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A narrowly endemic new species of *Calliandra* series *Racemosae* (Fabaceae) from Sinaloa, Mexico

HÉCTOR M. HERNÁNDEZ* & CARLOS GÓMEZ-HINOSTROSA
Departamento de Botánica, Instituto de Biología, Universidad Nacional Autónoma de México, Ciudad Universitaria, Apartado Postal 70-233, 04510 Mexico City, Mexico.
Author for correspondence: hmhm@ib.unam.mx

Abstract

Calliandra estebanensis, a new species of Fabaceae, mimosoid, from a remote locality of Sinaloa, Mexico, is here described and illustrated. The new species is probably closely related to *C. grandiflora*, an extremely common species frequently found in oak, pine and pine-oak forests, from northwestern Mexico, in Durango, Sinaloa and Sonora, to Honduras and El Salvador. The new species is distinguished from *C. grandiflora* by its flowers with longer peduncles, shorter pedicels, and larger calyces and corollas, and by the much denser white-sericeous vestiture covering all reproductive structures. Excluding the longer pedicels, *C. grandiflora* has smaller flower parts, which are covered with a finer vestiture of shorter, variably-colored trichomes.

Resumen

Se describe e ilustra *Calliandra estebanensis*, una nueva especie de Fabaceae mimosoide de una remota localidad de Sinaloa, México. La especie nueva está posiblemente cercanamente relacionada con *C. grandiflora*, una especie sumamente común en bosques de encino, pino y pino-encino, desde el noroeste de México (Durango, Sinaloa y Sonora) hasta Honduras y El Salvador. Las dos especies se pueden distinguir en que *C. estebanensis* tiene flores con el pedúnculo más largo, el pedicelo más corto, y el cáliz y la corola más grande, así como por las estructuras reproductivas cubiertas por un denso indumento seríceo de tricomas blancos. Con la excepción de los pedicelos más largos, las partes de la flor de *C. grandiflora* son más pequeñas, y están cubiertas por un indumento más fino de tricomas más cortos y de color variable.

Keywords: *Calliandra longipedicellata*, *Calliandra palmeri*, Leguminosae, legumes, Sierra de Surutato, taxonomy

Introduction

In its current circumscription, *Calliandra* Bentham (1840: 138) is a Neotropical genus of Fabaceae, mimosoid, comprising about 136 species grouped into five distinct sections (Barneby 1998). The genus is defined by a combination of characters, such as the elastically dehiscent pods, the 8-grained, bisymmetric, calymmate polyads with a mucilaginous basal appendage, and the atypical (n = 8 and 11) chromosome numbers (Guinet & Hernández 1989, Hernández 1989 and Barneby 1998). Souza *et al.* (2013), in a phylogenetic analysis using morphological and molecular data, concluded that the species of *Calliandra* constitute a monophyletic assemblage, including genus *Guinetia* L. Rico & M. Sousa (1999: 977) later transferred to *Calliandra* [*C. tehuantepecensis* (L. Rico & M. Sousa) E.R. Souza & L.P. Queiroz (2013: 1215)]. According to its current circumscription, the species of the genus are distributed throughout the tropical and subtropical regions of America, from northern Mexico and southern United States to northern Argentina, northern Chile and Uruguay (Barneby 1998), and two areas of species concentration have been identified, one in eastern Brazil and the other in southern and western Mexico, with 38 species known to occur in the latter country. Examination of herbarium specimens from northwestern Mexico lead to the discovery of one new species from Sinaloa, Mexico, which is herein described, illustrated and mapped. The hypothetical taxonomic relationships of the new species with other members of the genus are discussed.

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Methods

Morphological dissimilarities and discontinuities were used as evidence for the recognition of a new species. The descriptions and comparisons of morphological characters were based on stereomicroscopic observations of herbarium specimens from ARIZ, ENCB, MEXU, MICH, TEX, US and WIS (herbarium acronyms according to Thiers, 2018). Polyads were gold-coated and observed on a scanning electron microscope (Hitachi, model SU1510) at the Instituto de Biología, UNAM. Polyad measurements were made with the ImageJ image-processing program (https://imagej.nih.gov/ij/). The map was built from locality data obtained from herbarium specimens and plotted with the aid of ArcMap software, version 10.1.

