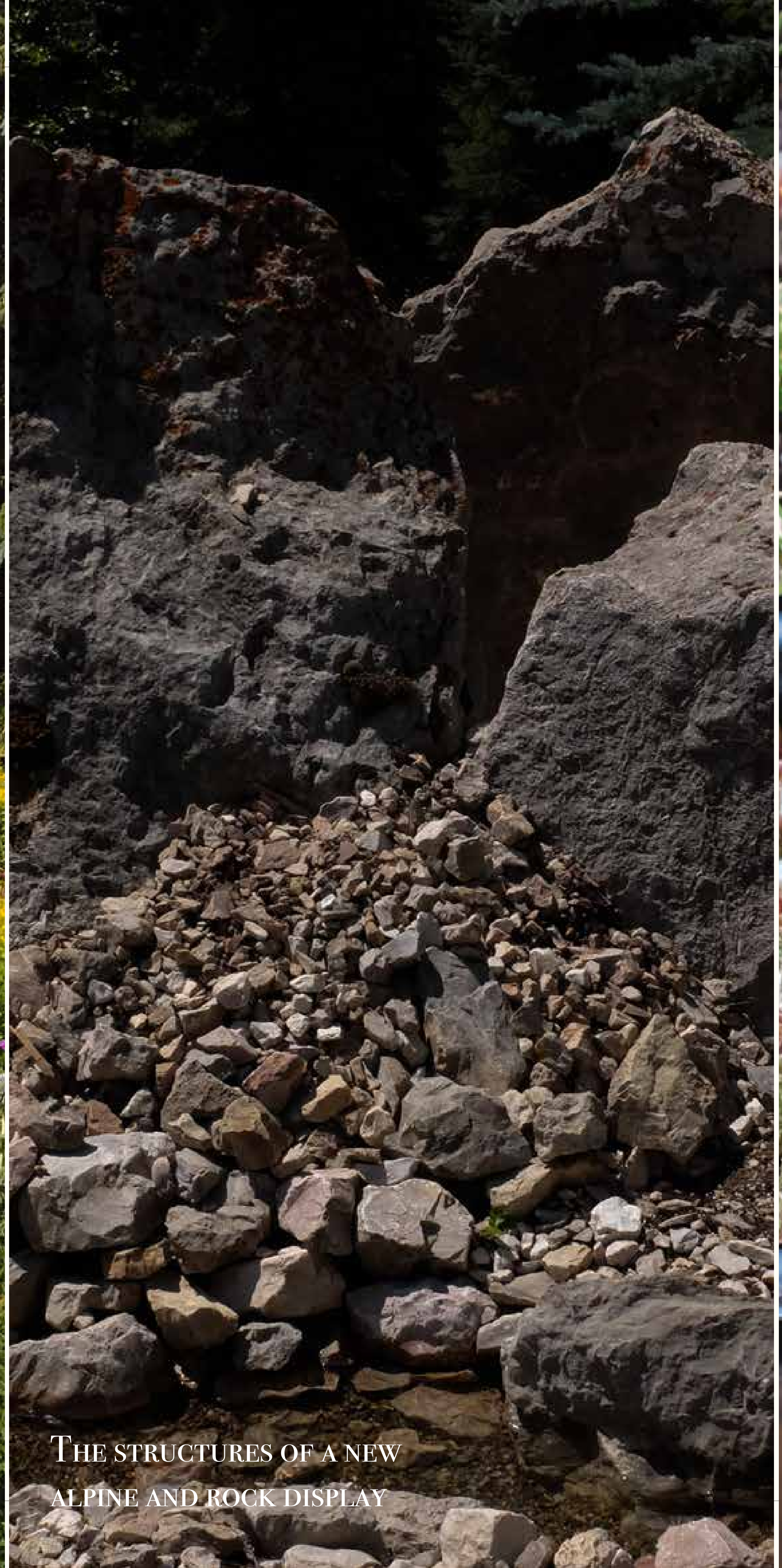
Colin overlooking the Rockies, the peaks blurred by wildfire smoke.

