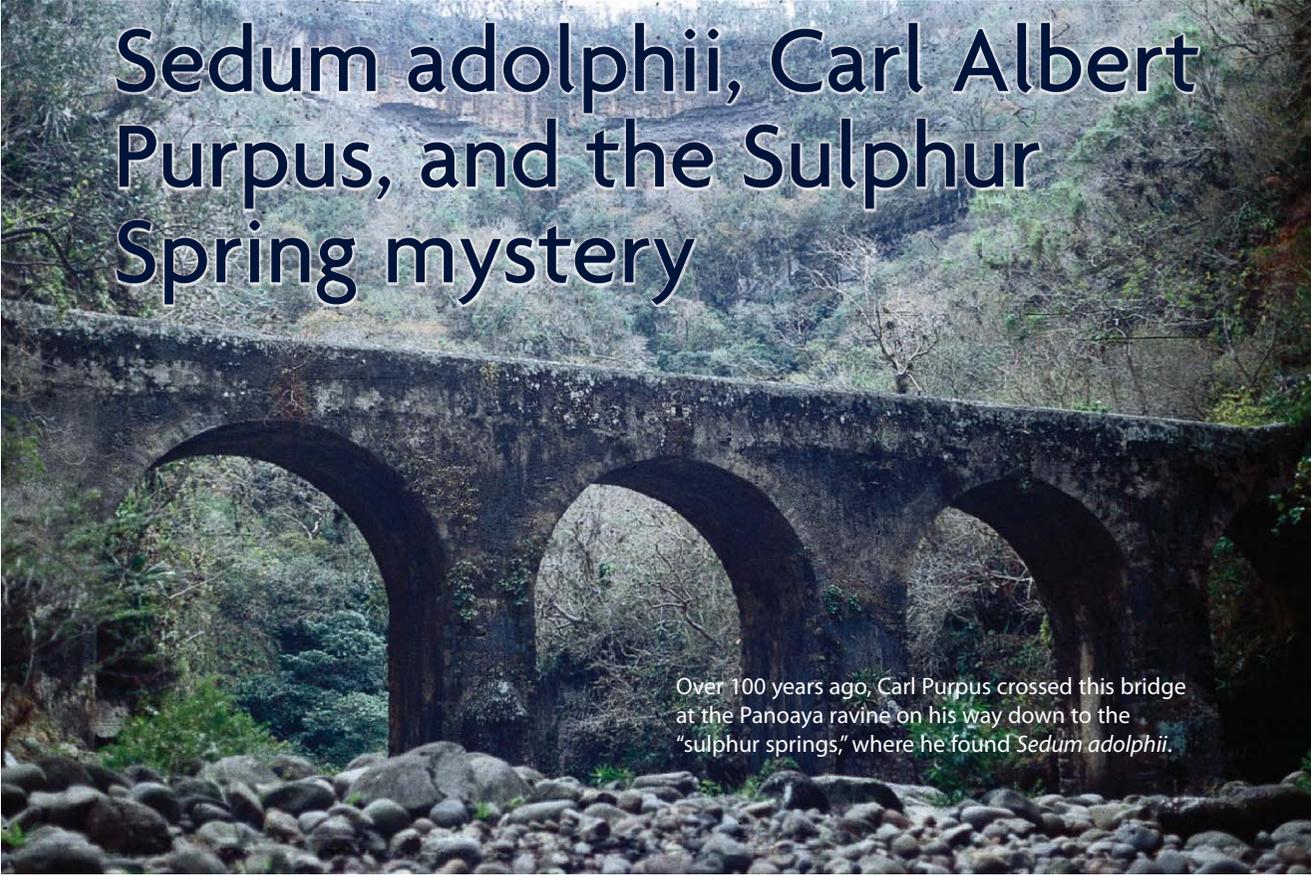


Sedum adolphii, Carl Albert Purpus, and the Sulphur Spring mystery



Over 100 years ago, Carl Purpus crossed this bridge at the Panoaya ravine on his way down to the “sulphur springs,” where he found *Sedum adolphii*.

For over one hundred years *Sedum adolphii* has been widely cultivated as an ornamental, yet its wild origins escaped detection for decades following its description, which gave a long-forgotten place name as the type locality.

Sedum adolphii is endemic to the ravines and lava flows of the central part of Veracruz state, in eastern Mexico, where it grows either hanging from rocky cliffs or upright on lava flow. It is abundant in tropical deciduous forest from 400–850 meters above sea level and flowers from March to May. But because its habitat is known to very few people, information about its wild origins is scanty.

