ECHEVERIA NEBULARUM(CRASSULACEAE), A NEW CLOUD-FOREST SPECIES FROM MEXICO

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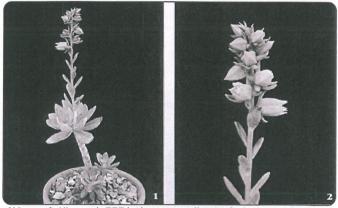
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Abstract: Echeveria nebularum *Moran & Kimnach* is described as a new species of series Nudae, differing from E. gracilis and E. montana—the species most closely resembling it—in its epiphytic habit, glaucous-green leaves and 26 pairs of chromosomes. It was first found by *Castillo, Iltis & Cortes* in Veracruz, Mexico, in 1951, but has since been found more commonly in Oaxaca.

Key words: Ecbeveria nebularum sp. nov., new species, Crassulaceae, Mexico, Veracruz, Oaxaca

Introduction

In November 1959, we crossed the 10,000-foot Sierra Juarez from the mile-high city of Oaxaca to the steaming lowland town of Tuxtepec. North of Ixtepec de Juarez, birthplace of Mexican patriot and president *Benito Juarez*, the road follows the cloud-forested west slope of the Sierra not far below the summit. There we stopped at an interesting roadside colony of Ecbeveria montana *Rose* and Sedum dendroideum ssp. parvifolium *R. T. Clausen*, with an undercover of Sedum cupressoides *Hemsl. Myron* found a single seedling plant of another echeveria which we took to be E. rosea *Lindl.*, a rather widespread but scattered species of wet upland forests from the state of Oaxaca to the state of San Luis Potosi. We had collected E. rosea earlier that day some 30 miles to the south at nearly the same elevation, epiphytic on an oak, with scattered seedlings on the ground beneath. The single seedling found by *Myron* was quite similar in shape and coloring of the leaves to those seedlings of E. rosea.



Figures 1, 2. Echeveria nebularum (Moran & Kimnach 777/, the type collection), June 1, 1961.



Figure 3. Echeveria nebularum (Kimnach et al. 3217), epiphytic, above San Gabriel Etla, Oaxaca, Jan. 14, 1993.

Observations

In cultivation this plant continued to bear a general resemblance to E. rosea, but when it flowered in May of 1961 (Figs. 1, 2) it proved to be entirely different, bearing a lax raceme of orange-red flowers, with spreading sepals, angular corollas, and thick petals with well-developed nectar pits. Nevertheless, it did have at least one floral character strongly reminiscent of E. rosea, namely the relatively small number of elongate ovules, about twice as long as is usual in Echeveria.

It occurred to us that this plant might be a hybrid of E. rosea—which occurs at least in the same general area—with some other species such as E. montana, with which it grew. The apparent rarity of the plant first suggested this idea. However, the plant was not intermediate between E. rosea and E. montana, as might be expected in a hybrid, but rather had some characters of one and some of the other and was somewhat intermediate in some respects and somewhat different from both in other respects. However, the appearance of hybrids is not always predictable, especially that of second-generation hybrids. Therefore it was most interesting to hear a report from Dr. Charles Uhl after he had studied the cytogenetics—he found regular meiosis and a chromosome number having no obvious relation to those of the other two species. Thus the cytogenetic data give no suggestion that this plant was a hybrid, and we therefore treat it here as a new species.

Delays caused by many factors have postponed its publication for some 45 years since we first saw it in 1959. Its affinities, for example, were not easy to determine, and the type herbarium specimen was lost (or misplaced) for some years. During this time, we became gradually aware of other collections, not only in Oaxaca but also in Veracruz. *Myron* found two at MEXU and four at the herbarium in Jalapa (XAL), all cited below. One of them (*Castillo*, *Iltis & Cortes* s.n., collected in 1951) is the earliest collection yet known. In mid-

January 1993, while botanizing with *Miguel Chazaro* and *Martin Negrete* of the University of Guadalajara, *Myron* found another collection in the city of Oaxaca at the herbarium of the Instituto Politecnico Nacional (OAX). It had been collected above San Gabriel Etla, northwest of the city of Oaxaca. The specimen label described the plant as epiphytic, and the dried remains in every way resembled the mysterious species.

On January 19, 1993, they (along with *Rudi Dorsch*, who had joined them) drove to San Gabriel Etla in an attempt to recollect the plant. The little town (one of several in the area with a name ending in "Etla") was reached by turning off the Pan American Highway at the crossroads to San Pedro y San Pablo, but proceeding northeasterly along a dirt road toward the mountains. Crassulaceae seen along the way were Sedum dendroideum, S. oaxacanum *Rose*, Echeveria pinetorum *Rose*, E. gibbiflora *D. C.*, E. megacalyx *E. Walther* and Villadia guatemalensis *Rose*. The road was seldom travelled; only one lumber truck was encountered on the way to the 2950 m summit.

