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A new species of *Zamia* (Zamiaceae) from Belize and the Yucatan Peninsula of Mexico

DENNIS WM. STEVENSON[1], ALDO MORETTI[2], LUCIANO GAUDIO[3].

[1]The New York Botanical Garden, Bronx, NY 10458, U.S.A. [2]Dipartimento di Biologia Vegetale and [3]Dipartimento di Genetica, Biologica Generale e Molecolare; Facoltà di Scienze, Università di Napoli Federico II, Italia.

Abstract. A new species, *Zamia polymorpha* D. Stevenson, Moretti & Vázquez Torres from the Yucatan Peninsula and Belize, is described. It appears to be related to but cytologically, morphologically, geographically, and climatically separated from *Zamia loddigesii* Miq. Chromosome number varies from 2n = 17 to 2n = 22 – 28.

Riassunto. Viene descritta *Zamia polymorpha* D. Stevenson, Moretti & Vázquez Torres, una nuova specie distribuita nella Penisola dello Yucatan (Messico) ed in Belice. La specie è affine a *Z. loddigesi* Miq., ma ne differisce per aspetti citologici, morfologici, geografici e climatici. *Z. polymorpha* presenta variabilità cromosomica con 2n = 17, 22, 23, 24, 25, 26, 27, 28.

Key words: Belize, cycads, karyotype, Mexico, Zamiaceae, *Zamia polymorpha*.

During the course of field work in 1988 in Belize and the contiguous Yucatan Peninsula of Mexico, we surveyed 11 populations of *Zamia*, collected herbarium specimens representing the variability observed in each population, and collected living plants for further morphological and cytological studies. At that time we assumed that the species was *Zamia loddigesii* Miq. although disjunct in distribution from Veracruz, Mexico. After examining more material from the Yucatan Peninsula collected by S. Cozzolino and G. Vallariello, the living collections of Fairchild Tropical Garden, and additional herbarium material from Belize at BRH, K, MO, and Z, we have come to the conclusion that all of these plants represent a new species.

Zamia polymorpha D. Stevenson, A. Moretti & M. Vázquez Torres sp. nov. (Fig. 1).

TYPE: **BELIZE**. Cayo: 22 Jan 1989, *D. Stevenson et al. 1119* (HOLOTYPE: NY; ISOTYPES: BRH, FTG, MO, NY, U).

Caudex subterraneus; folia 1-3, erecta, paucifoliolata; foliola mediana lanceolata ad suboblanceolata, acuta, serrulata; microsporophylla microsporangiis abaxialibus; strobili feminei fusca; semina rubra.

Stem subterranean, subglobose, to 10 cm diam. *Cataphylls* ovate, 3-4 cm long, 1.5-2.5 cm wide. *Leaves* 2-3 (1-4), 0.5-1.5 m long; petiole 15-50 cm long, sparsely to densely prickled; rachis with 3-12 pairs of leaflets. *Leaflets* lanceolate to oblanceolate, cuneate basally, acute to subacuminate apically, margins serrate in the upper two-thirds, the larger median ones 20-30 cm long, 2-8 cm wide. *Polleniferous strobili* tan, cylindrical to ovoid-cylindrical, 6-10 cm long, 2-4 cm diam.; peduncle 2-4 cm long. *Microsporophylls* with sterile tip composed of six slightly inclined facets surrounding a small, centrally depressed terminal facet, sporangia present on abaxial surface only. *Ovulate strobili* tan to brown, cylindrical to ovoid-cylindrical, 10-15 cm long, 5-7 cm diam. *Seeds* light-red to red, 1.5-2 cm long, 0.5-0.8 cm diam.
$2n = 17, 22, 23, 24, 25, 26, 27$, and 28.

Zamia polymorpha is endemic to the Yucatan Peninsula of Mexico and along the eastern coast of Belize extending westward up to 500 m on the eastern slope of the Maya mountains.

In many aspects many individual plants of *Zamia polymorpha* are most similar to *Z. loddigesii*. These include general growth habit, the presence of 2-3 leaves, leaf size and shape, and leaflet size and texture. However, both the pollen and ovulate strobili differ from *Z. loddigesii* in color, overall shape and the morphology of the individual sporophylls. The pollen cones of *Z. loddigesii* are brown at pollen shedding and have microsporophylls with a large terminal facet that obscures the presence of the six small lateral facets. In contrast, *Z. polymorpha* has light tan to tan pollen cones at pollen shedding and microsporophylls with a small terminal facet and six prominent lateral facets (Fig. 1H). The ovulate strobilus of *Z. loddigesii* is gray to very light tan and cylindrical with a prominent prolonged and constricted acuminate, sterile tip (see for example the color photograph on page 286 in JONES, 1993) whereas the ovulate strobilus of *Z. polymorpha* is tan to brown and ovoid with a gradual, acute, sterile tip (Fig. 1G).

Other plants of *Z. polymorpha* appear similar in leaflet morphology and texture to plants of *Z. furfuracea* L. fil. but they lack the distinctive pubescence that characterizes mature leaflets of *Z. furfuracea* as well as the obovate leaflets that generally characterize *Z. furfuracea*.

Other differences include the karyotype which is variable in *Z. polymorpha* (2n = 17, 22, 23, 24, 25, 26, 27, and 28) but only 2n = 18 in both *Z. loddigesii* (NORSTOG, 1980; MORETTI, 1990) and *Z. furfuracea* (NORSTOG, 1980; MORETTI, 1990) from Veracruz, Mexico. The numerous reports of the variable karyotype of *Z. polymorpha* from the Yucatan Peninsula and Belize have been published either under *Zamia* sp. nov. (MORETTI, 1990; MORETTI et al., 1991; CAPUTO et al., 1996) or *Z. loddigesii* (NORSTOG, 1980; VOVIDES & OLIVARES, 1996).