I met Colin and Emily as we set off for the Uneva Peak just outside Vail. Uneva Peak sits at about 12,500ft or 3,800m and would allow me to experience some true alpine for the first time on my visit. It was great to have Ellis with us, who was interning with Emily in her summer break from college. Together, we made our way through the riperian, woodland species at a lower elevation and quickly found ourselves moving into alpine meadows. The meadows brimmed with streams hosting *Primula* and *Caltha leptosepala.* The lower elevations were mostly coniferous species including bristlecone pine but also glades of vivid purple lupins. Throughout my time in Colorado, I was permanenty told that I would 'definitely see a moose' on whichever hike I was on. The moose however, never materialised...

We reached the true alpine, with snow pack still visible. A highlight was finding a *Ranunculus adoneus* emerging just next to a snowdrift. We saw a range of alpine cushions including the ubiquitous *Geum rossii* var. *turbinatum*, although they all looked a little dried out after the very dry Colorado summer. Lower down in Denver, I had experienced 'virga' rainfall. It appears as jellyfish like clouds over the valleys with the rain never making it to the ground as the air is too warm. In the alpine however, the view was only obscured by the forest fire smoke. You could smell charring pine in the very thin air.

The scree slopes on the way down hosted buckwheats and pikas. Emily and Ellis keyed out a number of the buckwheat species whilst we spotted marmots on the rocks, sunbathing. We of course used Jen Ackerfields 'Flora of Colorado', which is something of a sacred text.

A vista of the perennials at Betty Ford



The structures of a new alpine and rock display

Sempervivum in the rock and alpine nursery

Day 8

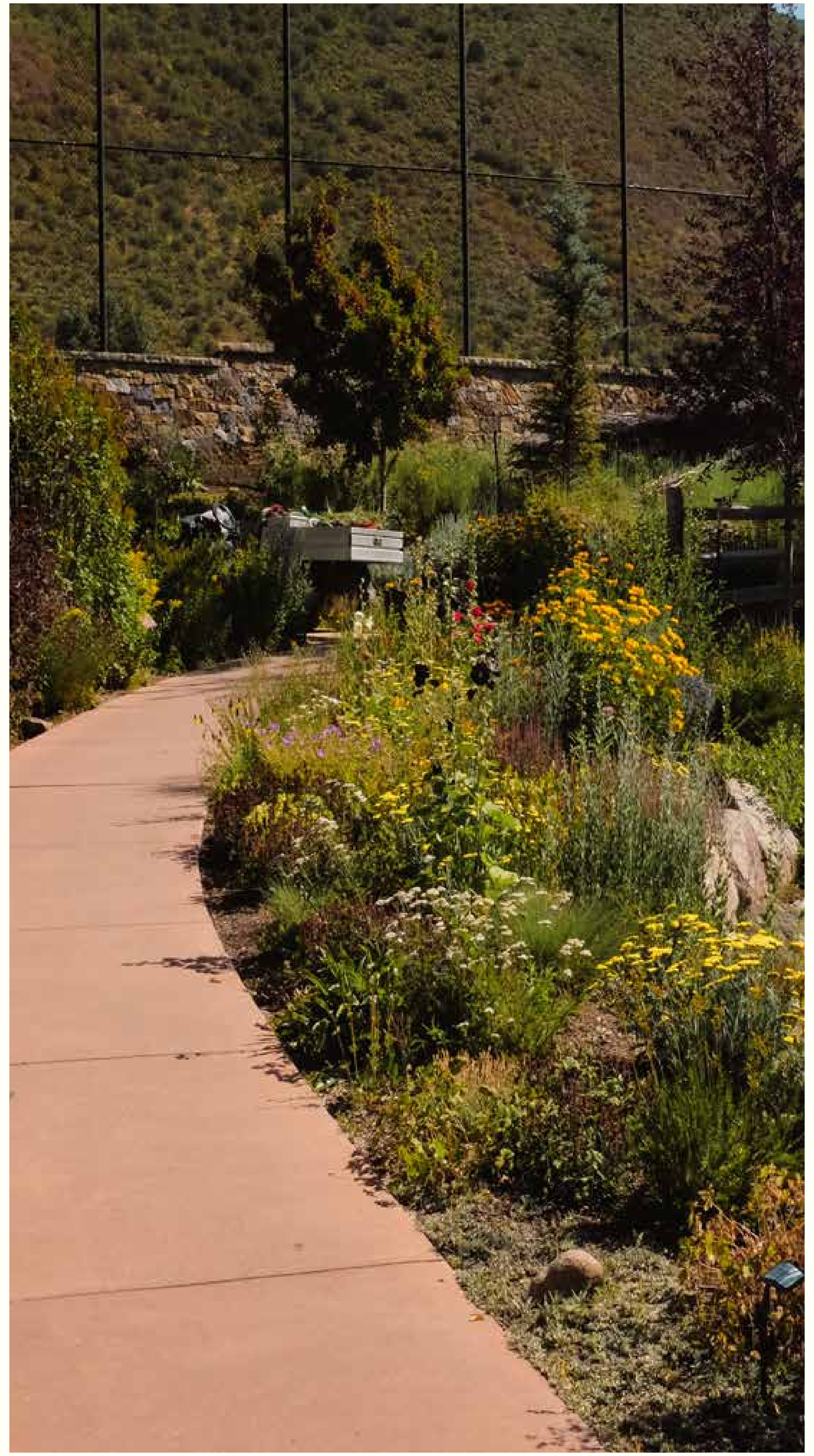
I was very excited to get to see more of the garden at Betty Ford, as it is one of the highest elevation botanical gardens in the world. For a large part of the year, it is covered in snow. Although the site is relatively small, it is free to the public all year round and hosts a range of gardening styles from traditional perennial to true alpine species. It was amazing to see plants like *Claytonia megarhiza* growing outdoors!

