

SEDUM PIAXTLAENSE (CRASSULACEAE), A NEW SPECIES FROM DURANGO, MÉXICO

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Abstract: *Sedum piaxtlaense* is described as a new species based on a collection in the Rio Piaxtla Canyon, growing in tropical deciduous forest in the Sierra Madre Occidental near the border of the Mexican states of Durango and Sinaloa. This new species belongs into the section *Sedastrum* (Rose) A. Berger whose distinctive morphological characteristics are basal rosettes, generally pubescent leaves, concave carpel base, usually paniculate inflorescences, and white corollas, the only exceptions being *Sedum glabrum* and *S. jarocho* which do not show any pubescence in their floral structures. *S. piaxtlaense* is apparently closely related to *S. hintonii* and *S. mocinianum* from which it differs in the laxer rosettes, concave leaves of larger diameter, as well as a shorter inflorescence with up to eight flowers per cincinnus and large pedicels, and its distribution in another biogeographical province.

Resumen: Se describe como nueva especie a *Sedum piaxtlaense* descubierta cerca del Río Piaxtla en un bosque tropical caducifolio en la Sierra Madre Occidental, municipio de San Dimas, Durango, cerca de la frontera de los dos estados mexicanos de Durango y Sinaloa. Este nuevo taxón se le ubica en la sección *Sedastrum* (Rose) A. Berger cuyas características morfológicas son rosetas basales, base de los carpelos cóncavo y hojas, inflorescencias y sépalos pubescentes generalmente, excepto *Sedum glabrum* y *S. jarocho* que no presentan pubescencia en todas sus estructuras, y todas las conocidas tienen inflorescencia en panícula con flores blancas. *S. piaxtlaense* se le relaciona de manera provisional con *S. hintonii* y *S. mocinianum*, de los que difiere por sus rosetas más laxas, hojas cóncavas y de mayor diámetro, inflorescencia más corta de hasta ocho flores por cincino y pedicelos largos, así como su distribución en otra provincia biogeográfica.

Fieldwork in Durango near the border with Sinaloa and studies of morphological characteristics of some Mexican Crassulaceae have revealed the following novelty:

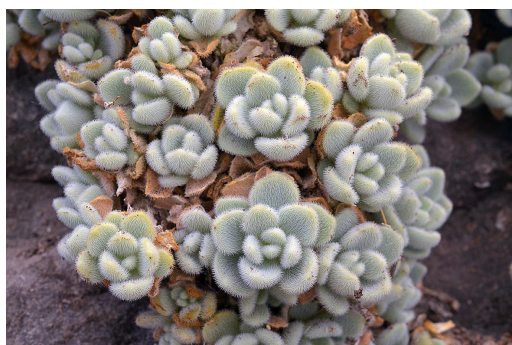
Sedum piaxtlaense Reyes, Etter & Kristen sp. nov., Figs. 1-5, 7.

Sedo hintonii et *Sedo mociniano* affine sed ab quibus differt foliis ample rhombeis, latioribus et magis concavis, inflorescentiis paniculis compactis minoribus, cincinnis usque ad 8 floribus, pedicellis, sepalis et petalis longioribus.

Perennial herb, caespitose. **Root** fibrous. **Stems** 1-3 cm high, 4-5 mm thick, light green, pilose. **Rosettes** 3-4 cm in diameter. **Leaves** oblanceolate to rhomboid, 1.7-2.2 cm long, 1.1-1.7 cm wide, concave, truncate at base, apex obtuse, densely pilose, light grayish green. **Floral stems** 1 per rosette, 7-10 cm long including inflorescence, (bract) leaves ovate, 1-2 cm long, 0.8-1 cm wide. **Inflorescence** paniculate, cincinni 2-3, each with 5-8 flowers. Pedicels 1-3.5 mm long, 1-1.5 mm thick. Calyx rotate. **Sepals** 5, basally free, ascending and appressed, elliptic, 4-4.5 mm long, 1.5-2 mm wide, densely pilose, light green. **Petals** 5, basally free, 8.5-9.5 mm long, 1.5-2 mm wide, lanceolate, white, retrorse, apiculate. **Androecium:** filaments white, antisepalous stamens 3.5-4 mm long including thecae; epipetalous stamens 5.5-6 mm long, filaments white, thecae reddish to brownish-gray. **Gynoecium** up to 5-6 mm long including style, white, papillose, stigma whitish. **Nectaries** ovoid, slightly yellowish.

