




## A NEW SPECIES OF *NAMA* (NAMACEAE) FROM THE VIZCAINO DESERT, MEXICO UNA NUEVA ESPECIE DE *NAMA* (NAMACEAE) DEL DESIERTO DE VIZCAÍNO, MÉXICO

 JOSÉ LUIS LEÓN DE LA LUZ<sup>1\*</sup>,  JON P. REBMAN<sup>2</sup>,  ALFONSO MEDEL NARVÁEZ<sup>1</sup>

<sup>1</sup> Centro de Investigaciones Biológicas del Noroeste, SC, La Paz, Baja California Sur, Mexico.

<sup>2</sup> Botany Department, San Diego Natural History Museum, San Diego, CA, USA.

\*Author for correspondence: [jleon04@cibnor.mx](mailto:jleon04@cibnor.mx)

### Abstract

**Background:** Although most of the *Nama* taxa grow on sandy substrates, none of them is restricted to the coastal dune environment. A small population of a unique looking taxon was found on the Pacific coast of the Baja California peninsula, which is here presented as a new species.

**Question and/or Hypothesis:** In the morphological analysis in the individuals of a putative new taxon, some peculiarities stand out, such as a suffruticose herbaceous perennial growth form with erect and compact branching, featuring a small cushion, unlike the rest of the known species, which are rather procumbent, or erect in form. It also has revolute leaf margins in the blade.

**Studied Species:** *Nama asuncionensis* sp. nov. (Namaceae) and morphologically similar species.

**Study Site:** Central Pacific coast of Baja California, Mexico.

**Method:** Through bibliographic consultation, review of herbarium specimens, and photographs, a comparative morphological analysis was carried out with other *Nama* species of the peninsula and mainland Mexico.

**Results:** Based on the comparative analyses, *Nama asuncionensis* is here presented and illustrated as a new species.

**Conclusions:** *Nama asuncionensis* is a micro-endemic species restricted to the Pacific coastal environment of the peninsula. We propose that this new taxon be included in the *Eunama* section of the genus based on its morphological characteristics, including a membranous loculicidal dehiscent capsule, free styles, and sepals divided to the base. This taxon seems to be limited to a narrow coastal strip, with high relative humidity, where it develops its fresh leaves and flowers during the mild season.

**Keywords:** Baja California Sur, Biosphere reserve, Boraginaceae, Hydrophyllaceae, micro-endemism, Pulvinate.

### Resumen

**Antecedentes:** Aunque la mayoría de los taxones de *Nama* habitan en sustratos arenosos, ninguno de ellos parece ser exclusivo del ambiente de dunas costeras. Se encontró una pequeña población de un taxón de aspecto único en la costa del Pacífico peninsular, que aquí se presenta como una nueva especie.

**Pregunta y/o Hipótesis:** En el análisis morfológico de los individuos de un supuesto nuevo taxón, se distinguen algunas particularidades, tales como una forma sufrutescente de herbácea perenne con ramas erectas y compactas, semejando una pequeña almohadilla, a diferencia del resto de especies conocidas, que son más bien formas procumbentes o erectas. Tiene además hojas revolutas.

**Especie de Estudio:** *Nama asuncionensis* sp. nov. (Namaceae) y especies morfológicamente similares.

**Sitio de Estudio:** Costa Pacífica Central de la Península de Baja California, México.

**Método:** A través de bibliografía, revisión de ejemplares de herbario y fotografías, se realizó un análisis morfológico comparativo con otros taxones reconocidos que habitan en la Península de Baja California y México continental.

**Resultados:** Basándose en los análisis comparativos, *Nama asuncionensis* se presenta e ilustra aquí como una nueva especie.

**Conclusiones:** *Nama asuncionensis* es una especie microendémica restringida al entorno costero del Pacífico peninsular. Proponemos que este nuevo taxón se incluya en la sección *Eunama* del género basándonos en sus características morfológicas, que incluyen una cápsula loculicida membranosa dehiscente, estilos libres y sépalos divididos hasta la base. Este taxón parece estar limitado a una estrecha franja costera, con alta humedad relativa, donde desarrolla sus hojas y flores durante la estación benigna.

**Palabras clave:** Baja California Sur, Boraginaceae, Hydrophyllaceae, microendemismo, Pulvinada, Reserva de la Biosfera

late 2018, the authors participated in a project entitled “Study to determine the distribution of the populations of micro-endemic plant species of the Vizcaino Desert Biosphere Reserve, Baja California Sur” (León-de la Luz *et al.* 2022). One of the several tasks of this project was to find and document a plant taxon of which there were certain doubts about its identity, and of which, few specimens were known, one was collected in 1998 by J. Rebman *JPR 5618* (SD142941; barcode SD 00025277), who at that time determined it as *Nama* aff. *hispida* A. Gray, a widely distributed taxon in the southwestern USA and, northern and central Mexico.

During fieldwork when the project in the Vizcaino Desert was in progress, no plants with the same characteristics as *Rebman 5618* were found in the region. But in December 2021, a population of five individuals was found in full bloom in a coastal location near the locality of the historic specimen; the plants also had both fruits and seeds.

