

A NEW SPECIES OF *ZIZIPHUS* (RHAMNACEAE) FROM FLORIDA¹

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ABSTRACT

A new endemic, *Ziziphus celata*, is described from the xerophytic scrub and pinelands of the Lake Wales Ridge in peninsular Florida. This distinctive geniculate-thorny shrub shows clear affinity with the arid, southwestern North American "*Condaliopsis* group" of *Ziziphus*, and represents a significant eastward range extension for this group. The native vegetation of the Lake Wales Ridge has been extensively destroyed, and the plant is represented only by a single specimen collected by Ray Garrett in 1948 near Sebring, Highlands County, Florida. The species is very likely now extinct.

Key Words: Endemism, extinction, flora of Florida, Rhamnaceae, *Ziziphus*

Ray Garrett, a local botanist, collected the type (and only) specimen for the species described herein near Sebring, Florida in March 1948. Correspondence at FLAS indicates that Garrett lived in Sebring. He collected extensively in the surrounding scrub and pinelands, and sent numerous specimens to the Herbarium of the University of Florida. Garrett consulted with Erdman West and Lilian Arnold at the U. F. Herbarium; neither could identify the plant but both thought it to be in the Rhamnaceae. The specimen was placed unmounted at the end of the family in an undetermined folder. Over the past thirty-five years no other specimen of this plant has been found, to the authors' knowledge. During this time efforts were made to identify this unusual plant; visiting botanists were shown the specimen, but none was familiar with it. Efforts were also made by several researchers to find the type locality and collect other specimens. On a recent visit to the Field Museum of Natural History (Chicago, Ill.) the senior author noticed the similarity of the undetermined specimen to *Condalia* Cav. and *Ziziphus* Mill. The taxonomic diversity of these genera in the southwestern United States and Mexico further suggested the possibility that they could be reasonable generic determinations, since Florida has a number of disjuncts of western taxa. Examination of material of many genera and species of the family Rhamnaceae has convinced the authors

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that the Sebring material is indeed referable to *Ziziphus*, and that it was unnamed. An interesting and prophetic remark was made by Ray Garrett, the collector of this specimen. In a letter written during the summer of 1948, he mused the J. K. Small had found many novelties in the arid scrub habitat, and wondered why he could not also find something rare. The specimen described below gives clear evidence that he did.

The specific epithet "celata" (meaning hidden) reflects the frustrating taxonomic history of the plant.

Ziziphus celata Judd and Hall, *sp. nov.* (Figure 1).

