Rockin’ with Cacti and Succulents

is it a cactus and succulent garden?... Echinocereus reichenbachii
…or a rock garden? Escobaria missouriensis / Pterocactus fischeri

hallmarks of traditional rock gardens: rock alpine garden / Gentiana acaulis
- small plants with alpine origins
- primary objective – making a habitat hospitable to plants (rocks, raised beds, troughs)
- restricted to temperate climates
- color peaks in spring
- water features

myth #1 – rock gardeners grow only small alpine plants: cowboy’s delight Sphaeralcea coccinea / Maihuenia poeppigii / Hesperaloe parviflora
- true alpine succulents on Mt Evans Scenic Byway CO: Claytonia megarhiza / Rhodiola rhodantha / Rhodiola integrifolia / Sedum lanceolatum
- Sedum anacampseros var. majus / S. sediforme / S. Sunsparkler® Cherry Tart Sempervivum ‘Oddity’ (Thymus pannonicus)
- the other hens and chicks: Jovibarba heuffelii / J. hirta / Orostachys furusei / Rosularia serpentinica
- Boulder CO: Sempervivum ‘Pinecone’ / Sedum kamtschaticum
- Denver CO: Lapidaria margaritae / Ebracteola wilmaniae / marsh orchid Dactylorhiza sp.
- South African Plaza at Denver Botanic Gardens (DBG): Ruschia pulvinaris / Aloinopsis spathulata (Delosperma Fire Spinner)
- South African succulents: Aloinanthus x ‘Last Night’ (Aloinopsis x Nananthus) / Aloinopsis spathulata / A. rubriolineata / Bergeranthus jamesii (Dudleya cymosa) / Delosperma basuticum ‘White Nugget’ / Rabiea albipuncta /
- Sunscapes, Pueblo CO: Aloinanthus x ‘First Light’ / Aloinopsis ‘Orange Rush’ / Rabiea albipuncta
- the truth is – collecting tendencies drive rock gardeners
- in Colorado, rock gardens have evolved into a mix of large and small plants from diverse origins: Delosperma ‘Gold Nugget’ / Agave parryi (pasqueflower seedheads Pulsatilla vulgaris)

myth #2 – rock gardening is restricted to temperate climates: rock gardening does have its origins in damp or wet climates where the biggest concern is too much precipitation
- water restrictions have fostered a revolution for rock gardeners in the West where winters are cold and summers are hot and dry: Yucca harrimaniae (Cytisophyllum sessilifolium, four-wing saltbush Atriplex canescens, Himalayan aster Aster himalaicus, Alyssum stribryni) / Yucca pallida
- cacti native to Colorado: Echinocereus reichenbachii ‘Albispinus’ / E. x lloydii / E. x rotteri / Escobaria missouriensis / E. vivipara var. buolamia / Pediocactus simpsonii
- Cold Hardy Cactus, Kelly Grummons, Lakewood CO: Opuntia aurea ‘Coome’s Winter Glow’ / O. ‘Dark Knight’ / O. arenaria reblooming in August / O. phaeacantha ‘Paradox Form’
- cacti and succulents in unirrigated rock gardens: Delosperma ‘Lavender Ice’ (prairie phlox Phlox andicola) / Sedum obtusifolium / Opuntia aurea ‘Chiffon Pink’ (Penstemon pseudospectabilis)
- Opuntia polyacantha ‘Nebraska Orange’ / O. imbricata ‘White Towers’ / O. humifusa
- AlpenRidge, Littleton CO: Opuntia fragilis f. desnuda / Orostachys furusei / O. spinosa crested form
- Centennial CO
- rock/cacti gardens at Boyce Thompson Arboretum State Park, Superior AZ / Huntington Botanical Gardens Desert Garden, San Marino CA