After a comparative review with individuals of the different recognized varieties of *Nama hispida* A. Gray, specifically with *N. hispida* var. *sonorae* C.L. Hitchc., collected once in the coastal environment of the Baja California peninsula, but at a locality approximately 600 km to the south, and *N. hispida* A. Gray var. *spathulata* (Torr.) C.L. Hitchc. and *N. hispida* A. Gray var. *revoluta* Jeps. from southern California and the northern edge of the Baja California peninsula, which have spatulate and revolute margin leaves, as well with *N. origanifolia* Kunth from mainland Mexico, which has a similar growth habit as perennial with dense growth form, the authors concluded that the population of plants in the Vizcaino area should be considered as a new taxon.

This new species exhibits a combination of morphological traits that help to differentiate it from other peninsular taxa in the same genus, standing out the perennial habit on marine dunes, the tiny stalked glandular trichomes of the leaf indumentum, and its pulvinate growth form as autapomorphic characters. This is here described and illustrated in detail.

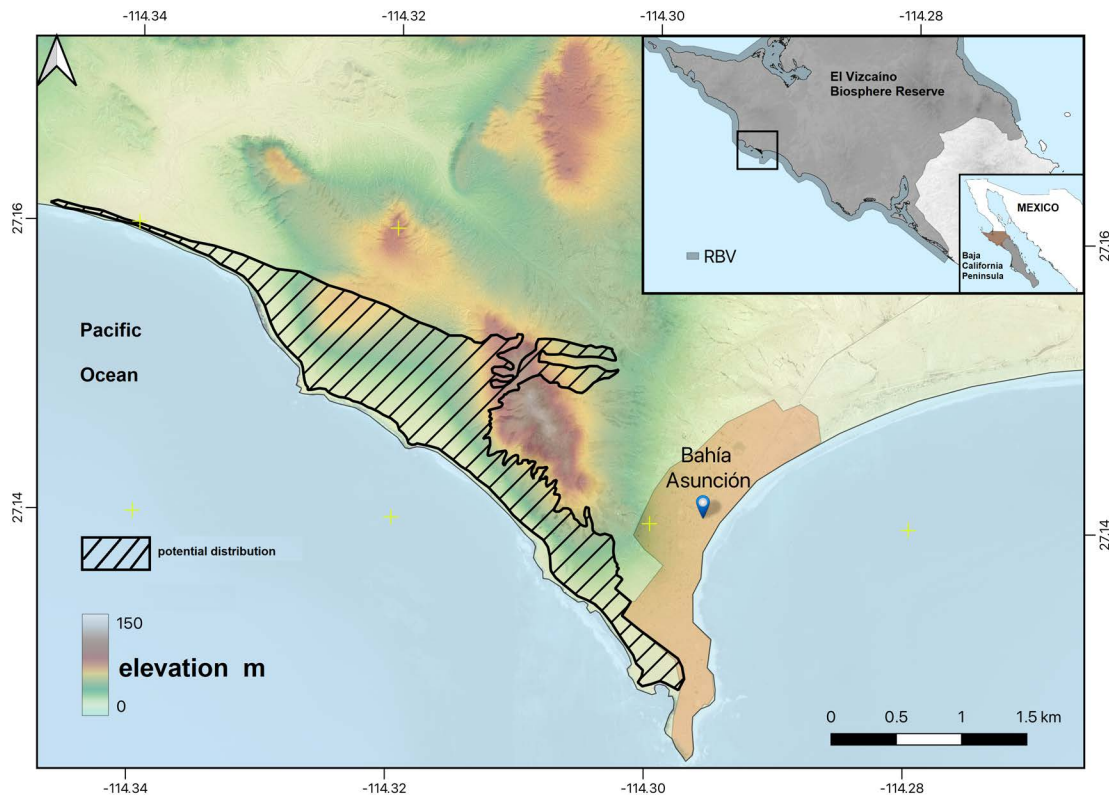
## Materials and methods

The only known population of this novelty occurs in the vicinities of the towns of Bahía Asunción and San Roque, small fishing settlements with about 1,000 inhabitants, located on the Pacific coast of the central portion of the Baja California peninsula, in the northwestern part of the state of Baja California Sur, Mexico. This location is within the Vizcaino Biosphere Reserve, a protected natural area administrated by the environmental secretariat (CONANP) of Mexico. The geology of this area is a complex of Mesozoic origin that are derived of ophiolites, which are rocks from the oceanic lithosphere that have been uplifted, exposed inland, and finally eroded and deposited as mafic soils (Kimbrough & Moore 2003). [Figure 1](#) shows the geographic position of the collecting and observation sites. The figure was created by QGIS v. 3.28.2 free software, using a digital model, on a digital cartographic dataset, in order to represent a continuous topographic elevation surface along the coastal dune between Bahía Asunción and San Roque towns. The calculation of the area of occupancy was obtained using the software tools.

