JULIA ETTER & MARTIN KRISTEN

Exploring in the Quebrada del Rio Piaxtla

We have spent over 15 years searching for Crassulaceae and Agavaceae in Mexico, most recently in the "Triangulo Dorado" (the Golden Triangle), an area where the Mexican states of Chihuahua, Durango, and Sinaloa meet. Although we have visited many different parts of this large region in the Sierra Madre Occidental, we had never reached Tayoltita, a bustling mining town with narrow streets near the border between Durango and Sinaloa (Fig. 1). Tayoltita lies at an altitude of 540 m, between mountain ranges 2000–3000 m high in the deeply carved-out valley of the Rio Piaxtla, the water level of which can surge as much as 10 meters during the rainy season. In a day's journey, Tayoltita can be reached all year from Durango on some rather difficult dirt roads in your own car or by public transportation. Only during a very short period of time towards the end of the dry season in the month of May — when the Rio Piaxtla's water-level is very low — can the little town also be reached from San Ignacio on the Pacific side of the mountains.

Botanically speaking, it was always thought that this area would prove to be a real treasure trove, since only a few researchers had dared to venture into this remote location. The Triangulo Dorado is the so-called "Narcoparaiso", the drug paradise. Venturing into these remote valleys and mountains, where marijuana and poppies are grown, is reputed to be dangerous. Other opportunities to make money, such as robbing travelers of their money and cars, are also said to be carried out by local gangs. Over our years of back-country exploration in northern Mexico, we have heard these stories (for example: "It's safe here, but the next village is really dangerous"). Fortunately we have never felt threatened during our travels, probably because of the low-key vehicle we now use and our friendly involvement with local people. Perhaps unwisely, we chose to ignore the warnings and explored this area, also called the "Quebrada del Piaxtla", although with fascinating results.

There are very few botanical explorations recorded from this region, one of them being the collections by R. Spencer received by the University of California Botanical Garden (Berkeley) and later also cultivated at the Huntington Botanical Gardens. Only a few Crassulaceae are know; in 1997, *Echeveria pringlei* var. *parva* was described by Kimnach from near Tayoltita (Durango, on northwestern slopes under shrubs along trail from Cinco Señores to Socayón (sic - the

1. View down to Tayoltita from above Cinco Señores.

2. Topographic map of the area around Tayoltita.

correct spelling is Socavón, meaning gallery or tunnel), San Dimas, 1350 m, R. Spencer s.n., Huntington Botanical Gardens 18306 (HNT, holotype); near Tayoltita, R. Spencer s.n., Huntington Botanical Gardens 19469 (HNT, paratype) (Kimnach 1998). We have found several locations of this attractive shrubby species with very small, almost glabrous and green leaves with red edges. The highest one is located near Las Cebollas at 2420 m, more than 1000 m higher than the type, in oak and pine forests growing with *Agave inaequidens* ssp. *barrancensis* and one single clone of *Graptopetalum amethystinum*, another Crassulaceae in the general area. The other localities were all between 2000-2200 m altitude where the plants prefer rocky places. *Echeveria affinis*, with dark green to almost black leaves and spectacular bright red flowers, is found in the higher altitudes of Durango and *E. dactylifera* populates the slopes on the western side of the Sierra Madre. The latter is a very ornamental species reaching a diameter of up to 50 cm with red-edged, green to sometimes deep purple leaves and tall inflorescences with pink flowers. Of course there are also several rather inconspicuous *Sedum* species known from the area. What was of real interest was the region to the west of Tayoltita on the Pacific side of the mountains, where no Crassulaceae had been found before.

In May of 2009 we made our first trip through these remote mountains and valleys, traveling west of Tayoltita towards San Ignacio. As mentioned above, this road is only passable during the dry season because the Rio Piaxtla must be forded some 90 times (Fig. 2). About 10 km west of Tayoltita we found the almost completely dried-up rosettes of a very small species of *Sedum*, growing on shady rocks and cliffs (Fig. 3). Other succulents were *Agave vilmoriniana*, *Pachycereus pecten-aboriginum*, *Pilosocereus alensis*, a *Hechtia* species, several different *Tillandsias*,

3. Shrivelled rosettes of *Sedum kristenii* during the dry season.

4. *Echinocereus* sp. aff. *koehresianus* flowering in May on the bans of the Rio Piaxtla.

5. Pinkish-colored *Echeveria juliana*. growing well-protected between Hechtias and *Agave* sp. aff. *filifera*.

a *Peperomia* and *Echinocereus* aff. *koehresianus*. We first thought it might be *Sedum copalense*, described from Copala near the Mazatlan–Durango highway. Here it was very shriveled up because of the dry season, but even with good soil and watering in the greenhouse the rosettes did not become much larger and never larger than *S. copalense*. In May of 2010 and again in June of 2012 we found *Sedum copalense*, a species producing annual vegetative shoots from last year's stems with panicles of white flowers, at 2240 m, 1600 m higher than the type locality, far above Tayoltita. The plants populated a vertical rock face covered with moss and ferns in an oak forest and even in the dry and hot month of May the rosettes looked pretty good and had nothing in common with the plants from west of Tayoltita. In February of 2010, after the plants flowered in the glasshouse, it was clear that they were not *S. copalense*. Subsequently, at the Botanical Garden of the Instituto de Biología at UNAM (Universidad Nacional Autónoma de México), it was confirmed that it was indeed a new species of *Sedum* which was recently described as *Sedum kristenii* (Reyes Santiago et al. 2012).