Colin took me through the history of the garden, from it's founding in 1985. The town of Vail itself has truly only been a town since the 60's, when it was popularised by the late President Gerald Ford and his wife Betty who had a keen interest in horticulture.

The physical size of the garden is not representative of the scale of the work they undertake both nationally and internationally for the conservation of alpine plants and alpine environments. Colin and Director Nicola Ripley regularly collaborate with international organisations to advocate for the alpine environment, including at the IUCN.

Colin showed me some of the areas that the garden has developed for visitors, and discussed some of their future plans. As with all gardens, they need to manage the collection both for botanical value as well as a visitor experience. Colin showed me how they had developed the original schoolhouse for the village of Vail into a childrens garden.

True cushions were growing happily, even as weeds amongst the rocks. Again, hummingbirds were flitting between the colourful perennials. I couldn't imagine how dramatic the shift must be in the landscape when it becomes covered in snow. Colin also showed me some of the nursery plants, and we talked a little about the gardens propogation methods. So many of even their youngest plants where potted into almost a pure mineral media, and looked as though they were thriving.



Part Three
The Desert

Montrose, Fruita and the American Wild West

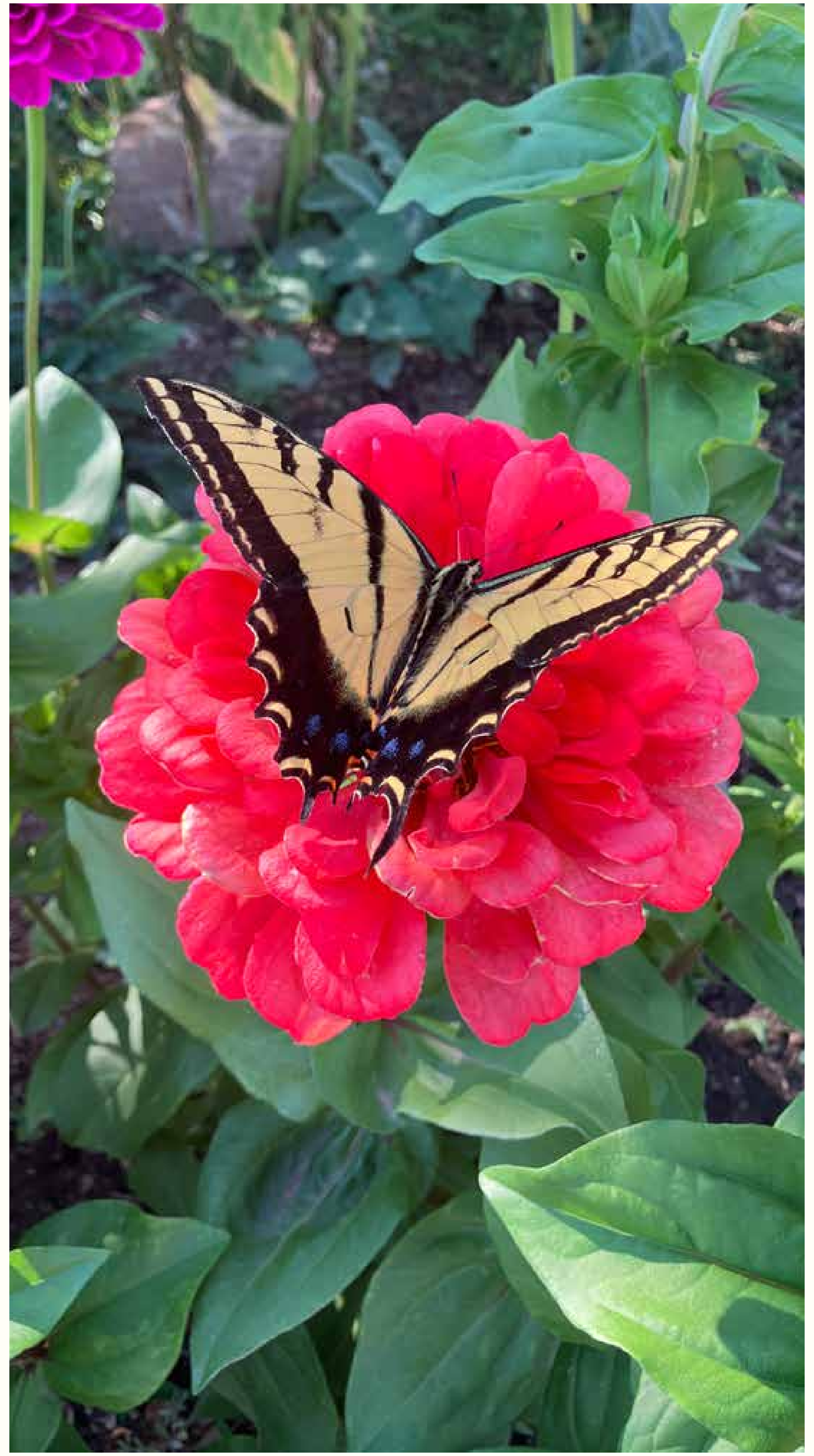
I wanted to take in some of the high desert and mesa landscapes to the south of the state. The further you go south, the hotter and drier it gets. I headed towards Montrose, which would act as my southern base. Here I would spend time Sara Ungrodt, landscape architect, master gardener and director of Montrose Botanic Gardens. Whilst staying in Montrose I would also meet Kenton Seth. Kenton is a south Colorado native who has a deep understanding of the native plants which he uses to make beautiful gardens. Along the way I stopped at some small mining towns from the gold rush era, and a number of hot springs.

Day 9: A talk with The Colorado Native Plant Society at Chelsea Nurseries.

Day 10: Giving a talk at Montrose Botanic Gardens about my work at Kew, as well as getting to take a look at the gardens themselves.

Day 11: Working alongside Kenton Seth.