Type: Mexico, Durango, municipality of San Dimas, along the Río Piaxtla between Guarisamey and Las Huertas, 625 m, June 12th, 2012. *Julia Etter & Martin Kristen 3606* (Holotype: MEXU).

Paratype: Mexico, Durango, municipality of San Dimas, 1 km S of Mala Noche, 950 m, March 8th, 1990. *M. González, A. García & A. Lux 2403* (CIIDIR-Durango 7-74).



Figures 1-3. *Sedum piactlaense* in habitat. Photos by J. Etter & M. Kristen.

Phenology: This species flowers from February to April in a greenhouse. According to the herbarium sheet of *M. González, A. García & A. Lux 2403* (CI-IDIR-Durango) of flowering plants collected in the field in early March, the species seems to flower at the same time of the year in the field as in the greenhouse.

Distribution and habitat: *Sedum piactlaense* grows in tropical deciduous forest on cliffs along the Rio Piaxtla with *Plumeria rubra* L., *Pereskiaopsis* Britton & Rose spp., *Pachycereus pecten-aboriginum* (Engelmann) Britton & Rose, *Pilosocereus alensis* (F.A.C. Weber ex Roland-Gosselin) Byles & G.D. Rowley, *Hylocereus purpusii* (Weing.) Britton & Rose, *Hechtia* sp., *Mammillaria chaletii* Plein, *Echinocereus ortegae* Rose ex J.G. Ortega, *E. subinermis* ssp. *ochoterenae* (J.G. Ortega) N.P. Taylor, *Bursera* Jacq. Ex. L. spp., and orchids. The population from which the paratype came, south of Mala Noche, was incorrectly identified as *Sedum lumboltzii* by S. González.



Figure 4. Detail of densely pilose leaves of *Sedum piactlaense*. Photo by J. Etter & M. Kristen.

S. lumboltzii belongs to section *Americana* because of its flat leaves and especially its well-defined rosettes in relation to the floral stems, and for not being pu-

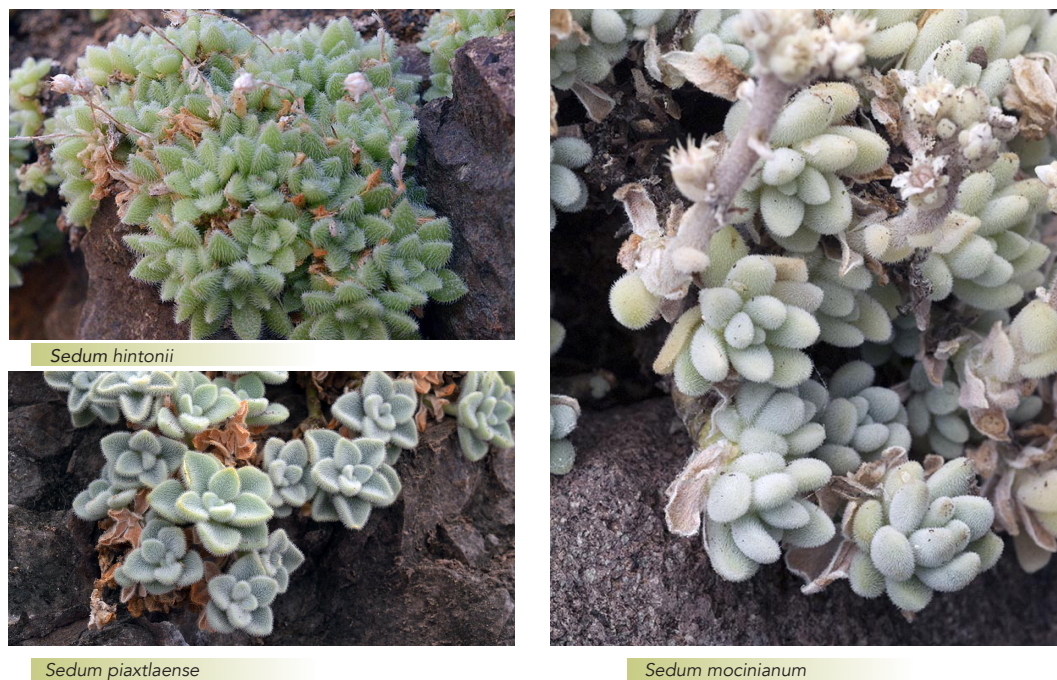


Figure 5. Comparison of *Sedum hintonii*, *S. piaxtlaense*, and *S. mocinianum* in habitat. Photos by J. Etter & M. Kristen.