Taxonomy

Calliandra estebanensis H.M. Hern., *sp. nov.* (Figs. 1–2)

Calliandra estebanensis is closely related to *C. grandiflora* L'Héritier (1788: 30) Bentham (1840: 139) from which it could be distinguished by having flowers with longer (1.1–2 cm vs. 0.6–1.2 cm) peduncles, shorter (4–6 mm vs. 6–10 mm) pedicels, and larger calyces (2–4 mm vs. 1–2 mm) and corollas (10–16 mm vs. 8–12 mm), prominently covered by a much denser white-sericeous (vs. white, black or ferruginous pilose) vestiture.

Type:—MEXICO. Sinaloa, municipality Badiraguato, Los Laureles, 75 km NE of Mocorito on road to Surutato, 25º53'45'' N, 107º40'40'' W, 1430 m, 2 August 1983 (fl., fr.), *E. Martínez S. et al. 4180* (holotype: MEXU 1478305!; isotypes: CICY!, ENCB!, K!, MEXU 1478306!, MO!, NY!).

Shrubs to 2 m high, erect; stems slender; stipules 5 mm long, adpressed, narrowly triangular, white-sericeous, usually caducous. *Leaves* microphyllidious; pinnae 15–32-jugate; petioles 0.5–0.9 cm long, tomentose or velutinous with white or brown trichomes; rachis 13.3–25 cm long, tomentose or velutinous with white or brown trichomes; rachillae 3.5–5.8 cm long; leaflets 42–56 pairs per pinnae, 4–5 × 0.8–1 mm, narrowly oblong-lanceolate, thinly coriaceous, glabrous at the abaxial and adaxial faces, ciliate at margin, oblique at base, acute at apex, with a single primary, sub-central vein visible under magnification. *Inflorescences* organized in terminal, conical pseudoracemes formed by numerous umbellate capitula arising at several nodes along a central axis; axis 10.5–18.5 cm long, covered by a dense vestiture of white trichomes; umbels usually 3 per node; peduncles, 1.1–2 cm long, 1–1.5 mm diameter at anthesis, white-tomentose. *Flowers* homomorphic, usually 3–5 per umbel; pedicels 4–6 × 0.8–1 mm at anthesis, white-tomentose; perianth coriaceous, densely white-sericeous externally, glabrous internally; calyx 2–4 × 4–7 mm, short-campanulate; corolla 10–16 mm long, campanulate, the lobes lanceolate, (3–)4–7 wide; filaments 9.7–10.5 cm long, red or pinkish-red; the staminal tube inserted, ca. 4 mm long; polyads 8-grained, 189–242 × 126–146 μm, flattened, bisymmetric, with a mucilaginous appendage on the basal cell; ovary white-velutinous; style ca. 12 cm; stigma capitate. *Pods* erect or ascending, to 12.5 × 1.5 cm, ligneous, velutinous with white, long trichomes. Seeds unknown.

Etymology:—This species in named to honor Esteban Martínez S. (1954–), a Mexican botanist based at the National Herbarium of Mexico (MEXU), who over the last 36 years has produced tens of thousands of botanical collections from all over Mexico and described numerous taxa, greatly contributing to our knowledge of the flora of this country.

Distribution and habitat:—*Calliandra estebanensis* is currently known only from two neighboring localities at the Sierra de Surutato, northern Sinaloa, Mexico (Figure 3). The area is a mountain range of volcanic origin with elevations ranging from 1430 to 2130 m. The vegetation is a mixture of pine and pine-oak forest, and grassland (Gentry 1946).

Phenology:—Flowering: August–September; fruiting: August–September.

Additional specimens examined:—MEXICO. Sinaloa: Ocurahui, Sierra Surotato [Surutato], 25º56' N, 107º39'01'' W, 1830–2130 m, 1–10 September 1941 (fl., fr.), *H.S. Gentry 6330* (ARIZ, MEXU, MICH); same locality and date, (fl., fr.), *H.S. Gentry 6330-A* (ARIZ, MEXU, NY).