Day 12 : The Journey Home



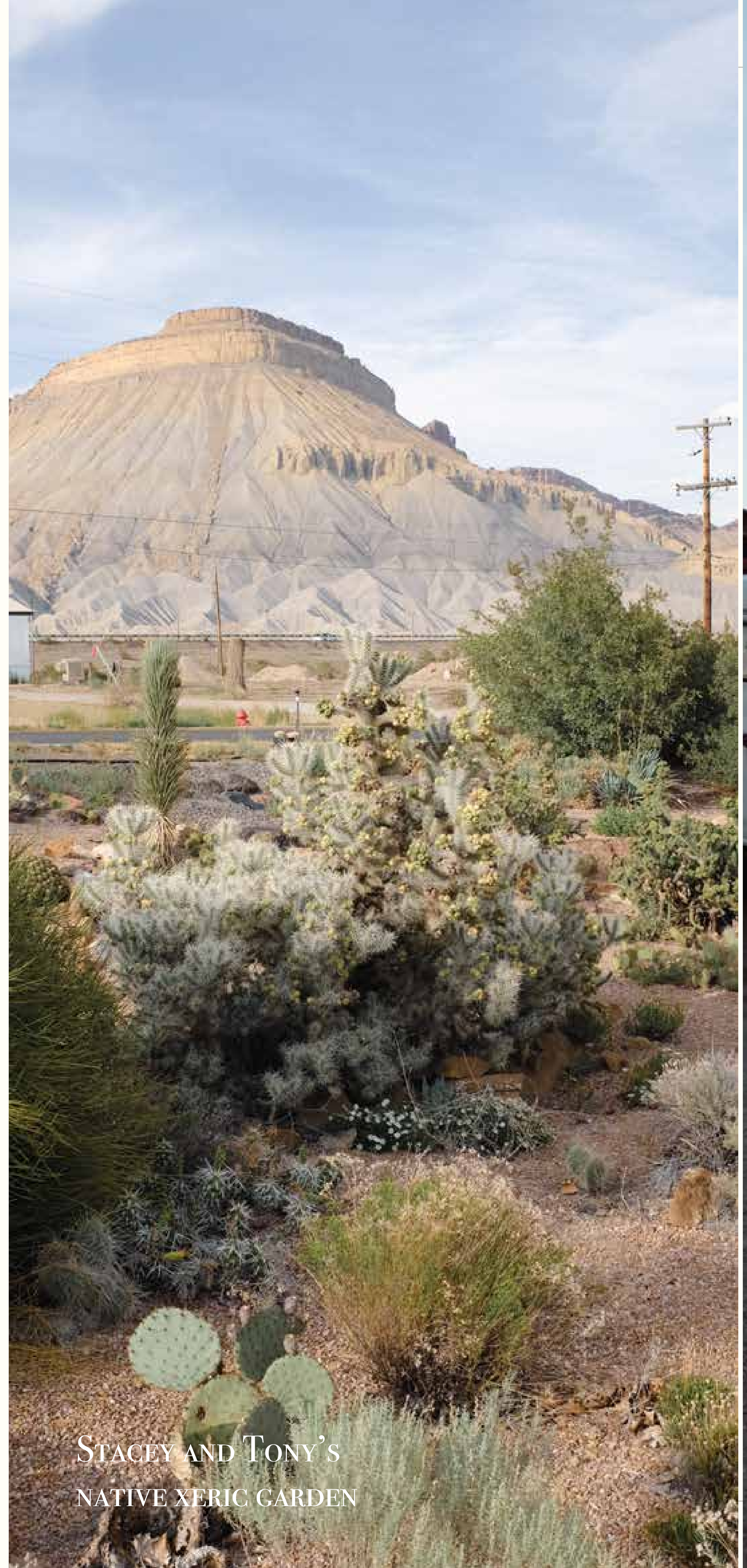
Day 9 & 10

Driving through the increasingly blue and scrubby landscape, I knew that I had entered a distinctly different ecosystem to that which I had found in the mountains. Tall, flat top 'mesa' mountains loomed on the horizon. The Grand Mesa in Western Colorado is the largest flat topped mountain in the world. Formed through volcanism and erosion, you can make out the distinct layers of rock in the mountains.

My first stop was Chelsea Nursery, run by Stacey Stecher and Tony Urschitz. They specialise in native xeric plants and hardy cacti, and have been growing in Grand Junction for close to 30 years. Their nursery is back dropped by the beautiful mesa, and in fact Tony and Stacey have spent a great deal of time collecting and propogating interesting wild seed which they have found in the surrounding areas, including thornless native roses. This again highlighted for me the greater prevalence of working with native species in American horticulture, owing to their greater variety of landscapes, species and wild spaces. Tony gave us a tour of their native show garden featuring many species of *Berberis*, *Opuntia* and *Yucca* amongst other plants perfectly suited to the Western USA. These plants are never irrigated once established and the garden showed me the structural beauty of gardening not only on gravel but combining cacti with tough, spiny shrubs.

I was beautifully hosted by Brenda and Kevin back in Montrose before heading to the garden for my talk the following day. It was so wonderful to meet the vibrant and enthusiasic community which has sprung up around the gardens at Montrose. They shared many of the bedding display plants which we grown in the UK, however their pollinators were mostly made up of hummingbirds and swallowtail butterflies.

Staying with garden director Sara and her husband Bryan, they showed me an area of urban redevelopment in downtown Montrose where Sara talked me through how some of the Plant Select programme plants were regularly being used as low water alternatives