Carl (Karl) Albert Purpus (1851–1941), a German botanist, was born in Hanesleshof bei Bürrstadt. He was trained as a physician, but his interest in botany led him to North America in 1887 as field assistant to his brother Joseph Anton (1860–1932), who was engaged in a dendrological (tree) study of the

northwestern United States and southwestern Canada. A year later, when Joseph went back to Europe, Carl remained behind. Joseph went on to procure a gardening job in St Petersburg, Russia, where he stayed from 1882 to 1888. He later moved to Darmstadt, Germany.

Carl spent the years from 1887 to 1904 in the western US and northwestern Mexico, including the Baja California peninsula and the state of Sonora. His first trip to Mexico, in 1897, was to accompany Townsend S and Katherine Brandegee from the Botany Department of the University of California, Berkeley. Together they explored the Baja California peninsula in search of cacti and other succulent plants. In 1900 he returned to collect plants near Guaymas, Sonora, and again in the Baja California peninsula. In 1902 he explored Mazatlan, Sinaloa, and central parts of Mexico, and climbed the Iztacihuatl volcano up to the timberline.

In 1904, after a trip again to the Iztacihuatl and Popocatepetl volcanos in the valley of Mexico, he continued on to central Veracruz, exploring Xalapa, Huatusco, and Hacienda Zacuapan. The

► The rocky volcanic cliffs at Panoaya ravine are home to *Sedum adolphii*.



following year Carl decided to emigrate from the USA to Mexico and chose to settle permanently at the Hacienda Zacuapan (now called El Mirador) near Huatusco, a settlement in Veracruz, a southeastern state of Mexico. Zacuapan was a property owned by the descendants of a German, Carl Sartorius (1796–1872), who bought it in 1832. Carl lived in Zacuapan the rest of his life and is in fact buried there. In 1907 he was nominated collector of the University of California, Berkeley, Herbarium, and, collaborating with the Brandegees, Zacuapan was to be his headquarters for thoroughly exploring the central parts of Veracruz, with departures to the states of Puebla, Hidalgo, San Luis Potosi, Oaxaca, and Chiapas².

The quantity, quality, and importance of his botanical work place Carl Purpus in the first

rank of collectors of Mexican plants. More than 17,000 of his collection numbers were distributed by the Brandegees to the main herbaria of the USA, Canada, Mexico, and Europe, and from his *exsiccata* (dried specimens), taxonomists have described some 485 species, many of them named *purpusii* or *purpusorum* for Carl and his brother. Among succulents we have *Agave purpusorum*, *Echeveria purpusorum*, *Hylocereus purpusii*,

▼ *Sedum adolphii* localities within the state of Veracruz, Mexico.



KNOWN LOCALITIES OF *SEDUM ADOLPHII*

Besides the type locality, now we know of seven others habitats of *Sedum adolphii*, all in central Veracruz:

1. 2.8 km SE of Cerro Gordo, along the road from Xalapa to Veracruz, on a rocky cliff. 14 June 1987. CH Uhl and Felipe Otero. No herbarium specimen was made (Uhl, pers comm, 1990).
2. Barranca of Tenampa, discovered by Felipe Otero and CH Uhl⁹.
3. Barranca of Santa Maria Tatetla along the road from Mata de Jobo to Santa Maria Tatetla. 400 m. 28 May 1983 (in flower). L Robles & M Cházaro 211 (XAL).
4. Barranca of Pachuquilla. 450 m. 14 April 1990 (in flower), M Cházaro & C Viveros 6204 (XAL and WIS).
5. Panoaya ravine, 2 km NE of El Coyol. 500 m. April 1992. M Cházaro & R Acevedo sight record, not in bloom.
6. Lava flow of Almolonga. 800 m. 31 March 1994 (in flower). M Cházaro & Patricia Hernández de Cházaro 7288 (XAL and WIS).
7. Trail from Jalcomulco to Buenavista. 600 m. 2 April 1994 (in flower). M Cházaro & Dario Hernández 7293 (XAL, WIS, IEB).

Pilosocereus purpusii, *Rhipsalis purpusii*, and *Sedum purpusii*. TS Brandegee wrote a series of articles under the title “Plantae Mexicanae Purpusianae” in which he described many novelties. The holotypes of plants described from his collections are deposited at University of California, Berkeley Herbarium (UC). Carl’s living plant collections

▼ A long, pendent plant of *Sedum adolphii* grows on a cliff with *Hechtia lindmanoides*, *Mammillaria sartorii*, and *Agave lophantha* at Pachuquilla ravine.



