Systematic Botany (1989), 14(2): pp. 214–219

A New Species of *Zamia* from Honduras

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ABSTRACT. A new species in the genus *Zamia* (Zamiaceae), **Z. standleyi**, from northern Honduras is described. This subterranean-stemmed species appears most closely allied to *Z. splendens*. The combination of characteristics that set *Z. standleyi* apart from other species in the genus are its arcuate leaves, slightly folded leaflets, sexual dimorphism in cone habit, and pronounced falcate leaflets with extremely spinulose marginal teeth. Its diploid chromosome number is 16.

Having first observed an unusual cycad at Fairchild Tropical Gardens, interest in it was intensified during a 1985 visit to the cycad collection of Mr. Merrill Rogers in Tampa, Florida, where several fertile microsporangiate and megasporangiate plants were growing. The strobili bore a striking resemblance to those of *Z. splendens* Schutzman, and were quite unlike those of *Z. loddigesii* Miq., the species in which it was included in earlier studies of Mesoamerican zamias (Schutzman 1982). Herbarium materials do not preserve key leaflet characteristics, and often lack reproductive structures and important plant habit details. These missing data, together with the lack of information about the diploid chromosome number, may explain why the species was not recognized as distinct until now.

Zamia standleyi Schutzman, sp. nov. (figs. 1, 2).—TYPE: Honduras, Atlántida, Lancetilla Valley, near Tela, Aug 1984, *Schutzman 449* (holotype: FLAS; isotypes: ENA, FTG).

Haec species *Z. splendens* Schutzman affinis sed foliolis falcatis vel subfalcatis, plus angustis et plus tenuibus, apicibus acuminatis, iunctura foliolorum ad rhachem gracilior, laminis secus axes longos leviter plicatis, dentibus plus spinulosis, strobilis megasporangiatis erectiusculis.

Plants dioecious. Leaves usually 1–3 depending on size, location, and condition of the plant, arcuate, white tomentulose when emergent, 20–100 cm long; leaflets opposite to subopposite on a single leaf, long-lanceolate, 20–45 cm long, 1.5–3.5 cm wide; apex acute; margin denticulate, subrevolute; marginal teeth spinulose, 0.5–4.0 mm long; base attenuate, red or bright green when expanding, green, coriaceous and glabrous when mature; articulation with rachis 3.0–5.0 mm wide, remaining bronzy red in individuals with red emergent leaves; petiole variably spinose, especially closer to the petiole base, 10–55 cm long, 3.0–6.0 mm median diam.; spines terete, to 5 mm long; petiole base bulbous in larger leaves, lacking spines, rusty tomentulose and glabrescent; cataphylls chartaceous, elongate triangular, those preceding cone formation with a long twisted acuminate apex, exstipulate, 5.0–11.5 cm long, 0.9–1.5 cm wide; cataphylls preceding leaf formation triangular, stipulate, 3.5–5.0 cm long, 1.4–2.6 cm wide. Microsporangiate strobili decumbent, cylindrical, coffee-colored, 7–8 cm long, 1.5–2.0 cm in diam.; microsporophylls cuneiform, the distal ends hexagonal-truncate, 4.0–5.0 mm long axis, 2.5–3.0 mm short axis, proximal to distal end 6.0–7.5 mm; microsporangia spheroidal, (14)16(18) per sporophyll, aggregated into sori of two microsporangia each, dehiscing by longitudinal sutures, 0.8–1.0 mm in diam.; peduncle puberulent, 2–4 cm long, 0.6–1.0 cm in diam. Megasporangiate strobilus cylindrical, barrel shaped with an extended apiculate apex, coffee-colored, tomentulose, 8.5–11.5 cm long, 4.3–8.5 cm in diam.; peduncle puberulent, 2.5–3.8 cm long, 1.5–1.8 cm in diam.; megasporophylls cuneiform, the distal ends hexagonal-truncate with a short hexagonal-truncate protuberance, 1.8–2.0 cm long axis, 0.8–1.1 cm short axis, proximal to distal end 1.6–1.9 cm; ovules two per megasporophyll. Seed 1.6 cm long, 1.0 cm wide, salmon pink turning bright scarlet at maturity. Chromosome number $2n = 16$.