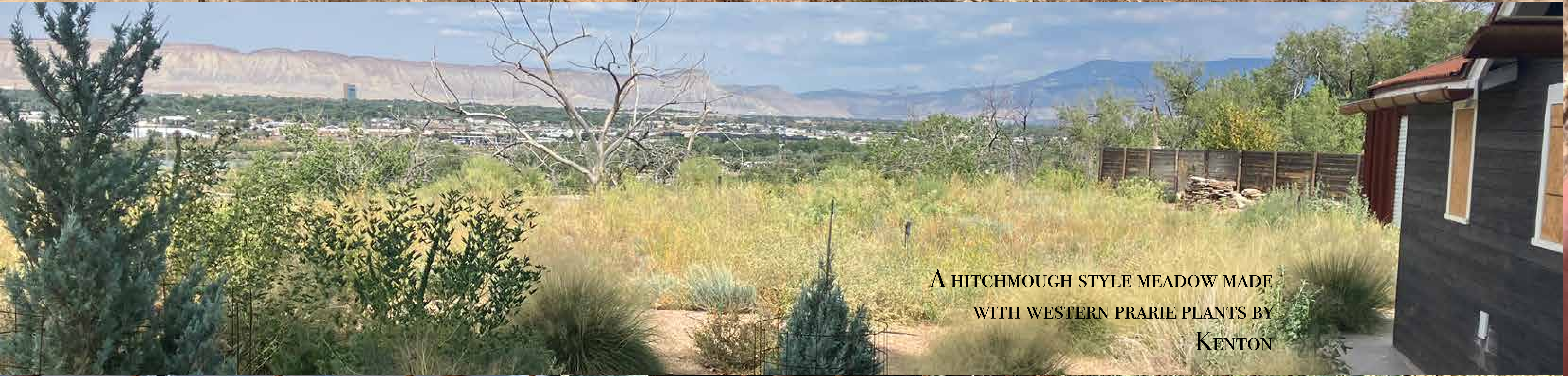


Stacey and Tony's native xeric garden

Sunset in the wild west

Tony talking through propo-cation techniques

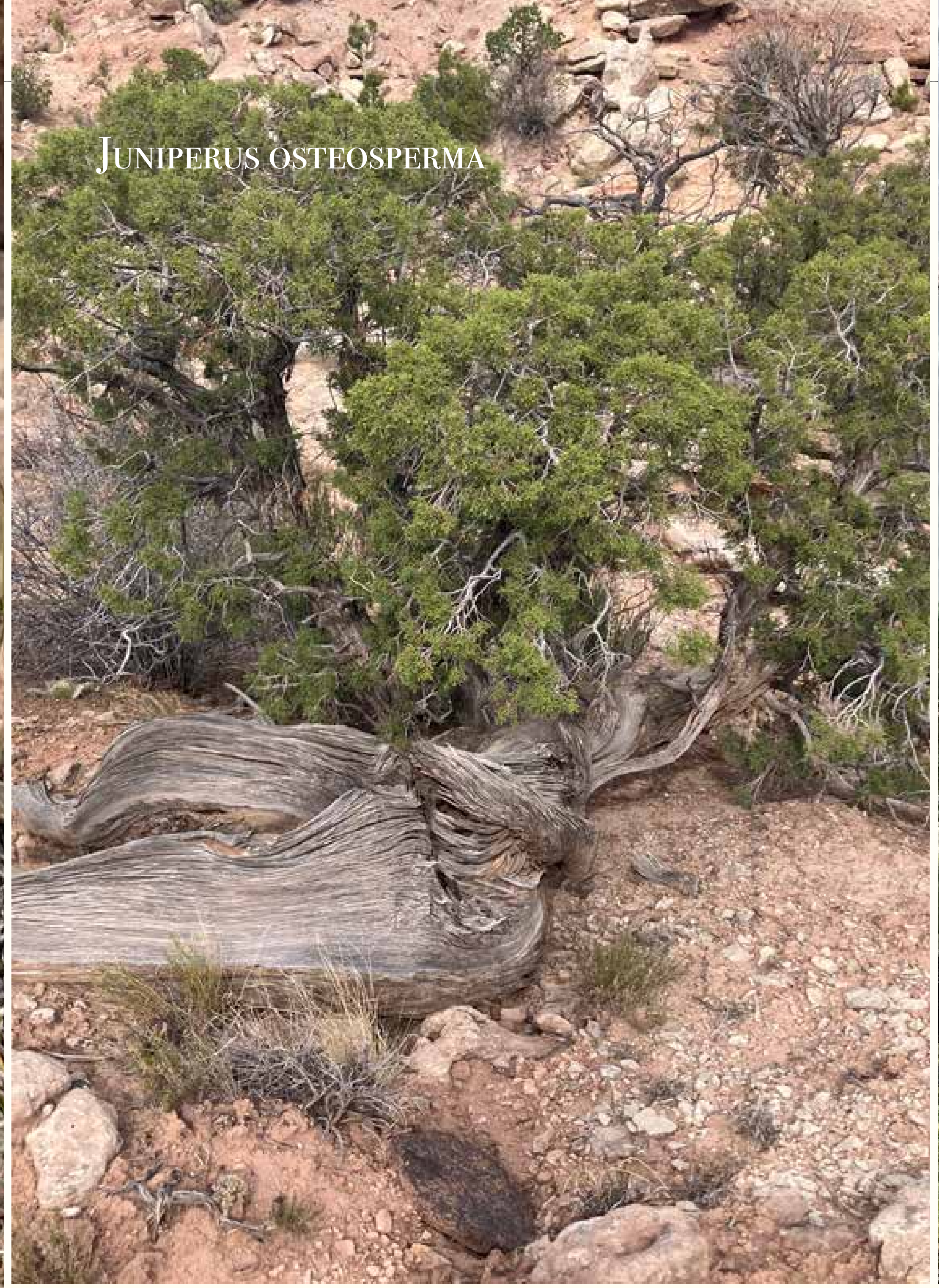
Pinyon Juniper Desert



A hitchmough style meadow made with western prarie plants by Kenton

Buffalo Gourd

Day II



Juniperus osteosperma

Kenton in his collection

I was lucky enough to spend a whole day with Kenton Seth. We started by working together on a native xeric garden which he is creating around a historic house in Fruita. We talked about how he mulched heavily to decrease water loss, using different types of mulch for different plants (gravel for xeric, woody for shrubs). We then headed to his own personal nursery, where he grows plants on for his various projects. The polytunnel is of his own design with a large fan at one end and a wall of water storage tanks. This attempts to keep the plants cool in the scorching summer, and warm in the cooler winters. Kenton regularly trials his own seed varieties and grows on particular plants which carry interesting traits. We visited some of the projects which he has undertaken as designer, grower and gardener. This includes his own home as well a number of properties in the local area. Whilst he is know internationally for his work on crevice gardens, I was so interested to hear how he had applied a granite based seed mulch as a method of creating a meadow matrix at a holiday home which we saw. He described the process of establishing a landscape like this and then managing it into more of an intentional, designed space.

We had time to head a little further towards Utah, in order to see some Piñyon Juniper desert. This unique ecosystem is typical of south west Colorado, combining Two needle Pinyon Pine (*Pinus edulis*) and Utah Juniper (*Juniperus osteosperma*) which can be thousands of years old. We sampled the local delicacy *Ephedra viridis*, or Mormon Tea, which was growing vigorously. It has a slight stimulant effect similar to caffiene when chewed. Kenton gave detailed descriptions of the plants we saw, and was on the look out for a Fabaceae plant which was endemic to the area, to collect seed. Unfortunately the summer had been too dry for them to set seed. We saw some plants still managing to flower, including a range of buckwheats and grasses.