The description of this new species is based on material collected by the authors during the 2021-2022 field seasons; moreover, on two other historic specimens (now paratypes) deposited in the SD Herbarium. In our methodological approach, it was important to compare the new entity to other native *Nama* taxa that occur in the north, central, and southern portions of the Baja California peninsula. According to the most recent floristic compilation for the peninsular flora (Rebman *et al.* 2016), eight species and three varieties (11 total taxa) are currently recognized and known to occur, these are: *Nama californica* (A. Gray) J.D. Bacon, *N. coulteri* A. Gray, *N. demissa* A. Gray, *N. depressa* Lemmon ex A. Gray, *N. dichotoma* (Ruiz & Pav.) Choisy, *N. hispida* A. Gray with three varieties, *N. jamaicensis* L., and *N. stenocarpa* A. Gray. Digital images of these taxa are available on the following network portals: BajaFlora 2022 ([www.bajaflora.org](http://www.bajaflora.org)), CalFlora Database 2022 ([www.calflora.org/](http://www.calflora.org/)), GBIF 2022 ([www.gbif.org](http://www.gbif.org)), Naturalista 2022 ([www.naturalista.mx](http://www.naturalista.mx)), and SEINet Portal Network 2022 ([www.swbiodiversity.org](http://www.swbiodiversity.org)).

A thorough examination of the morphological characteristics of the sampled material was carried out using stereomicroscopes Nikon SMZ25 and Zeiss STEMI DV4 Spot, such material was rehydrated to make various trait measurements. In addition, notes and images including macrophotography were taken in the field (Canon EOS 5DS

R and *Olympos*  $\mu$  9010). After the completion of the analysis, we concluded that this entity occurring in the narrow coastal corridor, between Bahía Asunción and San Roque towns, is an undescribed taxon, and is best represented at the species level.



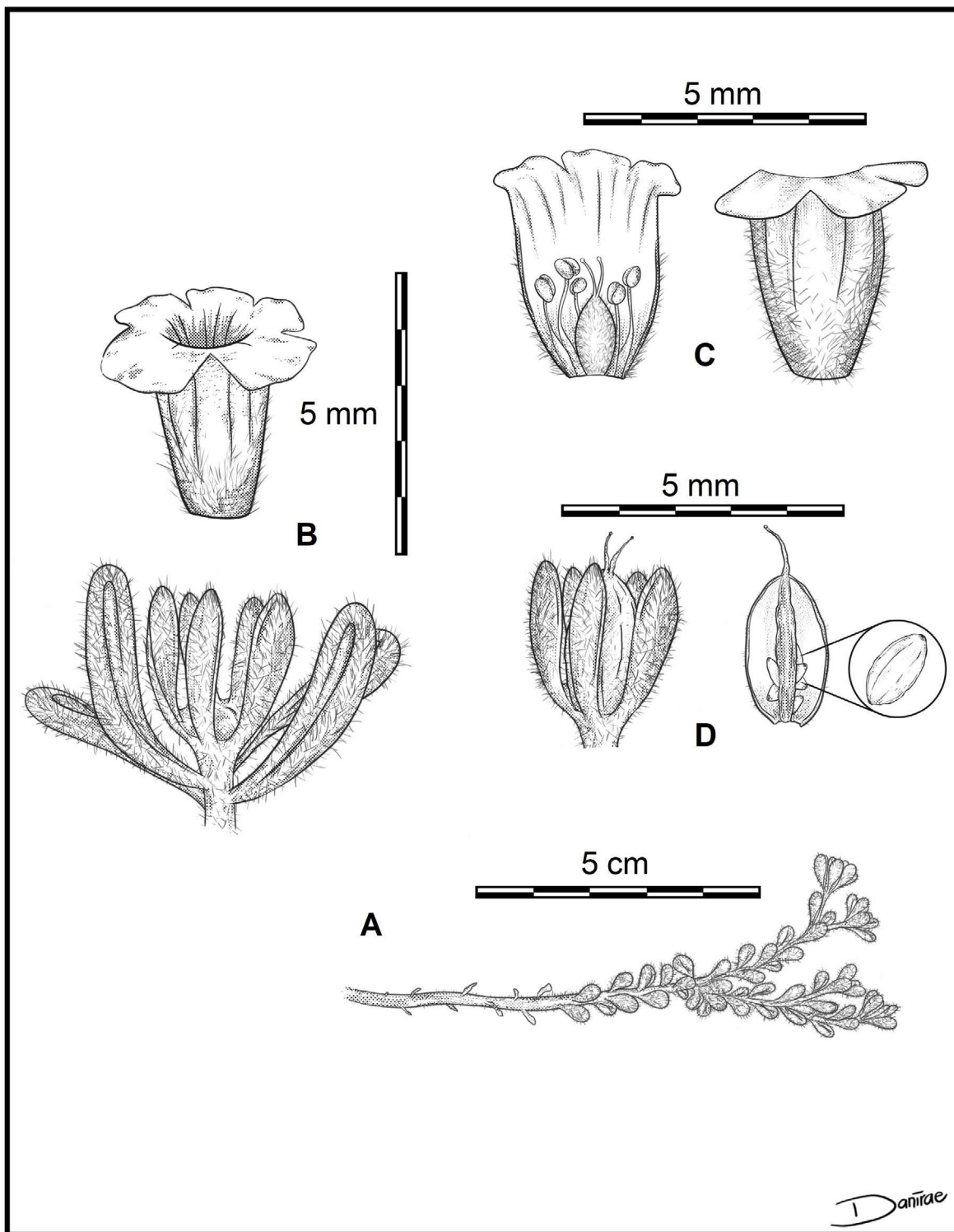
**Figure 1.** Geographical location of the population of *Nama asuncionensis* in the vicinity of Bahía Asunción and San Roque towns, located in the Pacific Coast of the El Vizcaino Biosphere Reserve, in the Baja California Peninsula, Mexico. The stripped area shows the potential distribution for additional exemplars of this new species, along the coastal sand dune.