The specific epithet, *Z. polymorpha*, is derived from the fact that the species exhibits extreme variability in leaf and leaflet morphology (Fig. 1). Those plants and in some cases individual leaves that are exposed to full sun are shorter, more narrow, coriaceous, and have leaflets that are lanceolate and finely serrate (Fig. 1C, E). In contrast, those plants, and in some cases individual leaves, that are in deep shade have longer, broader, subcoriaceous to papyraceous leaves and have leaflets that are elliptic to suboblanceolate (Fig. 1D, F). Those plants growing under intermediate conditions exhibit leaf morphologies that are intermediate between these two extremes. This variability in leaf morphology was observed in all eleven populations studied in the Yucatan Peninsula and Belize.

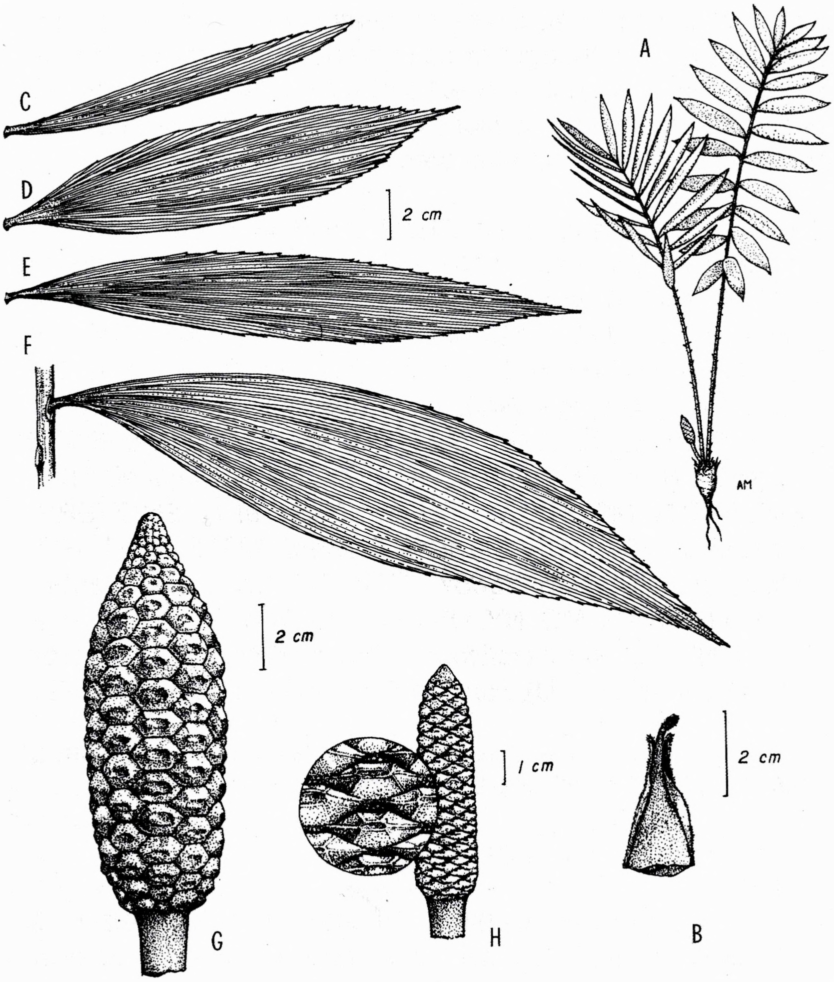

Fig. 1 - *Zamia polymorpha*. **A.** Habit based on Stevenson et al. 1118. **B.** Cataphyll. **C–F.** Leaflets based on Stevenson et al. 1119 (holotype). **G.** Ovulate strobilus. **H.** Polleniferous strobilus.

Moreover, it was in all cases correlated with habitat so that the extremes can be thought of as sun and shade forms. This is supported by the fact that both extremes were observed in a few cases to exist on the same plant (Fig. 1A) where one leaf was exposed to full sun and another was highly shaded.

Other specimens examined: BELIZE. **Belize**: *Ratter 5195* (E, NY); *Stevenson et al. 1135* (BRH, FTG, MO, NY, U); *Whitefoord 2569, 2603* (BM). **Cayo**: *Balick et al. 1803, 3157* (BRH, NY); *Stevenson et al. 1118, 1120, 1121* (BRH, FTG, MO, NY, U); *Fairchild Tropical Garden 84-13a,b* (FTG); *H. Fowler s.n.* (K); *Wiley 333* (MO). **Orange Walk**: *Balick et al. 3264* (BRH, NY); *Davidse & Brant 32768* (BRH, MO, NY). **Stann Creek**: *Balick et al. 2731* (BRH, NY); *Schipp 1, s-1* (BRH, Z); *Stevenson et al. 1129, 1130* (BRH, FTG, MO, NY, U). **Toledo**: *Balick et al. 2520* (BRH, NY); *Davidse 36274* (MO); *Davidse & Brant 32232* (BRH, MO, NY); *Davidse & Holland 36657* (MO). MEXICO. **Campeche**: *Stevenson 1140* (FTG, MO, NY, U). **Quintana Roo**: *Stevenson et al. 1138* (FTG, NY, U); *S. Cozzolino s.n.* (NAP). **Yucatan**: *Stevenson et al. 1139* (FTG, MO, NY, U); *Fairchild Tropical Garden 60-466* (FTG).

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