Taxonomic notes:—*Calliandra estebanensis* clearly belongs to *C.* ser. *Racemosae* Bentham (1844: 111), which includes eight Mexican and Central American microphyllidious species characterized by having terminal, efoliate pseudoracemose inflorescences, with the flowers grouped in capitula or umbels inserted in several nodes along elongated axis (Macqueen & Hernández 1997). Bentham's *C.* ser. *Racemosae*, however, was sunk by Barneby (1998: 148–149) into *C.* ser. *Calliandra*, which includes 39 species grouped into two geographically congruent assemblages, one in

Brazil, and the other in Mexico and Central America. Nonetheless, we consider *C.* ser. *Racemosae* as an acceptable taxon to include a compact group of North and Central American species with racemose inflorescences and, thus, treat *C. estebanesis* under it.

The precise taxonomic relationships of the new species are difficult to determine based on overall morphology. There are three species in *Calliandra* ser. *Racemosae*, occurring in western and northwestern Mexico, that may be superficially confused with *C. estebanensis*: *C. palmeri* S. Watson (1887: 410), *C. longipedicellata* McVaugh (1987: 151–152) Macqueen & Hernández (1997: 40) and *C. grandiflora*. The former two are endemic to western Mexico (Figure 3) and are clearly segregated geographically with respect to *C. estebanensis*. On the other hand, *C. grandiflora* is a widespread and morphologically variable species occurring from northwestern Mexico (Durango, Sinaloa and Sonora) to Honduras and El Salvador (Macqueen & Hernández 1997), and is sympatric with *C. estebanensis*.