Additional specimens examined. HONDURAS. **Dep't. Atlántida:** Tela, Dec 1922, *Van Severen 1450* (NA), Aug 1923, *Reinking s.n.* (NA #32199), 1927/1928, *Standley 53721* (F, US); Puerto Sierra, Feb 1903, *Wilson 537*

FIG. 1. *Zamia standleyi* vegetative structures. A. Cultivated plant, *S-417*, showing habit. B. Leaf. C. Detail of leaflets, showing subplicate lamina. D. Detail of leaflet showing margin with spinulose teeth. E. Detail of spinulose petiole. F. Detail of leaf base, bulbous and lacking spines. G. Emergent leaf, showing tomentulose quality and early arcuate habit. H. Cataphylls preceding leaves (left) and strobili (right). Scale for A = 10 cm; for B, C, G = 5 cm; for D–F, H = 1 cm.

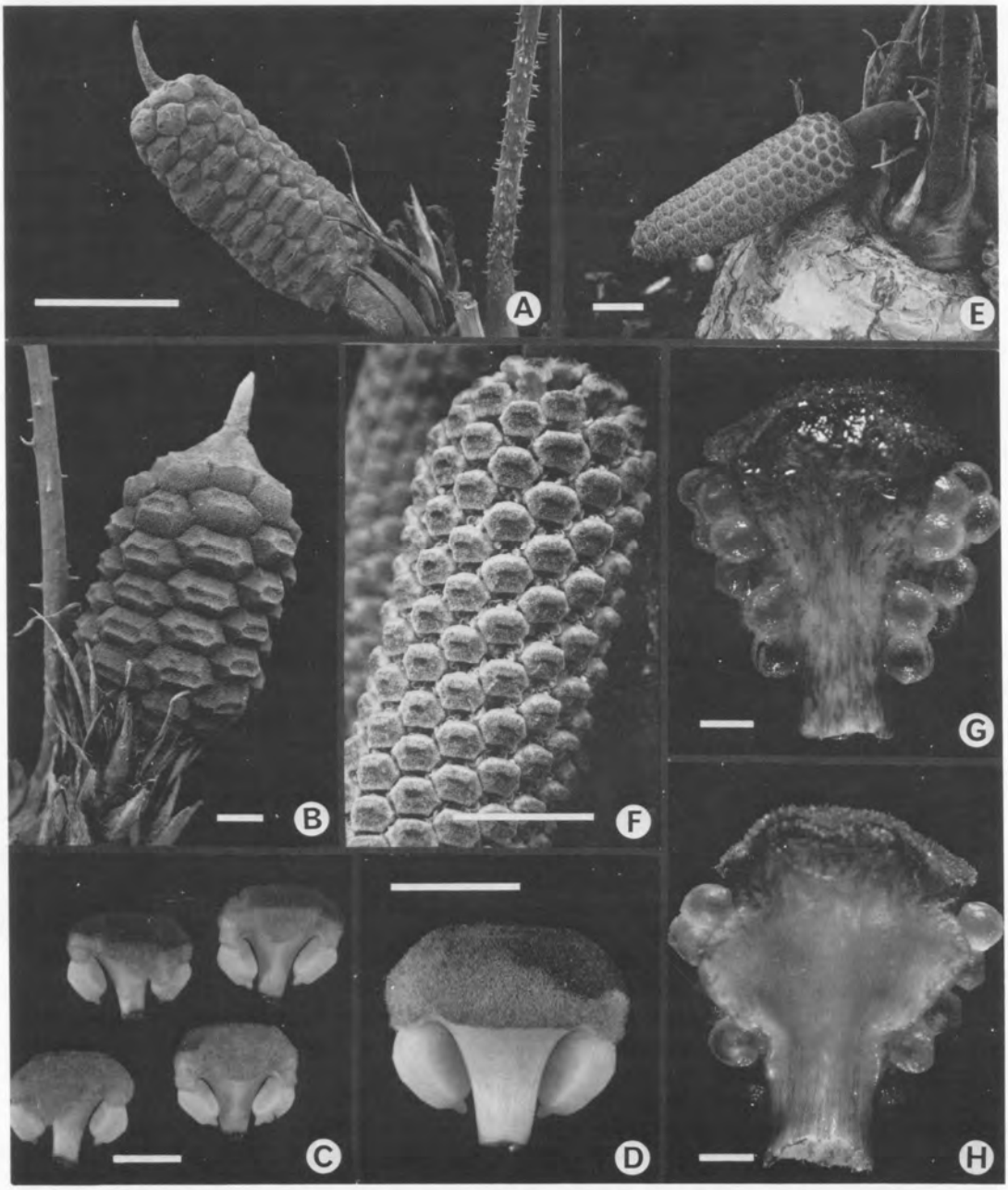

FIG. 2. *Zamia standleyi* reproductive structures. A, B. Megasporangiate strobili. C. Abaxial view of megasporophylls. D. Adaxial view of megasporophyll. E. Microsporangiate strobilus. F. Detail of dehiscent microsporangiate strobilus. G. Abaxial view of microsporophyll. H. Adaxial view of microsporophyll. Scale for A = 5 cm; for B-F = 1 cm; for G, H = 1 mm.