bescent. This population is located approximately 30 kms SSE of the type locality as the crow flies. The plants near Mala Noche grow at a slightly higher altitude than those along the Río Piaxtla, but also in tropical deciduous forest in a canyon, presumably the Río Presidio or one of its small tributaries.

Etymology: The specific epithet makes reference to the Piaxtla River where the new species was found.

DISCUSSION

During an exploration in June 2012 of the Río Piaxtla canyon in the municipality of San Dimas, Durango, looking for more localities of the recently described *Echeveria juliana* Reyes, González-Zorzano & Kristen and *Sedum kristenii* Reyes, González-Zorzano & Etter, a species of *Sedum* was found and tentatively identified as *Sedum* aff. *mocinianum* (Etter & Kristen, 2013). The plant was cultivated at the Botanical Garden, Instituto de Biología, Universidad Nacional Autónoma de México. When compared with *S. mocinianum* Pérez-Calix and *S. hintonii* Clausen, we found this new collection along the Río Piaxtla differed in various morphological characteristics.

Sedum piaxtlaense belongs to the section *Sedastrum* (Berger, 1930) which consists of eight species, including the new one described herein, their main morphological features being basal and almost acaulescent rosettes, generally with pubescent leaves and a concave carpel base. These characteristics justified the description of the genus *Sedastrum* (Rose, 1905). In 1930 Alwin Berger reduced the genus *Sedastrum* to a section of the genus *Sedum* arguing that the veg-

etative differences were not sufficient evidence for a separation (Clausen, 1940). In a cytological study of four species of the section *Sedastrum* it was concluded that the basic chromosome number is $n=20$ and that it morphologically makes up a natural group (Uhl, 1992), however it was found that *S. ebracteatum* Moc. & Sessé ex DC. and *S. hemsleyanum* Rose are polyploids with gametophytic chromosome numbers above $n=140$. It is even suspected that these two are in fact just one species with a great variation throughout its wide geographical distribution from northern Mexico to Oaxaca and into Central America. A phylogenetic analysis of the *Acre* clade – where *Sedum hemsleyanum*, *S. chazaroi* Carrillo-Reyes & Lomeli-Sención and *S. hintonii* belong – shows strong support for monophyly of section *Sedastrum* (Carrillo-Reyes et al., 2009).

Section *Sedastrum* can now be tentatively divided into two groups: *Sedum hintonii*, *S. mocinianum*, *S. chazaroi*, and *S. piaxtlaense* in one group, and *S. ebracteatum*, *S. hemsleyanum*, *S. glabrum* (Rose) Praeger, *S. roberti* Veldk., and *S. jarocho* Carrillo & Jimeno-Sevilla in the second group. The members of the first group are more ornamental: in general their rosettes don't die back while flowering, their leaves are thicker, and, above all, their whitish pubescence stands out. They are restricted to the western central part of Mexico, while the latter group has an ample distribution in Mexico particularly towards the south. It is possible that the "*hintonii*" group is polyploid. The "*hintonii*" group has undescribed relatives that are very caespitose plants with green leaves in Jalisco and Zacatecas that still have to be studied. In particular, *S. aff. mocinianum* of the Río Los Colo-



Sedum hintonii basal leaves of the floral stem



Sedum hintonii inflorescence



Sedum hintonii in a green house



Sedum hintonii floral stem

Figure 6. *Sedum hintonii* in cultivation. Photos by J. Reyes.



Figure 7. *Sedum piaxtlaense*. Flowering plant in cultivation. Photo by J. Etter & M. Kristen.

mos, municipality Huejuquilla el Alto, Jalisco and two populations in Zacatecas, one along the Río Atengo near San Juan Capistrano and the other near Pico del Aguila, are in need of study.