**myth #3 – rock gardens always contain rocks:** Yucca harrimaniae, desert beardtongue Penstemon pseudospectabilis, sulphur-flower buckwheat Eriogonum umbellatum ‘Kannah Creek’
- cacti and succulents are frequently found in rocky environments: Hwy 34 Wheatland to Laramie WY / Pediocactus simpsonii
- growing in rocks: keeps roots cooler in summer and warmer in winter, keeps crowns dry, reduces competition: Delosperma cooperi ‘Mesa Verde’ / D. ‘White Nugget’ / Orostachys furusei / Opuntia whipplei ‘Snow Leopard’ (Tanager gazania Gazania krebsiana)
- the rock effect – increases winter hardiness: Coryphantha sulcata / Echinocereus dasyacanthus and hybrids / Mammillaria melanacantha / Agave havardiana
- rocks collect and concentrate run-off: in an arid climate a small amount of extra water can be the difference between life and death of a plant / Lewisia rediviva (Split Rock WY)

**myth #4 – raised beds are essential to rock gardens:** raised beds do increase the number of microclimates, improve drainage, increase air circulation (helps prevent rot) and accommodate more plants and stage for viewing: Lewisia cotyledon
- raised beds are essential to growing cacti in damp climates: Pediocactus nigrispinus (Ann Arbor MI) / Agave ovatifolia (Twello NL)
- Dryland Mesa – Denver Botanic Gardens: Agave huachuensis / Coryphantha orcuttii var. koenigii / Opuntia echinocarpa, Calylophus lavandulifolia / O. aurea ‘Coombe’s Winter Glow’
- going vertical (use engineered walls when the slope exceeds 30% or is over 3 ft.): Delosperma nubigenum

**myth #5 – all cacti and succulents want to bake** (intense solar radiation – UV light is 26% higher in Denver than at sea level): Sempervivum arachnoideum / Sedum sieboldii ‘Mediovariegatum’ / Chiastophyllum oppositifolium
- shade structure: Echinocereus engelmannii at Desert Botanic Garden, Phoenix AZ

**the rock gardener’s primary objective is making habitats to suit the needs of the plants:** Raoulia australis / sand bed
- small changes can have a huge impact on plant health (every nuance of exposure, every pocket of incongruous soil, every swale that holds a bit more moisture expands planting options): Manfreda maculosa
- macroclimates (4 sides by compass orientation) and microclimates (any areas that differ from prevailing conditions, i.e., wetter, drier, sunnier, shadier, less windy, soil type): within each macroclimate there are dozens of microclimates (Pawnee Buttes National Grasslands CO)
- horizontal rock gardens: Jovibarba globilifera / Lewisia cotyledon
- going below grade for extra protection from the elements: Chamaebatiaria millefolium (Craters of the Moon NP ID)
- **insider tips:** put “zone denial” selections next to a house wall (Cylindropuntia kleiniae) or cover temporarily during deep freezes
- Colorado Springs CO: mosaics of cacti and succulents
- free-standing walls and fences provide shade and windbreaks but can also impede air flow and frost drainage
- troughs – portable microclimates: Echinocereus viridiflorus / Pediocactus knowltonii / P. winkleri / Lewisia ‘Little Plum’
- expanding container options: *Cylindropuntia echinocarpa* ‘Golden Lion’ / *Orostachys chanetii*
- avant-garde containers

**myth #6 – color peaks in the spring:** DBG Rock Alpine Garden, *Escobaria vivipara*
- summer: Kendrick Lake Park, Lakewood CO - *Yucca pallida* / *Y. thompsoniana*
- autumn: DBG WaterSmart Border - *Sedum cauticola* ‘Lidakense’ / *Opuntia phaeacantha* var. major, *Sedum* ‘Purple Emperor’
- winter: *Agave chrysantha* / *Sedum spurium* ‘Tricolor’
- evergreen succulents: *Delosperma* ‘John Proffitt’ / *D. nubigenum* / *Sedum spurium* / *Rabiea albipuncta* / *Stomatium beaufortense*

**building a rock garden**
**choosing a site:** front yards / against a house wall / hillsides / odds and ends
- insider tip: don’t site rock gardens containing cacti under messy trees or where you pile snow in winter
- Centennial CO: *Echinocereus coccineus* / *E. reichenbachii*