The Journey Home

Although this is a summarised version of my trip, and there were many stops in between which I have not included, I feel that I achieved my aims. I was immersed in a wide range of landscapes and their native plants; I visited domestic and botanic gardens as well as sprawling properties and municipal landscape projects. I met a huge range of gardeners, managers, plantspeople and scientists. I saw how directly these people work with their native flora, and how this feeds so clearly into domestic and public gardening in Colorado. I learnt a great deal about plants I had only ever seen in cultivation, as well as how different people approach these plants having got to know them in the wild.

My key conclusions are:

The USA has a greater number of native plant species that the UK, because it is a larger and more diverse land mass. This makes it much easier for botanical and horticultural institutions to focus on native flora.

Focussing on native flora, gives the work of these people and gardens a much more clear link to conservation and ecology. There is a connection between the wild spaces and the cultivated plants.

America is expansive and varied, both in landscapes and people.

As is so often the case, greater funding makes the jobs of conservationists much easier. Well funded projects can be thought through clearly and actioned effectively.

I had many preconceptions about what my experience in Colorado might be like, it was however much more different to the UK than I was expecting. I was surprised at just how vast and wild a state it was, and just how close you are to relatively unspoilt nature. It has driven me to keep learning about plants, and how the movement of useful native plants from botanical institutions into the horticultural trade can improve outcomes for climate resiliant planting in public and domestic settings.