In the original description of *Sedum mocinianum*, Pérez-Calix (1998) mentioned the erroneous identification of specimens from the Río Las Ventanas Canyon identified as *S. hintonii* by Robert Clausen, stating that these might be *S. mocinianum*. Plants seen by Ray Stephenson shown in a photograph in figure 86 of his book “*Sedum: Cultivated Stonecrops*” (Stephenson 1994), which are of cultivated origin without certain locality data but thought to have been collected near Canoas, Durango also appear to be very similar to *S. mocinianum*. For comparison, illustrations of *S. hintonii*, *S. piaxtlaense* and *S. mocinianum* are shown growing in habitat (Fig. 5), as well as illustrations of *S. hintonii* from near the type locality in Michoacán (Fig. 6). Further cytological and phylogenetic studies will allow botanists to better circumscribe those species. Here we want to provide additional data for differentiation of the section *Sedastrum* of the genus *Sedum*. The species of this section exude aromas of aged cheese or valerian (known in Mexico as ‘hierba del gato’, a cat attractant) when flowering. This is otherwise unknown in species of the genus *Sedum* of the Americas. Finally, *S. piaxtlaense* is a species restricted to the biogeographical province of the Pacific coast nestled in the Sierra

Madre Occidental. The wide leaves, short inflorescence, as well as the large pedicels distinguish it from its putative closest relatives, as is shown in table 1.

ACKNOWLEDGMENTS

The authors thank Myron Kimnach and Pablo Carrillo Reyes for their valuable comments and suggestions greatly improving the manuscript. We also thank Omar González Zorzano for the Latin diagnosis. Our appreciation also goes to Enriqueta Molina of SINAREFI/SAGARPA for his support of the project “Red de *Echeveria*” in agreement with the Instituto de Biología de la Universidad Nacional Autónoma de México, and to SEMARNAT for the official federal collecting permit SEMARNAT SGPA/DGVS/0076/12.

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| | | <i>Sedum piactlaense</i> | <i>Sedum hintonii</i> | <i>Sedum mocinianum</i> |
|--|-----------------------|---|--|---|
| Stem (cm) | | robust, very short 1-3 | robust, very short 0.5 (plants almost acaulescent) | robust and pendant up to 80 or robust and very short (and in this case plants almost acaulescent) |
| Rosette Ø (cm) | | lax 3-4 | lax 3-10 | dense 1.5-5 |
| Basal leaves | Shape | amply rhomboid | oblong to elliptical | elliptical to oblong-elliptical |
| | Length (cm) | 1.7-2.2 | 1.5-5 | 0.8-2.5 |
| | Width (cm) | 1.1-1.7 | 0.3-1.0 | 0.6-1.1 |
| | Color | light grayish green | light green | grayish green |
| Flowering stem (including inflorescence) | Length (cm) | 7-10 | up to 24 | 2.0-3.5 |
| | Inflorescence type | compact panicle | open panicle | thyrses |
| | Shape of bract leaves | ovate | oblanceolate | elliptical to oblong-elliptical |
| Pedicels length (mm) | | 1-3.5 | 0.8-1.4 to absent | absent to almost absent |
| Sepals | Shape | elliptical, ascending and adpressed | elliptical to ovate | oblong |
| | Length (mm) | 4-4.5 | 2-2.5 | 2.5-3 |
| Petals | Shape | lanceolate | ovate-triangular | oblong-lanceolate |
| | Length (mm) | 8.5-9.5 | 4-5 | 5 |
| | Width (mm) | 1.5-2 | 2.7 | 3 |
| | Color | white | white | white |
| Nectary | | ovoid, slightly yellowish | oblong, yellowish | narrowly oblong to ovoid, yellow |
| Type locality | | Río Piaxtla, NE of Tayoltita, San Dimas, Durango | Pinzán, Coalcoman de Vázquez Pallares, Michoacán | San Luis de Los Agustinos, Acámbaro, Guanajuato |
| Altitude above sea level | | 625-950 m | 830 m | 2400 m |
| Geographical distribution and biogeographical provinces in México | | Durango Pacific coast set deep in the Sierra Madre Occidental | Michoacán Pacific coast set deep in the Sierra Madre del Sur | Guanajuato Sierra Los Agustinos set in the Mexican High Plateau |

Table 1. Comparisons of *Sedum piactlaense* and its putative closest relatives, *S. hintonii* and *S. mocinianum*.