## Results

### *Nama asuncionensis* León-de la Luz & Rebman sp. nov. (Figures 2, 3)

*Type.* México, Baja California Sur, municipio de Mulegé, inmediaciones del poblado de Bahía Asunción, Reserva de la Biosfera El Vizcaino, zona estable de la duna costera, 27.134332 °N, -114.304077 °W, 12 m de elevación, 8 diciembre 2021, *J.L. León de la Luz 13036* (Holotype: HCIB 32362!; Isotypes: MEXU!, UC!, SD!).

*Diagnosis.* *Nama asuncionensis* is similar to *Nama hispida* in having tricolored corollas and leaves that are revolute, but differs in its perennial, cushion-like growth habit and having corollas that are much smaller (5 mm vs 8-15 mm). *Nama asuncionensis* looks somewhat like *N. origanifolia* as both are perennials life forms, but they are easily distinguished based on the color of the corolla limb (pink lavender vs whitish), and its densely branched growth habit vs a more open vegetative structure. As singular characters, *N. asuncionensis* occupy only the coastal dune habitat, have a pulvinate growth form, have tiny glandular capitate trichomes among the simple trichomes in the leaf indumentum, and develops flowers only in the apex of the branches, with corollas that are easily deciduous.



**Figure 2.** *Nama asuncionensis*. A. Twig with alternate leaves at branch tip, in the middle branch dead leaves remain persistently attached. B. Detail of tip of a twig where the inflorescence (1 flowered) sprout, note the similarity between sepals and new leaves, these with revolute margins. C. Detail of the gamopetalous corolla sparsely pubescent in the outer surface, divided in a tube, throat, and five rotate lobes. Also, note the similarity between sepals and new leaves, these with revolute margin. D. Detail of the developing fruit, note short peduncle, and cross-section of the capsule showing the ellipsoid-ovoid seeds (JLLL 13036, HCIB 32362).

*Description.* Plants perennial, suffruticose, stem rhizomatous some lignified, erect branches ascending 10-30 cm tall, branching densely compact, pulviniform, canopy 30-40 cm wide. *Leaves* persistent and helicoidally alternate in the growing stems, leafy in terminal stems; blades spatulate in outline, 5-7 mm long, 1-1.5 mm wide in the apex, gradually narrowing to base into a short petiole < 1 mm, or almost sessile; margin entire throughout but the terminal half of each blade strongly revolute; indumentum on adaxial surface with appressed non-glandular trichomes 0.2 to 0.4 mm long, strigulose-hispid at touch, and tiny capitate glandular trichomes on the abaxial surface. *Inflorescences* arranged in the axils of the apical leaves, 1-2 flowered, peduncle 1 mm long. *Flowers.* Calyx divided from the base into 5 oblanceolate lobes, 5-6 mm long and 1.5 mm wide each, densely hispid. Corolla gamopetalous, tubular-campanulate, separating readily from the receptacle/hypanthium with gentle teasing, tricolored when fresh, the basal tube expands into a salverform apical portion, 5 mm long, 3 mm wide at the limb, sparsely to densely pubescent in the outer surface, glabrous within; limb with 5 lobes, oblong and rotate, pink-lavender, < 1 mm long, tube narrow cylindrical yellowish, throat whitish. Androecium with 5 stamens, filaments distinct,  $\pm 1.5$  mm long, 3 longer than the other 2, opposite to corolla, base adnate to corolla somewhat dilated; anthers gray, united dorsally, broadly elliptic, 0.3 mm long, dehiscence longitudinal. Pistil with ovary semi-inferior by adnation to basal part of calyx,  $\pm 1$  mm long, two celled; two free styles,  $\pm 1$  mm long, reaching the level of anthers at flowering; stigmas capitate, < 1 mm wide. *Fruits* narrowly ovate, 4-5 mm long 1.5 mm wide, loculicidal dehiscent capsules. *Seeds* around 15-30 per capsule, ellipsoid-ovoid, about 0.7-0.8 mm long and half as wide, yellowish-brown, pitted or foveolate in appearance.

*Etymology.* The specific epithet *asuncionensis* is in reference to the town where the primary exemplars were located: Bahía Asunción.

*Suggested Common Names.* Asunción mat, colchoncito de Asunción.