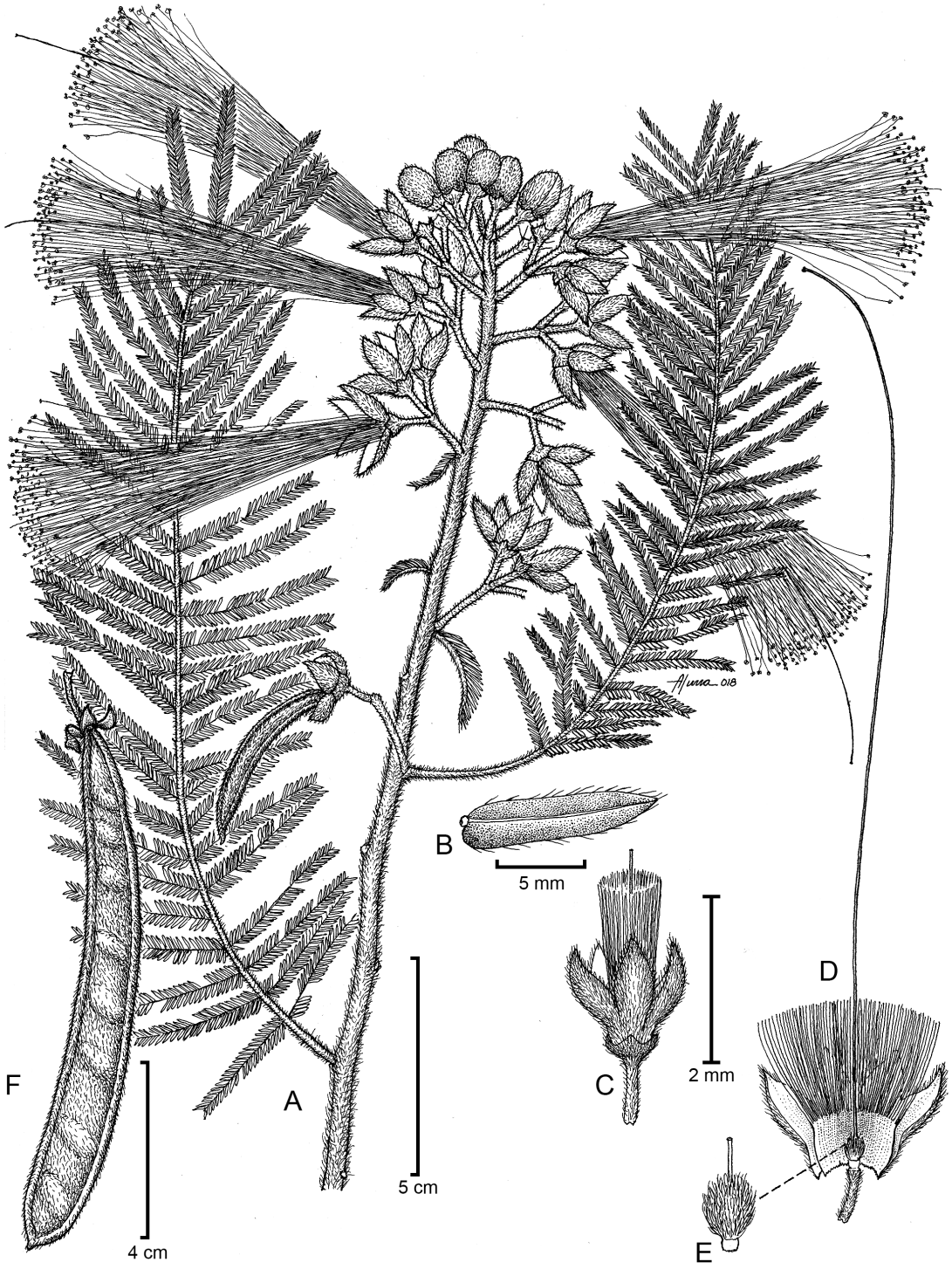

FIGURE 1. *Calliandra estebanensis* H.M. Hern. A. Branchlet with inflorescence at anthesis and developing pod. B. Leaflet. C. Detail of calyx and corolla. D. Dissected flower showing the staminal tube and pistil. E. Detail of the ovary. F. Pod. Vouchers: A–E, *E. Martínez et al. 4180* (MEXU); F, *H.S. Gentry 6330-A*, (MEXU). Drawn by Albino Luna.