**soils (to amend or not?):** xeric plants evolved in native soils that are high in minerals and low in organic matter: *Yucca filamentosa* ‘Bright Edge’ (*Salvia officinalis* ‘Icetrina’) / *Coryphantha vivipara*
- amend selectively to create soil microclimates – patchy environments suit larger number of plants: for rock gardens, amend only lightly to aerate compacted soils and to increase the water-holding capacity (WHC) – 2% OM = 75% increase in WHC) – common denominator soil mix for rock garden plants: 1/3 existing soil, 1/3 sharp sand, 1/3 small rock
- amending soil: changing the soil to meet the plants’ needs: *Yucca glauca*
- *Nolina texana* / *Agave parryi*, *Sedum* ‘Angelina’ / *Othonna capensis* / *Phemeranthus* (*Talinum calycinum*) / *Solidago* ‘Wichita Mountains’
- display gardens at Timberline Gardens, Arvada CO:
  - *Agave parryi* var. *neomexicana* / *Yucca pallida* / *Y. rupicola*
  - growing opuntias in junk soil: *Opuntia aurea* ‘Golden Carpet’ / *O. ‘Mandarin Sunrise’* / *O. niccolii*
- Chine Cactus and Succulent Society display garden, Grand Junction CO: *Sedum sichotense*

**rock choices:** sandstone / lava
- choose only one type of rock if design unity is your goal
- rules are meant to be broken
- rock alternatives: hypertufa / concrete culverts / broken cement sidewalks / drain pipes (all Utrecht Botanic Gardens NL)

**rock arrangement:** nature’s rock gardens: observe geology if convincingly naturalistic arrangement of rocks and plants is your objective
- naturalistic plantings in shale: creekbed / *Pediocactus simpsonii* / Front Range twinpod *Physaria bellii* / alpine bladderpod *P. reediana* in shale wall / succulents in stylized planting
- placing rocks: rock garden construction – Gardens at Spring Creek, Ft. Collins CO
- setting rocks: start at the base; large rocks first; follow strata; don’t space evenly; slope into hill; bury 2/3’s; shim as necessary
- crevice gardens: (vertical and horizontal): *Physaria bellii*, *Delosperma sphalmantoides*, *Erigeron compositus* and *Veronica saturejoides*
- Raven Ranch, Franktown CO: garden of desert pavement
  - *Talinum brevifolia* / *Yucca angustifolia* / *Agave toumeyana* var. *bella*, *A. nana* / *Grusonia clavata* / *Castilleja integra*
- Rock Alpine Garden at DBG: *Escobaria sneeditii* var. *leei* / *Echinocereus viridiflorus* / *Talinum* ‘Zoe’
- APEX Crevice Garden, Arvada CO: *Agave lechugilla* / *A. toumeyana* spp. *bella* / *Escobaria leei*
- urbanite crevice and rock gardens – Juniper Level Botanic Garden and Nursery, Raleigh NC: 
  *Manfreda undulata* ‘Mint Chocolate Chip’ / *Mangave* ‘Man of Steel’
- paths: access for maintenance & to view the garden
- stairs
- water features: desert seep / bubbling rock 

**mulch:** reduces evaporation and erosion, keeps crowns dry, finished look: decomposed granite

*Pediocactus simpsonii* / seashells *Opuntia humifusa* / marbles *Rosularia chrysantha*
- organic mulches – use for plants from meadows, tall grass prairie, forest edge, woodland habitats, 
  irrigated gardens: yellow fairy wings *Epimedium versicolor* ‘Sulphureum’
- rock mulches – use for plants from dry, arid regions; shortgrass prairie; alpines; xeric gardens: 
  saltbush *Atriplex canescens*

**insider tip:** collect mulch at the same time as collecting rocks

- dark colors collect heat: *Cleistocactus icosaginus* Lotusland, Montecito CA
- **insider tip:** use the same mulch in paths and beds

**plant selection (where the fun begins)**
- gneiss crevice garden by Kenton Seth
- essential to match cultural conditions: sunlight, soil (fertility, drainage), water needs
- determining a plant’s needs is not always intuitive: *Lewisia cotyledon* subalpine / *L. nevadensis* moist 
  mountain meadows / *L. tweedyi* north-facing cliffs / *L. pygmaea* moist alpine / *L. rediviva* dry 
  shrublands
- plant placement
- art in the rock garden: *Delosperma dyeri*
- *Agave parryi* spp. *neomexicana*

**for more information about rock gardening, go to:** www.rmcnargs.org and www.rockstarplants.com

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