FIG. 3. Distribution of *Zamia standleyi* in Honduras.

(NY). **Dep't. Santa Barbara:** San Pedro Sula, Jun 1887, *Thieme 144* (US). **Dep't. Yoro:** Coyoles, Jun–Aug 1938, *Yuncker & Wagner 8186* (F, G, GH, MO, NY); La Lima, Dec 1929, *Johansen s.n.* (F #605352). **Dep't. Cortes:** Montaña Sta. Ana., *Molina R. 3628* (F, GH).

Etymology. The species is named for Paul C. Standley, to whom the scientific community is indebted for his outstanding as well as prolific floristic work in Mexico and Central America.

The plant has the vernacular name "camotillo," and is well known because of its potent toxic qualities. Standley (1937) writes: "In the coast of Honduras there is a species of this group (*Z. furfuracea* L. f.), which is known by the name Camotillo. Its root is highly poisonous, and has been employed at times for criminal poisonings, as well as for poisoning noxious animals. There is a popular belief that the root, if out of the ground two days, kills its human victim in two days; if dug in a week, it kills in a week, and so on."

The plant has been under cultivation in the United States for several years, and Fairchild Tropical Garden maintains several specimens in outdoor plantings. Its leaves are usually damaged at FTG while in their tender emergent stage by larvae of *Eumaeus atala florida*, but this problem is localized to cycads planted outdoors in tropical regions; elsewhere the plant is quite attractive, especially the red-leaved individuals, which keep their emergent coloration for quite some time.

Distribution and Ecology. *Zamia standleyi* is found in the northern river valleys of Honduras, from San Pedro Sula eastward toward the Caribbean coast, reported as far east as the Rio Plátano (fig. 3). It has been collected from semixeric woodlands, disturbed secondary scrub (matorral), moist hillsides, and cultivated fields. Standley (1931), who identified it as *Zamia furfuracea*, reported the plant as "occasional in brushy places" with a range extending northward into southern Mexico, but this distribution encompasses several species that were poorly known at that time, only one of which bears even a superficial resemblance to the Honduran entity (*Zamia loddigesii*). Altitude of known collections are all between sea level and 100 m. Further fieldwork is necessary to determine the full extent of the range of the species and whether it extends into contiguous areas in Guatemala. Precise localities of this species are withheld due to possibility of overcollection or eradication of populations by commercial interesets, as has been discussed by Dehgan (1983) and reported by Vovides and Gomez-Pompa (1977).

Taxonomic Relationship. *Zamia standleyi* has affinities with *Z. splendens*, native to Chiapas, Mexico; *Z. purpurea* Vovides, Rees & Vázquez-Torres, from Veracruz and Oaxaca, Mexico; and *Z. cremnophila* Vovides, Schutzman & Dehgan (Schutzman et al. 1988), a cliff-dwelling, pendent-leaved species from Tabasco, Mexico. *Zamia standleyi* has falcate to subfalcate leaves that are least coriaceous within this group of species (0.40–0.50 mm thick); *Z. splendens* has leaflets which are long-elliptic to oblanceolate, and those of *Z. purpurea* are elliptic to elliptic-lanceolate. *Zamia standleyi* is the only species in the genus in which the leaflets have a slight

fold paralleling their long axis (fig. 1C). This phenomenon has been observed consistently in living plants seen from several localities representing a significant portion of the species' known range, but this feature is lost in pressed specimens. The folding also is more prominent in smaller leaves than it is in the largest ones. This trend also is applicable to leaflet shape; leaflets of the largest leaves are somewhat less falcate than those of smaller ones. Of the other species in this group, only *Z. splendens* populations in northeastern Chiapas occasionally exhibit slightly falcate leaflets. They are absent from *Z. purpurea* and *Z. cremnophila*.

Zamia standleyi shows a pronounced sexual dimorphism in the habit of micro- and megasporangiate strobili; the microsporangiate strobili are declinate to decumbent, while the megasporangiate strobili are held nearly erect. Cone morphology of *Z. splendens* and *Z. standleyi* is remarkably similar; cone size, color, and shape are nearly identical, but megasporangiate strobili of *Z. splendens* are declinate or decumbent early in development and eventually become pendent. Megasporangiate strobili of *Z. purpurea* are small, dark brown, and held upright, those of *Z. cremnophila* are deep brown, but megasporangiate strobilus size is similar to *Z. standleyi* and *Z. splendens*. Predominant microsporangial number per median microsporophyll in both *Z. standleyi* and *Z. cremnophila* is 16, while it is four or eight in *Z. purpurea* and 20 in *Z. splendens*. This feature appears to be reliable because it is consistent even in smaller depauperate strobili sampled within a given population.