We continued to about 30 km west of Tayoltita, where a spot of red on a vertical cliff attracted our attention. With binoculars, we saw that it was *Echinocereus* aff. *koehresianus* in flower (Fig. 4). When we then climbed up the cliff we were astonished to also find a beautiful pinkish-leaved *Echeveria* species growing in tropical deciduous forest with *Bursera* spp., *Plumeria rubra*, *Pseudobombax* sp., and succulents such as *Agave vilmoriniana*, *A.* aff. *filifera* (probably another new species), *Pilosocereus alensis*, *Pachycereus pecten-aboriginum*, and *Hechtia* sp (Fig. 5). We knew of no

6. *Agave* sp. aff. *filifera* growing in shady cliff below a Rock Fig tree.

echeveria of this size and shape in the general area, and at 350 meters it is rare to find any at all, since in general they prefer altitudes of 1500 m or higher. The plants were studied at UNAM, where it was determined that they were of a new echeveria which subsequently was described as *Echeveria juliana* (Reyes Santiago et al. 2012).

In June of 2012, on our last trip to the Quebradas, which literally translated means "the broken ones", for the sheer cliffs and deep canyons carved into the landscape millions of years ago by the rivers Piaxtla and Presidio and many smaller ones, we explored some more around Tayoltita, again with interesting

7. Pubescent rosettes of an unknown *Sedum* species related to *S. hintonii* and *S. mocinianum*.

finds. On our earlier trips we had already noticed an *Agave* species belonging into section *Filiferae*. Only *Agave colimana*, *A. microceps* and *A. ornithobroma* from this section are found at such low altitudes. *A. colimana* is native to the Pacific coast of Colima and Jalisco, and one of the differences to the plants around Tayoltita is that it has many more and much wider and flatter leaves. *A. microceps* occurs south of Culiacán and near Cosalá in the state of Sinaloa. Unlike the Rio Piaxtla plants, its rosettes only grow to about 30 cm wide and the plants are very caespitose. *A. ornithobroma* was described from near Escuinapa, Sinaloa. It differs from the Tayoltita plants in being a caespitose, few-leaved species with almost round leaves. The Tayoltita *Agave* species grows at low altitudes along the Rio Piaxtla in tropical deciduous forest, preferably in rocky places and on cliffs. It is a solitary, medium-sized rosette with narrow, flat, and densely filiferous leaves (Fig. 6). So far flowers have only been observed in cultivation and no seed has been found. There is more work to be done before any conclusions about this species can be taken, especially since the *Agave filifera* group is a very complex one.

On a day of relaxing from the previous strenuous days on some of the worst and least-traveled roads in the area, we had decided on a short trip to Guarisamey, the oldest mining village in the area, to see if we could find another locality for the new *Echeveria* and *Sedum* species. To get there we had to climb from 550 m altitude up to 1050 m and then down to the river again, all in tight switchbacks in only 10 kilometers. This, as most of the other roads in the area, is nothing for the faint of heart or people with fear of heights. The centuries-old church walls in Guarisamey are slowly crumbling away with the rain. In May and June the local people sell 'pitaya', the delicious fruit of *Stenocereus queretaroensis*. Others have fruit orchards, work in mining or try to sell antique stone mortars, pestles and hammers. Upriver we found the same interesting agave again, growing in a forest of *Plumeria* and *Bursera* species, *Pereskiopsis* sp., *Pachycereus pecten-aboriginum*, *Pilosocereus alensis*, *Echinocereus* aff. *koehresianus* and *E. subinermis*, a *Hylocereus* sp., *Hechtia*, a straight-spined *Mammillaria*, and orchids clinging to shady cliffs. Another interesting find was a species of *Sedum* clearly related to *S. mocinianum* and *S. hintonii* (Fig. 7). It formed large cushions of rosettes with densely pubescent leaves. We saw only dried-up, very short inflorescences which would place the species closer to *S. mocinianum* than to *S. hintonii*. We did a lot of searching but were unable to find one single plant of the new *Echeveria*, or the *Sedum* species, although it was the same river and the valley looked more or less the same with many of the same trees and succulents and was only 300 m higher than the type localities for these plants. The interesting agave and sedum are now also being studied at the Botanical Garden of the Instituto de Biología at UNAM.

We're quite certain that there are more undescribed species to be found in these remote mountains and valleys. One of the main problems is the difficult access to many of the places ideal for Crassulaceae — along rivers and creeks — because many of the roads are transitable only during a very short period of the dry season (Fig. 8). As with every trip we have taken into a general area to explore new terrain, we come home with a longer list of places to be checked out next time.

8. Our low-key vehicle ,well marked with UNAM stickers, fording the Rio Piaxtla near Tayoltita.

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