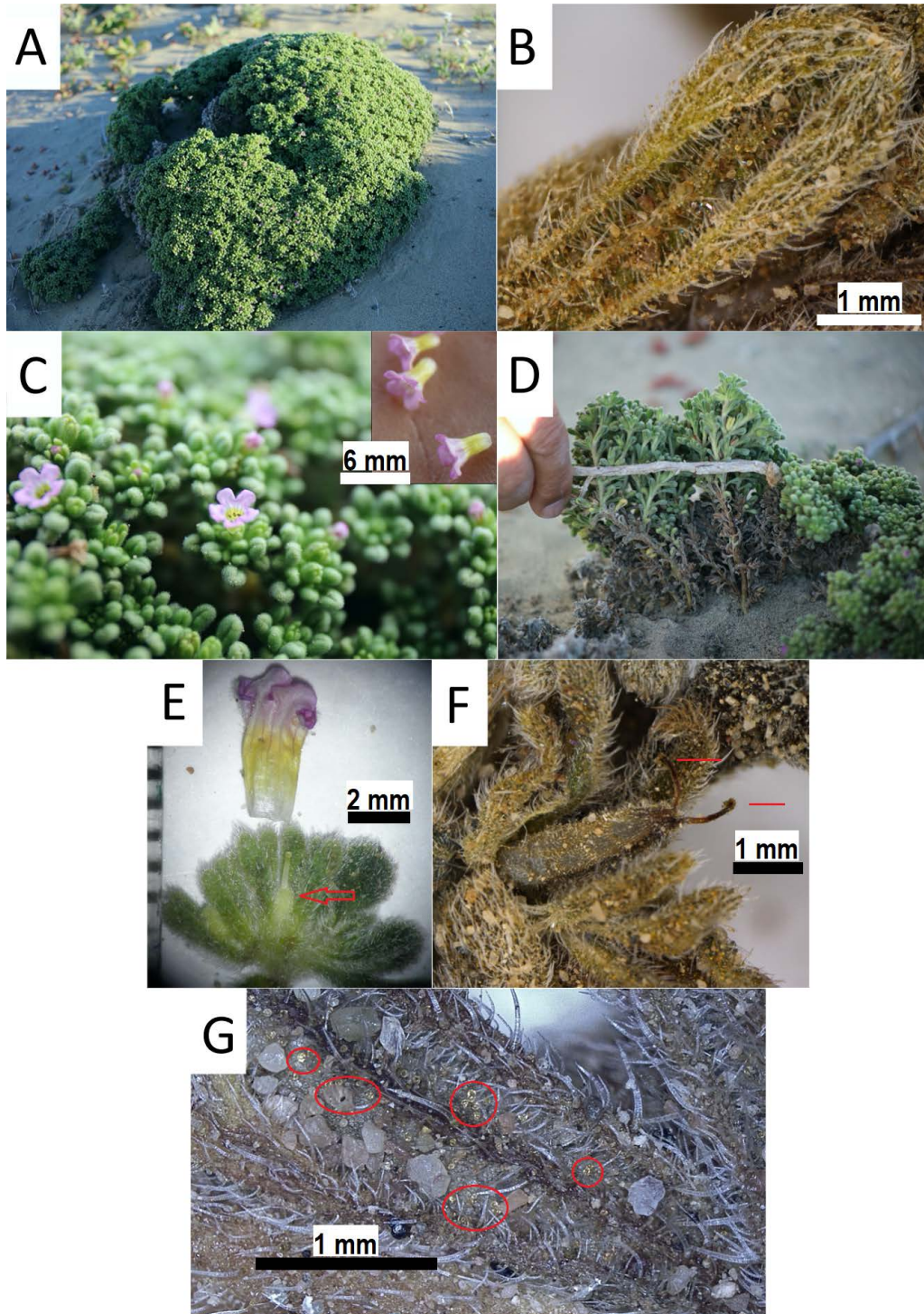
*Distribution and habitat.* The population of this new species is on sand hills; here, the shoreline is composed of a rocky cliff up to 10 m above sea level, which underlies a dune strand, up to 40 m. The surrounding vegetation type of this region corresponds to a desert scrubland. According to the Köppen climate classification, this area is characterized by a very arid and semi-warm climate type BWh(x'), the monthly mean temperature varies from 15 °C in January to 24 °C in August (García 1998), the pluvial precipitation is around 74 mm per year, where winter receives at last a third of that total. Furthermore, night fog and onshore winds are important features of the daily environment.

As far as we know, the species seems to be linked only to the coastal dune environment, specifically to the sand, where its low form, densely branched canopy, and dense indumentum likely prevents sand abrasion due to the relentless wind in this area. It is possible that such a growth form creates specific micro-environmental conditions that benefit the plant, such as a more stabilized temperature and increased soil humidity retention beneath the canopy. The pulvinate form, *i.e.*, the tight and dense growth, is an adaptation that also occurs in some taxa of *Paepalanthus* (Eriocaulaceae), the “cushion plants” native to Andean paramo (Hensold 2016).

Some other plants were seen by another person in other lesser impacted sites toward the town of San Roque, which is in the same geographical area visited in late 2022. The type locality is part of a large dune strand system, whose surface is estimated to be 1.5 km<sup>2</sup> (Figure 1). The vegetation in the sand dune area of Bahía Asunción is dominated by perennial species such as *Abronia maritima* Nutt ex S. Watson, *Bahiopsis* sp., *Encelia ventorum* Brandegee, *Eulobus crassifolius* (Greene) W.L. Wagner & Hoch, and *Triteleopsis palmeri* (S. Watson) Hoover, while *Abronia gracilis* Benth., *Dithyrea californica* Harv., and *Perityle emoryi* Torr. are the most common annuals or short-lived, herbaceous perennials. It should be noted that the invasive *Mesembryanthemum crystallinum* L. grows in abundance in this area during the spring season. Few halophytic plants were observed on these dunes such as *Frankenia palmeri* S. Watson.