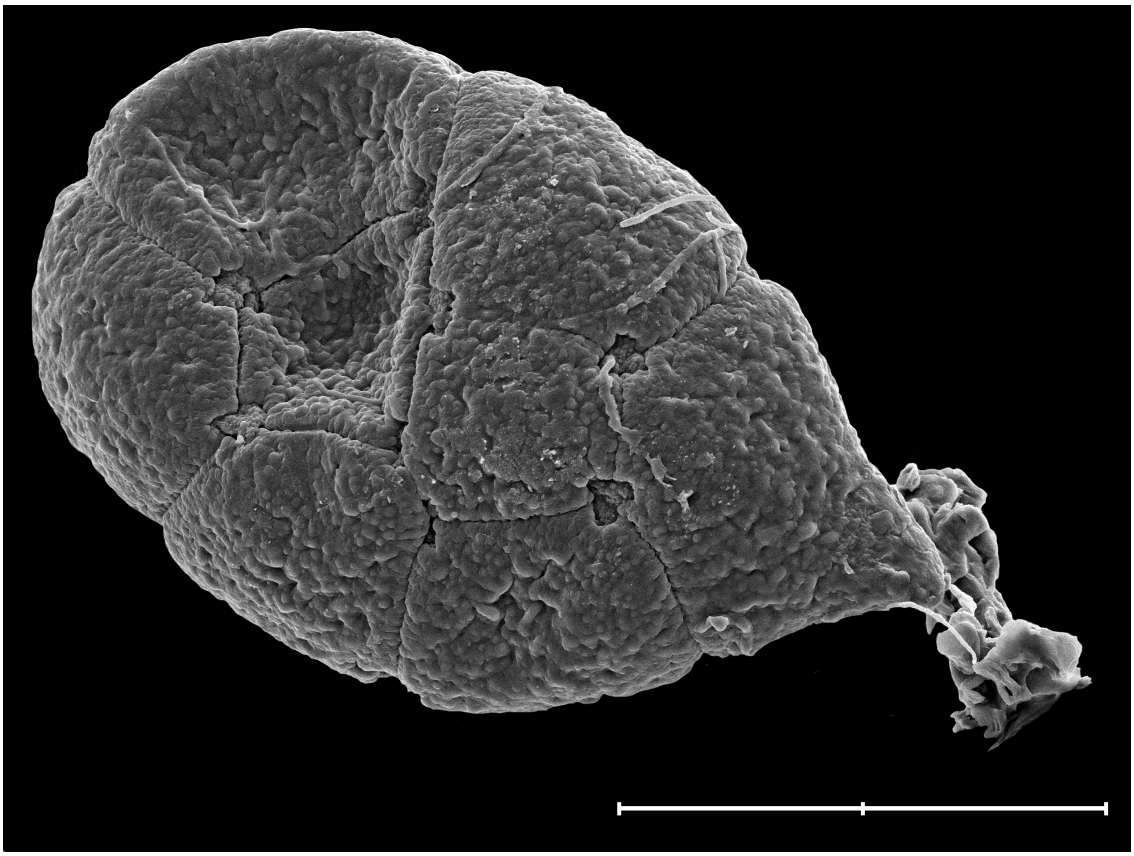

FIGURE 2. Unacetolyzed 8-grained polyad of *Calliandra estebanensis*. Voucher: *E. Martínez et al. 4180* (MEXU). Scale bar = 100 µm.