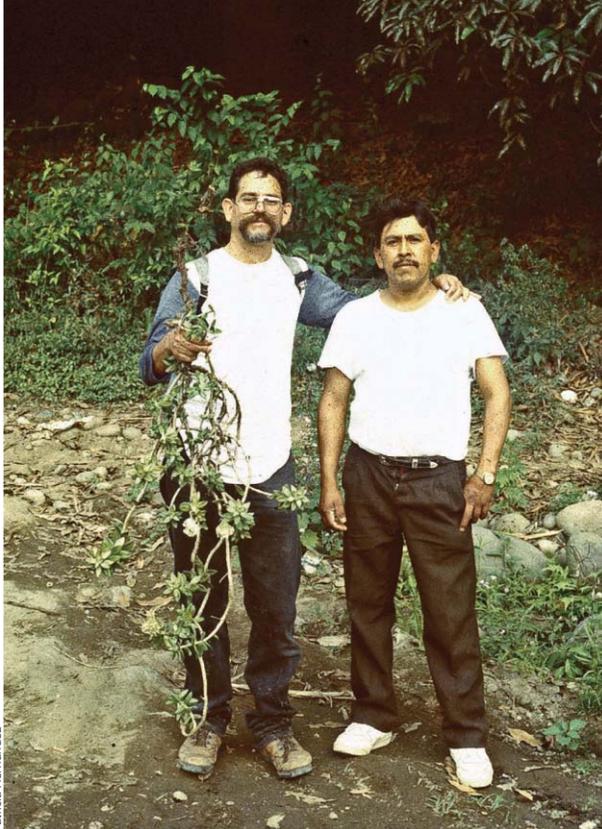
formed part of the collection of the Darmstadt University botanical garden in Germany.

The deep ravines of Veracruz

Central Veracruz has a rough topography. From sea level along the Gulf of Mexico, the terrain rises over a short distance to 5700 m at the volcanic Pico (Peak) de Orizaba and 4240 m at the Cofre de Perote volcano. As a result of its diverse topography, climate, geology, and soil, this region harbors a diverse flora, with vegetation types following altitudinal belts. From the lowlands to the highlands we find sand dune vegetation, mangrove swamps, tropical deciduous forest, tropical subdeciduous forest, tropical savanna, oak forest, montane rain or cloud forests, pine-oak forest, fir forest, *Pinus hartwegii* high-altitude forest, and, above 4000 meters, alpine tundra on the windward side of the mountains, pinyon pine–juniper forest leeward, along with xerophytic scrub and halophytic (salt-loving) grassland. At least 8000 vascular plants call this state home³.

The numerous rivers and rivulets arising from these two volcanoes, through eons of erosion, have carved deep ravines (*barrancas* in Spanish) that were favorite places for Carl Purpus’s botanical work. No wonder he found so many interesting plants and new taxa!

In 1907, while exploring the Panoaya ravine, Carl found a stonecrop on a rocky cliff at the sulphur springs. Since the plant was not described by Brandegee, we deduce it was not in flower at the time of Carl’s visit. But he must



▲ **LEFT** Miguel Cházaro (left) and his late dear friend Dario Hernandez, just coming back to Jalcomulco, Veracruz, after a long, exhausting (and successful!) walk in the mountains in search of *Sedum adolphii*. **RIGHT** Carl A Purpus, discoverer of *Sedum adolphii*, in the Tehuacan desert of Puebla, Mexico around 1903.



have sent seeds to his brother, who was the superintendent of the Darmstadt Botanical Garden in Germany, and Joseph appears to have distributed seeds to other German botanical gardens. A plant grown from seed flowered at Berlin-Dahlem Botanical Garden and Museum, probably in 1911, and became the type material used by Raymond Hamet, who described the stonecrop as *Sedum adolphii* after Adolf Engler, then director of that institution⁷. In 1922 a stonecrop grown from seeds sent by Carl in 1907 flowered at Bremen Botanical Garden, and George Bitter described it as *Sedum nussbaumerianum* to honor Ernst Nussbaumer, gardener of the succulent section at Bremen.

Naturally these two names have been a source of debate for decades⁹. Some authors favor lumping them together, whereas other prefers to maintain the species as separate. Although Clausen thought *S. adolphii* and *S. nussbaumerianum* to be similar, possibly the same species, he treated them as separate species in his book based on small differences in the inflorescences. However the facts indicate that *S. nussbaumerianum* should be regarded as a synonym of *S. adolphii*. The two plants have the same chromosome count ($x = 64$), they came from plants grown from the same source (seeds

gathered by Carl Purpus in 1907), and both have corymbiform inflorescences. With priority of 12 years, *S. adolphii* is the valid name.