*Conservation status.* During the field surveys of 2021 only five plants were documented at the type locality, and these were located along a 1 km transect of coastal habitat that is significantly impacted by the local settlement of

A new Vizcaino Desert *Nama*



**Figure 3.** Photographs of *Nama asuncionensis* illustrating habitat, growth form, and some morphological characters. A. Plant shape resembling a small cushion, or pulvinatiform growth. B. Detail in the leaf indumentum and abaxial view of the revolute margin. C. View of the apical position of the flowers, size, and its colors: the white tube, yellow throat, and pink-lavender lobes. D. View of stems and new leaves terminal on branches. E. Detail of tricolored corolla, calyx lobes similar in size and shape to new leaves, and young pistil (red arrow). F. Detail of an immature capsule with the two free styles (red lines). G. Detail of the abaxial leaf surface showing tiny capitate glandular trichome (red circles) beneath appressed simple trichomes. Images by JLLL and AMN.

Bahía Asunción (Figure 1). In December 2022, a survey in the proximity of the town of San Roque, revealed eight additional young plants with one of these growing on rocky soil, near the beach.

Applying IUCN (2022) red list methodology, considering 13 plants collected/observed in 0.3 km<sup>2</sup>, over a potential area of 2 km<sup>2</sup> of the coastal dune system (Figure 1), we have determined that our new species is critically endangered (EN). This risk category is obtained considering the criteria B, Geographical range, whether we prioritize the area of presence (EOO < 100 km<sup>2</sup>), or the area of occupancy (AOO < 10 km<sup>2</sup>).

*Phenology.* Individuals develop leaves most of the year, but in the hottest months of summer there is a notable water stress in the foliage. Flowers begin to be evident during the late autumn to early spring, with a peak blooming period in the winter months. There is a high-rate fruit set as can be deduced by the high number of fruits containing seeds on older branches, as well as by the seeds trapped between the leaf indumentum. Development of new leaves is noticeable also during the winter months.

*Additional specimens examined.* Mexico. Baja California Sur, Municipio de Mulegé, Vizcaino Desert, south of Guerrero Negro, 0.5 miles north of Bahía Asunción, sandy beach above ocean, 27.13583 N, 114.30722 W, 20 m elevation, 23 September 1998, J. Rebman & J.L. Zuñiga 5618 (SD142941); Bahía Asunción, coastal bluff north of town, in silty sand, 27.1326 N, 114.3024 W, < 10 m elevation; 3 May 2010, D. Valov 2010080 (SD208223).

## Discussion

*Nama* is a genus with around 50-60 species that is distributed mainly in dry habitats of the southwestern United States and northern Mexico (Ricketson 2008). Most species, typically grow in alluvial deposits and along margins of fluvial streams (Taylor 2012). The genus has been placed in the Boraginaceae and Hydrophyllaceae at different times, but more recently, it is recognized in the Namaceae according APG IV (Luebert *et al.* 2016, Molinari-Novoa 2016). Hitchcock's (1933a, b) *Nama* monograph included only 32 taxa, but approximately some 28 other taxa were described in the following 80 years (Taylor 2012).

In accordance with the division of five generic sections of *Nama* as proposed by Hitchcock (1933a, b), this new species falls within section *Eunama*, which is the most diversified of the genus (almost 90 % of the species), exemplified by the membranous and loculicidally dehiscent capsule, as well as entire leaves, free styles, and a calyx that is divided to its base.

Chance & Bacon (1984) examined the seed coat characters of 37 *Nama* species using scanning electron microscopy to look for possible relationships within the genus. They concluded that the seed coat characters are formed from cell wall thickenings of reticular cells with undulating walls, which results in an alveolar-reticular view of testa. However, they did not reach conclusive results on the use of these fine traits to divide the genus, although, they did define six groups using various systematic criteria. In relation with this taxonomy, our species would be assessed into group II, due to the foveolate patterning of the seed coat surface.

Nevertheless, Taylor's (2012) doctoral dissertation includes a phylogeny based on molecular analysis that show seven lineages within the genus. Taylor's lineages do not correspond to the same groups as Hitchcock (1933a, b), but they do correlate closely to the "seed groups" of Chance & Bacon (1984). Taylor (2012) also included a taxonomic key, and using her criteria, *Nama asuncionensis* appears to be closest to *Nama demissa*, which is different from the first judgment when it was identified as *Nama aff. hispida*.

*Nama demissa* is highly variable species, inhabiting the southwestern USA and northwestern Mexico, with four previously described varieties that are not currently recognized in most taxonomic indices (e.g., IPNI 2022 [www.ipni.org](http://www.ipni.org)). *Nama hispida* is also a variable species occurring in the USA-Mexico bordering states. This species has had six described varieties, but only five are considered to be valid now ([www.ipni.org](http://www.ipni.org)).