The combination of characteristics that set *Z. standleyi* apart from other species in the genus are its arcuate leaves, unusual, slightly folded leaflets, sexual dimorphism in cone habit, and pronounced falcate leaflets with extremely spinulose marginal teeth. Previously, others have allied this plant with *Z. loddigesii*, which has none of the above-mentioned features. I treated *Z. standleyi* preliminarily as "Honduran Loddigesii Group" in earlier phenetic, morphological, and anatomical work (Schutzman 1982) but had not seen reproductive characteristics. Therefore, I reached no conclusions as to its distinctness. Herbarium specimens of the plant are mostly labeled *Z. furfuracea* and annotated *Z. loddigesii* or *Z. pumila*, neither of which is known to occur in Honduras. A key to Mexican, Honduran and Guatemalan zamias is presented in the appendix.

Norstog (1980) studied metaphase cell configurations of several *Zamia* species, including this one, which was misidentified as *Z. tuerckheimii* Donn. Sm., an arborescent species native to Guatemala and Honduras, in Fairchild Tropical Garden accession records (accession number FTG 76-977, from Olanchito, Honduras). He did not present details of its karyotype because chromosome morphology was obscure in his configurations. The diploid number $2n = 16$ is characteristic of *Z. splendens* (Schutzman 1984), *Z. purpurea* (Vovides 1983a, 1983b) and *Z. cremnophila* (Schutzman et al. 1988), among others. Further work in preparation may elucidate karyotypic differences and similarities among the species.

ACKNOWLEDGMENTS. I would like to thank the following institutions for loans of and/or access to herbarium materials: F, G, GH, MO, NY, US. Personal assistance from Alan Meerow is gratefully acknowledged. I would also like to thank Scott Linke for his assistance in fieldwork, Carlos Carías for help in collecting arrangements, Escuela Nacional de Agricultura (ENA) in Catacamas, Olancho, and the Ministro de Recursos Naturales in Tegucigalpa for their gracious assistance in obtaining collecting permits. The valuable commentary of Bijan Dehgan, Walter S. Judd, Knut Norstog, and Thomas J. Sheehan during the preparation of this manuscript is greatly appreciated. This paper is Florida Agricultural Experiment Station Journal Series No. 8926.

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APPENDIX. Key to Mexican, Guatemalan, and Honduran Species of *Zamia* L.

1. Plants arborescent, leaflets with entire margins.
   2. Petiole/rachis unarmed ..... *Z. inermis* Vovides, Rees & Vázquez-Torres
   2. Petiole/rachis spinulose.
      3. Leaflets wider than 2 cm ..... *Z. tuerckheimii* Donn. Sm.
      3. Leaflets narrower than 2 cm ..... *Z. soconuscensis* Schutzman, Vovides & Dehgan
1. Plants not arborescent, leaflets with denticulate margins.
   4. Leaflets of plants obscurely to brightly variegated with yellow to white spots ..... *Z. picta* Dyer
   4. Leaflets of plants not variegated.
      5. Plants partly hypogeous, partly epigeous, leaflet apices obtuse to acute ..... *Z. furfuracea* L. f.
      5. Plants entirely hypogeous, leaflet apices acute-long acuminate.
         6. Leaves pendent ..... *Z. cremnophila* Vovides, Schutzman & Dehgan
         6. Leaves erect to arching.
            7. Megastrobili declinate to pendent ..... *Z. splendens* Schutzman
            7. Megastrobili erect.
               8. Petiole/rachis unarmed, leaflets shorter than 10 cm. ..... *Z. fischeri* Miq.
               8. Petiole/rachis usually armed, leaflets longer than 10 cm.
                  9. Leaflets <7 mm wide ..... *Z. spartea* A. DC.
                  9. Leaflets >7 mm wide.
                     10. Veins slightly protruding on adaxial leaflet surface ..... *Z. purpurea* Vovides, Rees & Vázquez-Torres
                     10. Veins not protruding.
                        11. Leaflets papyraceous ..... *Z. herrerae* Calderón & Standley
                        11. Leaflets coriaceous.
                           12. Leaflets slightly folded lengthwise, falcate to subfalcate ..... *Z. standleyi* Schutzman
                           12. Leaflets neither folded nor falcate ..... *Z. loddigesii* Miq.