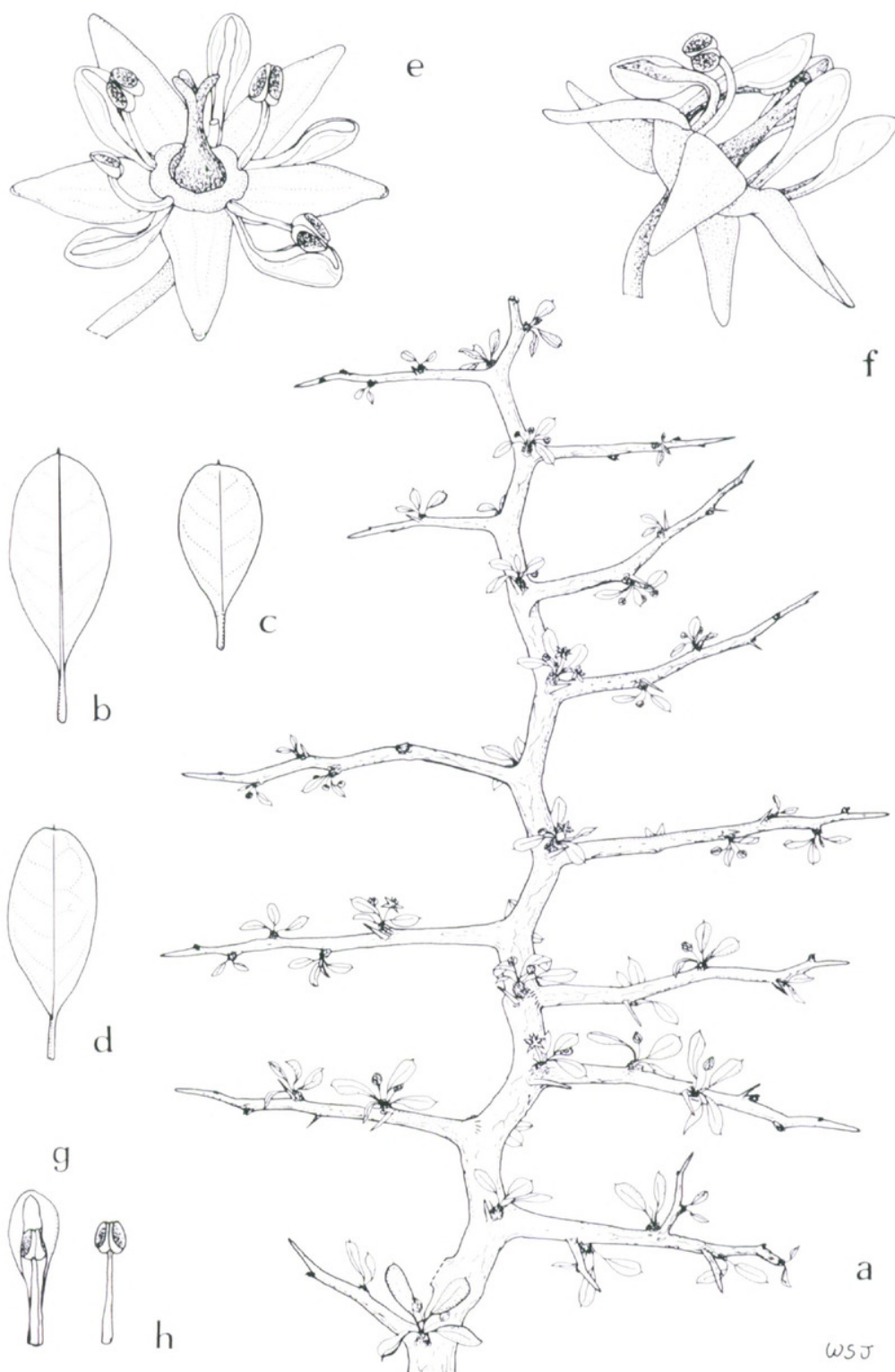
Frutex; rami primarii geniculati et glabri, ferentes brachyblastos et spinas inaequales binatas ad nodos; spinae minores ca. 1–4 mm longae, longiores (0.8) 1.3–3.7 cm longae cum (2)3 vel 4 brachyblastis secundariis et spinis tertiariis parvulis. Cortex grisea; internodia 3–12 mm longa. Folia decidua, alterna (vel fasciculata ad brachyblastos), glabra; lamina ca. 4.5–10 mm longa, 3–5 mm lata, oblonga-elliptica vel leviter ovata, ad apicem rotundata vel leviter emarginata cum mucrone minuto, ad basin cuneata vel attenuata; margo integer; nervatura brochidodroma; petiolus 1.5–3 mm longus; stipulae minutae. Flores axillares (fasciculati ad brachyblastos), vernaes; pedicellus 2–3 mm longus. Sepala 5, ovata-triangularia, 1.1–1.6 mm longa, glabra, viridia. Petala 5, spathulata, 1–1.3 mm longa, glabra, alba. Stamina 0.8–1 mm longa. Discus laevis, incrassatus, ovarii basin cingens. Ovarium 2–3 loculare; stylus contractus, bifurcatus vel trifurcatus. Fructus non visus.

Shrubs; primary branches geniculate and arcuate, to 20 cm long, glabrous, without thorn-tips, bearing numerous short shoots from the lowest nodes of which arise one or usually two distinctly unequal thorn-tipped secondary branches [the smaller ca. 1–4 cm long and the larger (0.8)1.3–3.7 cm long] the larger of which in turn bear from (2)3 to 4 short shoots. These secondary short shoots each usually produce a single small [0.3–4(–6.5)mm] tertiary thorn. Bark gray; internodes 3–12 mm long. Leaves deciduous, alternate (fascicled on short shoots); blade oblong-elliptic to slightly ovate, ca. 4.5–10 mm long, 3–5 mm wide (possibly becoming larger with age), glabrous, eglandular, coriaceous; apex rounded to slightly emarginate with a small mucro; base cuneate to slightly attenuate; margin entire; venation brochidodromous with midvein prominent, impressed above and raised beneath, secondary veins inconspicuous; petiole

1.5–3 mm long; stipules narrowly-triangular, minute. Flowers small, perfect, perigynous, solitary and axillary but seemingly fascicled on the short shoots, vernal (appearing with leaves); pedicel 2–3 mm long. Cup ca. 1–1.3 mm in diameter, glabrous. Sepals 5, ovate-triangular, 1.1–1.6 mm long, glabrous, green. Petals 5, spatulate and clasping the stamens, 1–1.3 mm long, glabrous, white. Stamens 5, 0.8–1 mm long; anther opening by 2 longitudinal slits. Disc smooth, thickened and closely surrounding but free from base of ovary. Ovary 2–3 loculed, glabrous, tapering to style; style ca. 0.7–1 mm long, bifid or trifid to ca. one-half its length. Fruit not seen, likely a drupe.

TYPE: UNITED STATES. Florida. Highlands Co., on sand dunes, vicinity of Sebring. 18 March, 1949. *Ray Garrett s.n.* (FLAS).