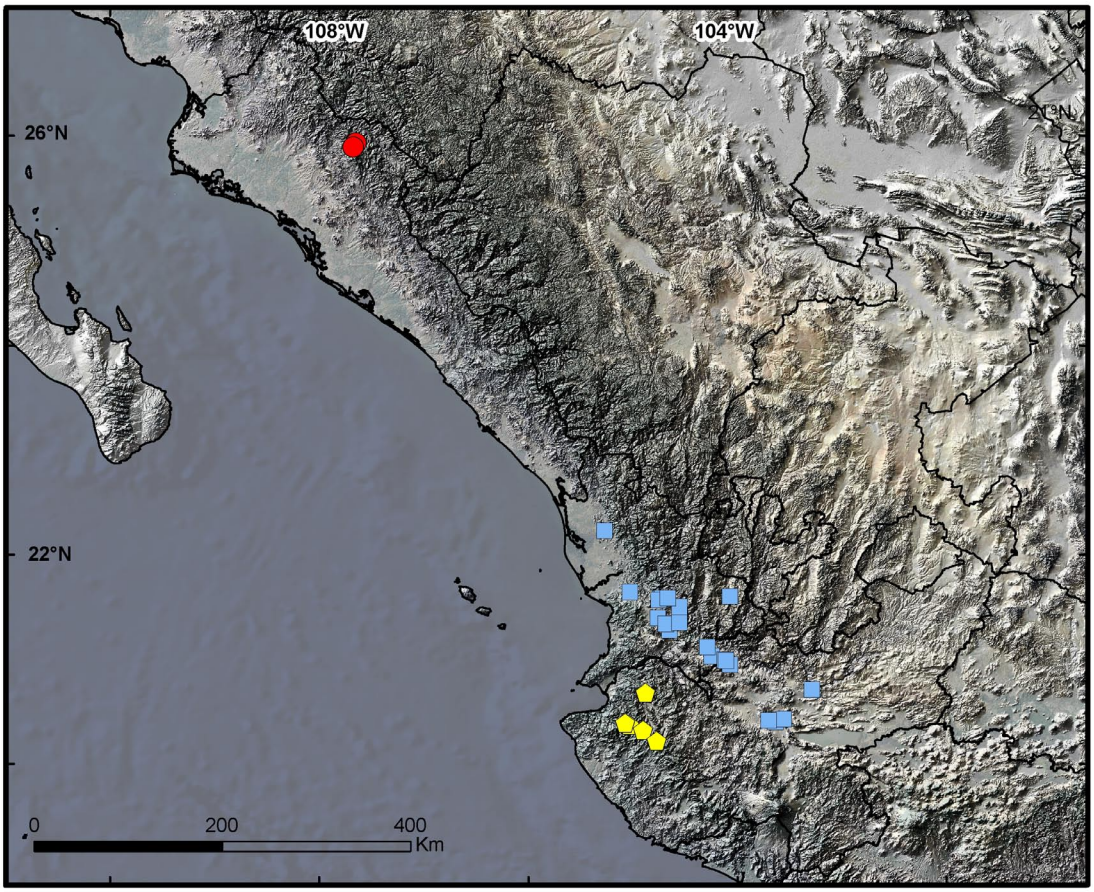

FIGURE 3. Geographical distribution of *Calliandra estebanensis* (red dots), *C. palmeri* (blue squares) and *C. longipedicellata* (yellow diamonds).

Calliandra estebanensis and *C. palmeri* share the presence of relatively large flowers and pods covered by a dense white-sericeous or velutinous vestiture. However, *C. estebanensis* may be readily distinguished from that species by its shorter petioles and rachillae, higher number of pairs of pinnae, smaller leaflets, shorter inflorescences, longer peduncles and pedicels, and smaller calyces, corollas and pods (Table 1). In turn, *C. estebanensis* may be distinguished from *C. longipedicellata* by being shorter, up to 2 m tall shrubs (vs. up to 6 m tall small trees in *C. longipedicellata*), and by its longer rachis, higher number of pinnae, white-sericeous vestiture (vs. amber-colored vestiture) and shorter pedicels (Table 1).

Calliandra grandiflora may be the closest relative of *C. estebanensis*. The two species differ mainly in size of floral organs and vestiture, as highlighted in the diagnosis. In addition, *C. estebanensis* usually has larger leaf parts (e.g., longer rachis and rachillae, more pairs of pinnae and leaflets, and larger leaflets); however, although differences in leaf characters between the two species are usually clear in most herbarium specimens, in cases they tend to overlap (Table 1).

TABLE 1. Comparison of *Calliandra estebanensis, C. grandiflora, C. longipedicellata and C. palmeri.*

	C. estebanensis	*C. grandiflora*[2]	*C. palmeri*[1]	*C. longipedicellata*[1]
Geographical distribution	Sinaloa	Widespread from northwestern Mexico to Central America	Jalisco and Nayarit	Jalisco
Elevation (m)	1430–2130	1220–2140	800–1650	1700–2260
Habit (max. height in m)	Shrubs (2)	Shrubs (4)	Shrubs (1.7)	Shrubs or small trees (6)
Petiole length (cm)	0.5–0.9	0.5–2	(1–)2.8–4.2(–6)	0.8–1.5
Rachis length (cm)	13.3–25	6.5–13.5	12.5–24.5	6.5–12.5
Rachillae length (cm)	3.5–5.8	1.3–3.7(–4.3)	4.7–16	2.3–6
Pairs of pinnae	(15–)21–32	16–26	8–16	6–19
Pairs of leaflets	42–56	29–46	26–55	25–45
Leaflet length × width (mm)	4–5 × 0.8–1	2.5–5 × 0.3–1	(5.5–)9–15 × 1.4–3.5	3–7 × 0.8–1.2
Perianth vestiture	Densely white-sericeous	Densely pilose with white, dark or ferruginous trichomes	Densely white-sericeous	Felted with long, yellow, white or brown trichomes
Inflorescence axis length (cm)	10.5–18.5	6.5–17.5	20–40(–50)	4–10.3
Peduncle length (cm)	1.1–2	0.6–1.2	0.5–1.3	0.9–1.6
Pedicel length (mm)	4–6	6–10	0–4	5–10
Calyx length (mm)	2–4	1–2	(3–)4–9	1–2
Corolla length (mm)	10–16	8–12	(10–)15–21	13–14
Pod max. length × width (cm)	12.5 × 1.5	10 × 1.3	18.4 × 2.2	9.3 × 1.3

1. Data taken from McVaugh (1987), Macqueen & Hernández (1997) and additional herbarium specimens.
2. Measurements taken from herbarium specimens from Durango, Sinaloa and Sonora.

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