In Table 1, we show the differences between *N. asuncionensis*, *N. hispida sensu lato*, *N. organifolia* from northern Mexico based on descriptions in Hitchcock (1933a, b), Hickman (1993), Pérez Calix & Carranza-González (2005), Shreve & Wiggins (1964), and *N. demissa*, due to the closeness suggested in the Taylor (2012) key.

A new Vizcaino Desert *Nama*

**Table 1.** Comparison between *Nama asuncionensis* and morphologically similar taxa, taken from descriptions in Shreve & Wiggins (1964), Hickman (1993), Pérez Calix & Carranza-González (2005), and Taylor (2012).

Character	<i>Nama asuncionensis</i>	<i>Nama hispida</i> incl. varieties <i>spathulatum</i> and <i>sonorae</i>	<i>Nama origanifolia</i>	<i>Nama demissa</i>
<b>Habitat</b>	Coastal dunes on the Pacific coast	Dry desert flats, hillsides, streams, on gravelly, rocky, and sandy soils	Desert flats to Oak and Pine woodland	Desert flats, hillsides, streams
<b>Geographic distribution</b>	Vizcaino Desert, northwestern Baja California Sur	Colorado Desert, southern California to Texas. Sonoran and Chihuahuan Desert, Sonora to Coahuila. Includes northern Baja California peninsula	North and central Mexico, from Tamaulipas to Guerrero	Great Basin & Mohave Deserts. most Sonoran Desert excluding southern Baja California peninsula
<b>Lifespan</b>	Perennial, base woody	Annual, sometimes biennial	Perennial, base woody	Annual, herbaceous.
<b>Growth form</b>	Suffruticose up to 30 cm tall erect and compact branching, pulvinate	Ascending to erect to 30 cm tall, compact tufted growth	Suffruticose to 40 cm tall, compact tufted growth	Prostrate, diffusely branched, forming dense mats
<b>Leaf shape</b>	Narrow leaves spatulate, widest at the apex	Narrow leaves spatulate, widest at the apex	Variable, linear to obovate	Leaf blades obovate to linear-spatulate
<b>Life size</b>	5-7 mm long, 1-1.5 mm wide at the apex	(5-)10-70 mm long, 1-8 mm wide	3-15(-25) mm long and 2-10 mm wide	10-25 mm long, 1-5 mm wide
<b>Margin</b>	Notably revolute in the superior half, entire toward the base	Entire, revolute only in var. <i>spathulatum</i> at superior half	Rarely revolute	Revolute in the superior half
<b>Indumentum</b>	Appressed simple trichomes, without swollen base, strigulose-hispid to touch; tiny glandular trichomes beneath the bigger non-glandular	Hispid with appressed hairs, bristly-strigose to touch, biggest trichomes with a swollen base	Adaxially pilose-hispid, mainly on nerves; abaxially densely hispid to tomentose	Villous-hirsute to cinereous
<b>Flower buds</b>	Solitary or weak cymes at branch tips, never in axils	Small cymes at branch tips and/or solitary in leaf axils	Small terminal or subterminal cymes 3-4 flowered, or solitaires in leaf axils	Cymes terminal or in axills of branches
<b>Flower size (mm)</b>	Corolla 5 mm long	Corolla 8-15 mm long	Corolla 4-6 mm long	Corolla 9-15 mm long, 6-12 mm wide
<b>Flower color</b>	Tricolored, base white, throat yellowish and limb lavender	Tricolored, base white, throat yellowish and limb pale purplish to lavender	Whitish	Bicolored, throat pale yellow and limb lavender



Character	<i>Nama asuncionensis</i>	<i>Nama hispida</i> incl. varieties <i>spathulatum</i> and <i>sonorae</i>	<i>Nama organifolia</i>	<i>Nama demissa</i>
<b>Calyx lobes</b>	Linear-lanceolate, 5.5 mm long and 1.5 mm wide	Linear-lanceolate, 6.5 mm long, 1-1.5 mm wide	Linear spatulate to lanceolate oblong, 3-5 mm long, 0.5-0.8 mm wide	Oval, 2-3 mm long, 0.5-1 mm wide
<b>Stamens size (mm)</b>	1.5 mm long	2-6 mm long	2-3 mm long	3-5 mm long
<b>Capsule</b>	Narrowly ovoid	Largely ovoid	Ovoid or largely ovoid	Linear-oblong
<b>Capsule size</b>	5 mm long, 1.5 mm wide	(4-)5-6 mm long, 1.5 mm wide	2 mm long, 1 mm wide	3-4 mm long, 1 mm wide.
<b>Seed size (mm)</b>	0.7-0.8 mm long and half as wide, the surface foveolate	0.5 mm long and half as wide, the surface foveolate	0.5 mm long, smooth to finely reticulate in undulate pattern	About 0.5 mm long, regularly reticulated-pitted

As shown in the [Table 1](#), the differentiation between *N. asuncionensis* and these other taxa is expressed mainly on geographic and habitat criteria, the presence of tiny, rather inconspicuous, capitate glandular trichomes beneath the more obvious non-glandular hairs, the small size of the corolla, the larger seeds, and the compact cushion-like growth form, or pulvinatiform. Some other traits shared with some taxa are the tricolored corolla and the infolded/revolute condition of the leaf margin to some degree, but in *N. asuncionensis*, this last character is extreme as it is not possible to lift and open the foliar blade without ripping it.

