From Bill Gray, a plant lover and photographer (and retired physician) in Salt Lake City.

The last (I regret) of what has been a free, weekly offering for the past year.

We'll ***Splurge on Spurge***, nod to past climate changes – and end with a plea to ***Purge your Spurge***.

One of the most extraordinary groups of plants is the genus *Euphorbia*, in temperate climates commonly known as 'spurge'. In these emails we have encountered several euphorbias of greatly varying form already. With almost 2000 species it is in the top 5 for diversity.

Remember what unites them all: the unique flower and fruit structures, plus extensive DNA analysis – despite vast differences in overall form.

So alike : *Euphorbia* flowers and fruits

... **but so different:** the same whole plants.

a

A prostrate ground-cover, Thyme-leaf Spurge, *Euphorbia (Chamaesyce) serpyllifolia*.
Harney Co., Oregon.

b

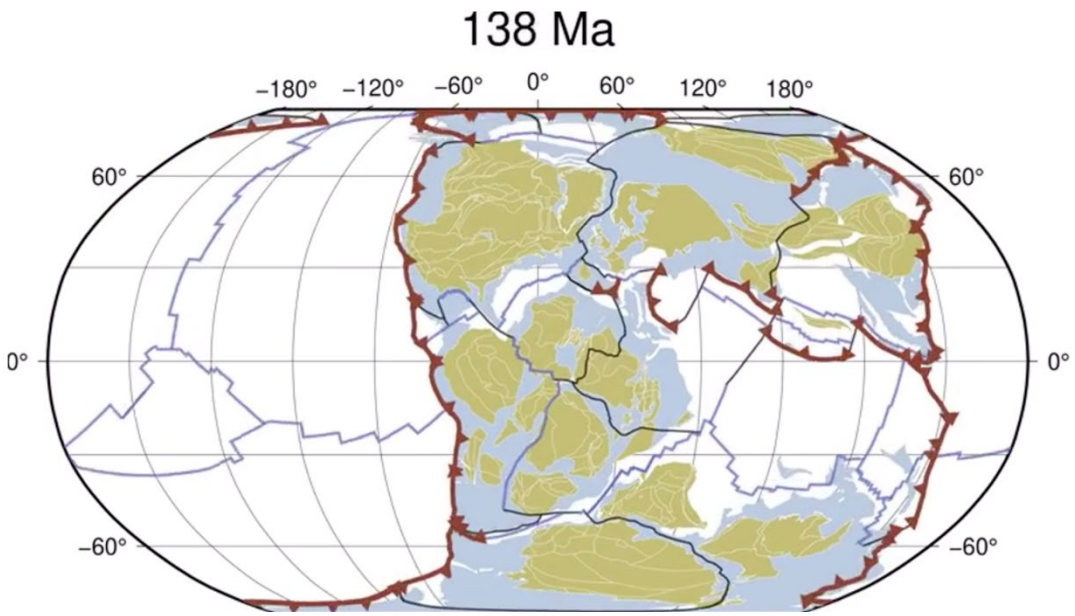
A leafy forb, Snow-on-the-Mountain, *Euphorbia marginata.* Kearney Co., Kansas.
c
A thorny tree, Silver Thicket *Euphorbia stenoclada*. Madagascar.

Bright coloration of the insects is indicative that they are likely poisonous due to feeding on the toxic plants.

Ancestors of these plants have been around for a very long time, as have those of many others, including cacti. Over those many millions of years plates of the Earth's crust have wandered all over the globe. It's easy to grasp that in their wanderings any passengers would have experienced drastically different climates and had to adapt or perish. But it goes far beyond that: as the plates aligned into supercontinents or broke apart and dispersed they changed the very nature of climate by completely transforming the circulation of both ocean and atmosphere. A recent study integrated an enormous amount of information into a time-lapse movie of those wanderings over the past billion years (one frame per million years):

https://www.nytimes.com/2021/02/06/science/tectonic-plates-continental-drift.html

It's absolutely hypnotic, but too large to include directly in this email. This is how things stood around the time flowering plants were starting to evolve in the southernmost parts.



As they entered extreme desert climates the challenges included:
1 absorbing and storing precious water,
2 defending that precious store,
3 protecting oneself from the intense sun.
It's not surprising that some of the solutions are similar, but amazing how closely the resulting forms may resemble each other in what is termed 'convergent evolution'. Cacti in the Americas and euphorbias in Africa provide one of the most spectacular examples.

Solutions
1 shallow, widespread roots, able to quickly absorb surface water
thick pleated stems that can expand and store water,
2 thick cylindrical or globular stems reduce surface area
waxy coating prevents evaporation
minimize leaves and do photosynthesis on the stems
spiny surface and/or toxic juice to minimize herbivory
3 spines also shade the stem

<u>Leafless cylinders:</u> Left, *Euphorbia mauretanica,* South Africa; right, Diamond Cholla Cactus *Cylindropuntia ramosissima,* Phoenix, Arizona,


<u>Mounded cylinders:</u> Left, Starry-spined Euphorbia *Euphorbia stellaespina*, South Africa; right,

Mohave Claret-cup Cactus *Echinocereus mohavensis*, Stansbury Island, Tooele Co.

Treelike, pleated stems: Left, Candelabra *Euphorbia ingens (?)*, South Africa; right, Giant Sequoia Cactus *Carnegiea gigantea*, Tucson, Arizona.

Globular, expandable: Left, Baseball Plant *Euphorbia obesa*, cultivated; right, Despain's Pincushion Cactus *Pediocactus despainii*, Emery Co.

Both are in full flower! I think the cactus wins even though its body is just dime-sized. As Spring turns to Summer the cactus can shrink so much that it may become completely submerged in a sandy habitat.

The euphorbias have a much wider range of body form than do the cacti, and that has made them vulnerable to overexploitation in the horticultural trade. Along with a lot of cacti many are protected under international law.

Not all euphorbias are well-behaved, though, including some that have been used as garden plants. In the past couple of decades Myrtle Spurge has become a major invasive pest along the Wasatch Front, and it is now classed as a noxious weed in Utah. Conservation groups including Utah Native Plant Society have partnered with Salt Lake County Weed Control to have annual "**Purge Your Spurge**" weekends in which people are encouraged to dig up the pest and exchange it for native plants. Interestingly, the name 'spurge' comes from a medicinal use of some species which are strong purgatives.

Unwanted, Dead or Alive: Myrtle Spurge *Euphorbia myrsinites*. Salt Lake City foothills. Escaped and rapidly expanded. This plant, like many other euphorbias has a very toxic milky sap. It flowers early - it's already beginning - and produces copious seeds which are shotgunned out as the fruiting capsules dry. Seeds are also spread by birds.