Mystery of the sulphur springs

Two of your authors are native to central Veracruz (Cházaro from Xalapa; Viveros from Carrizal), so we are well acquainted with a great part of geography of this area. Still, like others before us, we couldn't make sense of Purpus's description of the *Sedum adolphii* locality, which he described in 1918 as Baños del azufre, at the Panoalla ravine where the sulphur springs are. We simply could not find this spot, confusion compounded by erroneous information provided in Bitter's 1924 species description⁸: sulphur spring, Barranca of Zacuapan, Veracruz, Mexico. Clausen, author of *Sedum of the trans-Mexican volcanic belt*⁴ had searched for it in the 1950s and failed:

In 1955 I made two trips into the District of Axocuapan (Zacuapan) and explored the deep ravine there but without finding Sedum nussbaumerianum. The area is vast. One might spend many weeks exploring it thoroughly. Nor did I see S. nussbaumerianum in cultivation in México.

Indeed, there are dozens of deep ravines in



Patricia Hernandez

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◀ **LEFT** The first time we ran across *Sedum adolphii* (14 April 1990), it was by mere accident. We were just trying to get out of the Pachuquilla ravine. **RIGHT TOP** Its flowers appear in succession such that some flowers are at anthesis (fully open) while others are already fading. What might the pollinators be? **RIGHT BOTTOM** A single flower of shows the stamens ready to release their pollen.

Zacuapan. Nowadays Los Baños is easily approached by vehicle from the village of Dos Caminos on the south side of the ravine or from Palmillas to the north. The ravine near Zacuapan (elevation 1200 m) is a cool, humid, oak (*Quercus oleoides*) forest. *S. adolphii* thrives

central Veracruz, and up to 1990 the ravine of Zacuapan was considered the type and only locality where *S. nussbaumerianum* occurred^{5,6}.

On 26 Dec 1989, Miguel Chazaro and Cesar Viveros, along with Mark Leach from the University of Wisconsin, Madison, found *S. adolphii* at the Pachuquilla ravine by mere accident¹. This jump-started a more-earnest search for the mysterious “sulphur spring.” Unfazed by our first few failures, finally on 6 May 1991, while walking upstream in a ravine parallel to the Pachuquilla, we ran across an old man that knew of a hot spring and guided us to it. Upon arrival we realized that Purpus’s data was misleading. No wonder Clausen couldn’t find it; it’s a long way down from Zacuapan to the sulphur spring. And rather than being a sulphur spring, it is rather a thermal pond along the large Panoaya ravine. These days the spring Purpus referred to is known as “Los Baños” (the baths) by the local people.

We imagine that Carl must have traveled by horse, spending one day on the way down and one day coming back to

in hotter, drier places amongst tropical deciduous forest. The sulphur springs lie at 450 m.

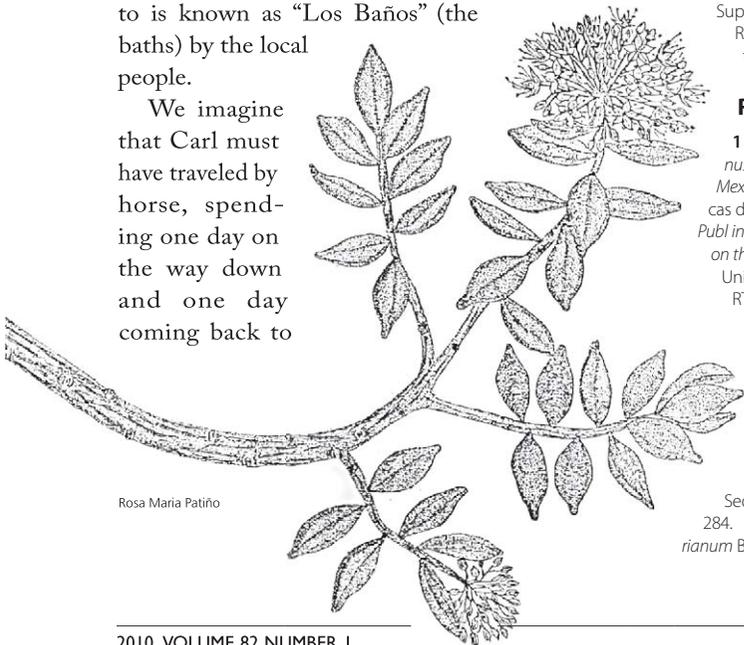
It is clear that this species is difficult to spot; Maria Elena Medina, a botanist from the Ecology Institute in Xalapa, Veracruz, for instance, spent 14 months collecting at the Acazonica-Palmillas ravine and never saw nor collected it. Since there are numerous unexplored stretches of the ravines in the central part of Veracruz, *S. adolphii* probably occurs more frequently than indicated by herbarium sheets. Nevertheless, at present this taxon is considered rare and ought to be protected by the federal government. But due to the fact that it only occurs at a few remote sites, this taxon has never been considered in the conservation-status list of Mexican plants. 🌵

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