An upcoming task should include the molecular study of this interesting micro-endemic species to help place in the phylogenetically and determine its affinities to both *Nama hispida* and *N. demissa*.

### Acknowledgements

We thank Celerino Montes García, deputy director El Vizcaíno Biosphere Reserve, for his goodwill to get financial support for the fieldwork of this activity during 2018-19, through the project “Study to determine the distribution of populations of micro-endemics plant species of the El Vizcaíno Biosphere Reserve, BCS”. Also, we thank Dr Isaac Lichter-Marck for his valuable information of newly sighted plants, as well the Botanical Sciences editor section Dr. María Silvia Ferrucci, and reviewers Dr. Karina Machuca M. & Dr. Nidia Mendoza Díaz, for their comments and suggestions that have improved this paper. Danira León Coria made the botanical illustrations.

### Literature Cited

- Chance GD, Bacon JD. 1984. Systematic Implication of Seed Coat Morphology in *Nama* (Hydrophyllaceae). *American Journal of Botany* **71**: 829-842. <https://doi.org/10.2307/2443474>
- García E. 1998. Climas de México, Cartografía de la clasificación climática de Köppen, modificado por E García. Escala 1:1,000,000. México: Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, CONABIO. <http://geoportal.conabio.gob.mx/metadatos/doc/html/clima1mgw.html>
- Hensold N. 2016. The Andean *Paepalanthus pilosus* complex (Eriocaulaceae): a revision with three new taxa. *Phytokeys* **64**: 1-57. <https://doi.org/10.3897/phytokeys.64.6864>
- Hickman CJ. ed. 1993. *The Jepson Manual: Higher plants of California*. Berkeley, CA: University of California Press. 1400 p. ISBN 0-520-08255-9
- Hitchcock CL. 1933a. A taxonomic study of the genus *Nama*. I. *American Journal of Botany* **20**: 415-430. <https://doi.org/10.2307/2435986>

- Hitchcock CL. 1933b. A taxonomic study of the genus *Nama*. II. *American Journal of Botany* **20**: 518-534. <https://www.jstor.org/stable/2436212>
- IUCN. 2022. Guidelines for Using the IUCN Red List Categories and Criteria. Version 15.1. Prepared by the Standards and Petitions Committee. <https://www.iucnredlist.org/documents/RedListGuidelines.pdf>
- Kimbrough DL, Moore TE. 2003. Ophiolite and volcanic arc assemblages on the Vizcaino Peninsula and Cedros Island, Baja California Sur, Mexico: Mesozoic forearc lithosphere of the Cordilleran magmatic arc. In: Johnson SE, Paterson SR, Fletcher JM, Girty JM, Kimbrough DL, Barajas AM, eds. *Tectonic evolution of northwestern Mexico and the Southwestern USA*. USA: Geological Society of America. Pp. 43-72. <https://doi.org/10.1130/0-8137-2374-4.43>
- León-de la Luz JL, Medel-Narváez A, Domínguez-Cadena R. 2022. Las especies vegetales endémicas (Magnoliophyta) de la Reserva de la Biosfera El Vizcaíno: recuento y notas sobre su fragilidad. *Áreas Naturales Protegidas Scripta* **8**: 131-147. <https://doi.org/10.18242/anpscripta.2022.08.08.01.0008>
- Luebert F, Cecchi L, Frohlich MW, Gottschling M, Matt Williams C, Hasenstab-Lehman KE, Hilger HH, Miller JS, Mittelbach M, Nazaire M, Nepi M, Nocentini D, Ober D, Olmstead RG, Selvi F, Simpson MG, Sutorý K, Valdés B, Walden GK, Weigend M. 2016. Familial classification of the Boraginales. *Taxon* **65**: 502-522. <https://doi.org/10.12705/653.5>
- Molinari-Novoa EA. 2016. Two new Lamiid families for the Americas. *Weberbauerella* **1**: 1-4. [https://weberbauerella.org/2016/2016Weberb1\\_7.pdf](https://weberbauerella.org/2016/2016Weberb1_7.pdf)
- Pérez Calix E, Carranza-González E. 2005. Familia Hydrophyllaceae. In: Rzedowski J, Calderón de Rzedowski G, eds. *Flora del Bajío y Regiones Adyacentes*, Fascículo **139**: 48 p.
- Rebman J, Gibson J, Rich K. 2016. *Annotated Checklist of the Vascular Plants of Baja California, Mexico*. San Diego CA: Proceedings of the San Diego Society of Natural History 45. 352 pp.
- Ricketson JM. 2008. A new species of *Nama* (Hydrophyllaceae) in Guatemala. *Novon* **18**: 517-519
- Shreve F, Wiggins IL. 1964. *Vegetation and Flora of the Sonoran Desert*. Stanford CA: Stanford University Press. 1025 Pp.
- Taylor SE. 2012. Molecular Systematics and the Origins of Gypsophily in *Nama* L. (Boraginaceae). PhD Thesis. University of Texas.

---

**Associate editor:** María Silvia Ferrucci

**Author contributions:** JLLL, manuscript edition, data comparison, field work; JPR, original idea, English edition, specimen and data examination; AMN, fieldwork, figures edition.