At an altitude of 2865 m, as dusk fell and the night fogs began to form, our odometer registered the kilometers recorded on the OAX herbarium specimen. We spied a tufted succulent with brownish flower-clusters high in a pine tree near the road. The plant was identified later as the little-known Sedum guatemalense, typically found in high cloud forests in southern Mexico and Guatemala. (The succulent misidentified in the early 1930s as this species is now known as S. rubrotinctum *R. T. Clausen*, not known in the wild and possibly a spontaneous hybrid between S. stahlii *Solms* and S. pachyphyllum *Rose*). Growing with the sedum on the trunk of the same tree—rooted only in moss and pine needles—was a large mass of the new echeveria (Fig. 3). Evidence of heavy logging was apparent in this area. Several weeks later the same group (minus *Rudi Dorsch*, who had returned home) found the echeveria again where the trees had recently been mostly eradicated, leaving a few terrestrial plants of Sedum guatemalense exposed to the sun.

Description

Echeveria nebularum Moran & Kimnach sp. nov.

Planta glabra fruticosa, caulibus ca. 15-20 cm altis 6-10 mm crassis. Folia ad apicem caulis rosulata, rosulis 6-10 cm latis, foliis oblanceolato-ellipticis obtusis subapiculatis glaucis 2.5-5 cm longis 12-18 mm latis 3-3-5 mm crassis. Inflorescentia racemosa equilateralis 3-12 cm longa, pedicellis 3-8 mm longis, sepalis expansis deltoideo-lanceolatis 5-13 mm longis, corolla 12-15 mm longa extus aurantiaco-rubra intus lutea.

Type locality: Mexico, Oaxaca, Ixtlan, Sierra de Juarez, along Highway 175, 12.5 miles N of Ixtlan de Juarez (near 17°30'N, 96°28'W), ca. 2750 m, Nov. 24, 1959.

Holotype: Moran & Kimnach 7771 (SD).

Paratypes: Veracruz: slopes of Cofre de Perote, 1700 m, epiphytic, flowers reddish-orange, 1951, G. Castillo. H. Iltis & G. Cortes s.n. (XAL); Mun. Calcahualco, San Miguel Tlacotiopa on road to Nueva Vaqueria in the barranca of Cuapa, 2600 m, epiphytic, J. Martinez & F. Vasquez 5241 (XAL); 35 km by road N of Vaqueria, epiphytic, flowers orange, 1981, M. Nee 2315S (XAL). Oaxaca: Sierra de Juarez: Municipio San Pablo Macuiltianguis, 2550 m, May 21, 1980, G. Castillo 1028 (MEXU, XAL): Llano de las Flores, 2800 m, Aug. 5, 1981, R. Cedillo 948, D. Lorence & A. Garcia (MEXU); above San Gabriel Etla, ca. 17°15'N, 96°38'W, 2865 m, epiphytic with Sedum guatemalense, Jan. 14, 1993, M. Kimnach 3217, M. Cházaro, R. Dorsch & M. Negrete (HNT, MEXU); along Highway 175, on road bank at km 125, ca. 2 km before turnoff to San Juan Lovina, 2745 m, Feb. 8, 1993, M. Kimnach 3347, M. Cházaro & M. Negrete (HNT) (Figs. 4, 5).

Etymology: nebularum = of the clouds, in reference to the cloud-forest habitat of this species.



Figures 4, 5. Plant and inflorescence of *Kimnach* et al. 3.147, a paratype collection. Photos: Figs. 1,2 by *Reid Moran*; Figs. 3-5 by *Myron Kimnach*.

Plant glabrous. **Stems** erect, branching from near the base, to 2 dm or more tall, 6-10 mm thick, elongating ca. 4-6 cm per year, smooth and terete, pale green and somewhat glaucous between the leaf bases, becoming tan and later somewhat silvery, the leaf base sites rounded-elliptical, 3-4 mm high, 5-6 mm wide, the attachment scars tan, elliptical, 1.5-2 mm wide, 0.5-1.5 mm high, each with a single bundle scar, often with aerial roots. **Rosettes** 6-10 cm wide, of 20-25 leaves in 3 and 5 para-stichies, the younger leaves crowded, the older leaves often separated by about their own thickness. Rosette **leaves** elliptical-oblanceo-late, obtuse and subapiculate, glaucous, often somewhat reddish towards the margins, 2.5-5 cm long, 12-18 mm wide, 3-3-5 mm thick, flattish or slightly concave ventrally, convex and faintly keeled dorsally, the margins rather obtuse, the base subterete, ca. 4 mm thick. **Floral stems** erect, 1.5-3 dm tall including the raceme, 3.5-4.5 mm thick at the base, with 13-20 ascending leaves rather evenly distributed from the base to the inflorescence, the stem leaves, bracts, pedicels and calyx glaucous and ± tinged with purplish-red. Stem leaves elliptical, acute to obtuse and subapiculate, scarcely spurred, decreasing upward, 12-27 mm long, 5-9 mm wide, 2-3 mm thick, flattish

ventnilly, convex dorsally. Inflorescence an equilateral raceme whose flowers tend to turn to one side, 3-12 cm long, with 9-20 flowers, which open at intervals of ca. 2 days. Bracts similar to the stem leaves, but smaller and more spreading. Pedicels 3-8 mm long, horizontal becoming ascending, 1-1.5 mm thick at the base, somewhat thickened upward, the bracte-olcs linear to oblanceolate, acute, 3-10 mm long, 0.5-2 mm wide, the two often unequal. Flowers in May and June, open about 5 (4-6) days. Calyx disc 4-5 mm wide, the segments spreading nearly at right angles or somewhat upcurved, unequal, triangular-lanceolate, narrowly acute or subacuminate, faintly grooved across the base, the smallest 5-9 mm long, ca. 2 mm wide, the largest 7-13 mm long, 2.25-3 mm wide. Corolla in bud pentagonal-ovoid, sharply acute, in flower 12-15 mm long, 7-8 mm wide below, 5-7 mm wide at the apex, orange-red but more yellow at the edges, yellow within, the sides shallowly concave, closing on withering. Petals non-convolute, connate ca. 3 mm, ellipticaloblong, acute and apiculate, 4.5-5 mm wide, dorsally subacutely keeled with the flanks slightly concave, the keel ending in a conic subdorsal apicula ca. 0.6-0.8 mm long, ventrally rather deeply channeled in the upper half, the nectar pit ca. 2.5-3 mm long, 2 mm wide, and 1-1.5 mm deep, sloping gently upward. Filaments yellowish white, subulate, ca. 0.6 mm wide, extending ca. 8 mm above the corolla base, the epipetalous inserted at the upper slope of the nectar pit and ca. 4.5 mm long, the antesepalous adnate at base for ca. 2-3 mm and ca. 0.8 mm thick, thus projecting to form a partition between nectar chambers, the free part ca. 5 mm long; anthers light yellow, oblong-ellipsoidal, ca. 2 mm long and 1 mm wide, dehiscing the first day the flower is open. Nectary scales white, 0.6-0.8 mm high, 2-2.3 mm wide, thin at the base, 0.5-0.8 mm thick above, the secretory face crescentic, perpendicular to the floral axis or facing somewhat outward. **Gynoecium** 6.5-7 mm high, 4.5-5 mm thick, the pistils erect, appressed, the ovaries yellowish white, ca. 4 mm high, rounded dorsally, connate ca. 2.5-3 mm, narrowing rather abruptly into the conic styles, ca. 3 mm long, 0.7 mm thick at the base, and dark red in color. Ovules 60-100, clavate, 0.9-1.1 mm long, ca. 0.3 mm thick. Gynoecium in young fruit 8 mm long, 6 mm thick, greenish, the adjacent styles ca. 2.5 mm apart. Chromosomes: n = 26.

Table 1. Comparison of Echeveria nebularum with suspected related species

	E. montana	E. gracilis	E. nebularum
Stems	To 50 cm long or more	Usually less than 20 cm long	To 25-50 cm long
Leaves	Widely aboutte, to 76 mm long and 40 mm wide, green, not glaucous	Widely obscute, 20-30 mm long, 12-17 mm wide, green, not glaucous	Elliptical-oblanceolate 25-50 mm long, 8-15 a wide, glaucous
Inflorescence	Howers spaced ca. 10 mm again	Flowers spaced 12-15 mm apart	Flowers spaced 12-15 mm apart
Pedicels	Less than 4 mm long	5~10 mm long	5-10 mm long
Sepals	To 6 mm wide	cu. 2 mm wide	ca. 2 mm wide
Corolia	10-15 mm long	ca. 10 mm long	ea. 10 mm long
Chromosomes	n = 22	H = 24	n = 26

Distribution: Mexico: Veracruz and Oaxaca.

Discussion

Echeveria nebularum is a member of series Nudae (*Walther*, 1972) as circumscribed by *Moran* (1977). All of these species are shrubby, with an unbranched racemose inflorescence and with flowers usually well-separated on the rachis.

Echeveria montana (Moran, 1965) and E. gracilis are the species in the series that most closely resemble E. nebularum (Table 1).

Echeveria nebularum thrives best in a cool damp environment; it has not done well outdoors in pots in the hot, dry summer climate of southern California. Under such conditions, it, along with another high-altitude denizen of cloud forests, E. rosea, does best in a humid air-cooled greenhouse. Outdoor cultivation would be most successful at, or very near, the California coast.

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