Ziziphus celata is reminiscent of both *Z. obtusifolia* (Hook.) A. Gray and *Z. parryi* Torr. It consistently differs from the former highly variable species in that it (1) has its flowers solitary in the axils of leaves of the short shoots, (2) lacks unicellular hairs on its twigs, leaves, and flowers, and (3) has branchlets lacking a grayish to whitish wax-like bloom. The taxon is separated from the latter by its (1) usually paired unequal secondary thorns, (2) several-noded secondary thorns (these bearing several short shoots and often small tertiary thorns), and (3) floral cup and sepals greenish (not purplish-green). These three species, along with *Z. lloydii* (Standley) M. C. Johnston, *Z. pedunculata* (Brandg.) Standley and *Z. mexicana* Rose, form a complex intermediate between the widespread tropical genus *Ziziphus* and the xerophytically adapted southwestern U.S.—Mexican—South American genus *Condalia*. This intermediate complex has the floral characters of *Ziziphus*, i.e., disc thickened around ovary, ovary base broadly attached to receptacle, style tapered and forked, petals present, along with some (to all) of the xeromorphic features of *Condalia*. The latter group includes scrubs of arid habitats with small, $\pm$ obovate, entire-margined, pinnate-veined leaves fascicled on short shoots borne on thorn-tipped branches with very short internodes. In addition, stipular spines are lacking (see Johnston, 1962). These intermediate species have been treated as *Condalia* subgenus *Condaliopsis* by Weberbauer (1895) or as a distinct genus *Condaliopsis* (Weberb.) Suessenguth (1953). However, Johnston (1962) noted that species of "*Condaliopsis* share characters of ovary, disc and style which set them off from *Condalia*



and at the same time show their similarity to *Ziziphus*.” He added that although these species approach “*Condalia* in several characteristics which can be put under the general heading of ‘xeromorphy’”, they are “not separable from the large diverse genus *Ziziphus*.” Following Johnston (1962, 1963) we consider the species described above as a *Ziziphus*.

Previously known species of the “*Condaliopsis* group” are limited to arid habitats of the southwestern United States (California to Texas and Oklahoma) and Mexico (Johnston, 1963). *Ziziphus celata*, collected only in the xerophytic sand scrub of Highland Co., Florida, thus represents a significant eastward range extension. However, as mentioned above, other Florida taxa show similar patterns, either occurring as disjuncts in mesic to xerophytic habitats of Florida and the southwestern U.S./Mexico or having closely related species to the west. Some examples include: *Callirhoe papaver* (Cav.) A. Gray, *Ceanothus microphyllus* Michx., *Eriogonum longifolium* Nutt. var. *gnaphalifolium* Gand. (*E. floridanum* Small), *Forestiera pubescens* Nutt., *Krameria lanceolata* Torr., *Lyonia ferruginea* (Walt.) Nutt., *Lyonia fruticosa* (Michx.) G. S. Torrey, and *Rudbeckia nitida* Nutt. var. *nitida*. The ancestors of *Ziziphus celata* may have reached Florida from the west during past periods of increased aridity.

The species has also been compared with various small-leaved Caribbean species of *Ziziphus* (see Johnston, 1964). *Ziziphus celata* is clearly distinct from these taxa (compare leaf margin, venation, inflorescence structure), and probably is not closely related. In addition, the Caribbean species are typically plants of limestone or serpentine habitats whereas *Z. celata* is found on acid white sand.

Ziziphus celata is likely a member of the characteristic and highly endemic flora occurring on the sterile white sands of the Central Florida Ridge. The most common plant communities of this region are known as the Sand Pine – Xerophytic Oak Scrub and the High Pinelands/Sandhills. The former is dominated by *Pinus clausa* (Chapm. ex Engelm.) Vasey ex Sarg., *Quercus geminata* Small, *Q.*

Figure 1. *Ziziphus celata*: **a**, habit (drawn from specimen), $\times 1$; **b-d**, leaves (drawn from material re-expanded by boiling), $\times 2$; **e**, flower (drawn from material re-expanded by boiling), $\times 15$; **f**, flower (drawn from dried material), $\times 15$; **g**, petal clasping stamen, $\times 15$; **h**, stamen, $\times 15$.

myrtifolia Willd., and *Q. chapmanii* Sarg., while the latter is dominated by *Pinus palustris* Mill. However, the area is now mainly occupied by citrus groves and urban developments. This area supports numerous other endemics: *Asclepias curtissii* A. Gray, *Bonamia grandiflora* (A. Gray) Heller, *Bumelia lacuum* Small, *Carya floridana* Sarg., *Chapmannia floridana* Torr. & Gray, *Chionanthus pygmaeus* Small, *Clitoria fragrans* Small, *Conradina canescens* (Torr. & Gray) A. Gray, *Dicerandra frutescens* Shinnery, *Eryngium cuneifolium* Small, *Garberia fruticosa* (Nutt.) A. Gray, *Hypericum cumulicola* (Small) P. Adams, *H. edisonianum* (Small) Adams & Robson, *Ilex opaca* Ait. var. *arenicola* (Ashe) Ashe, *Lechea cernua* Small, *Liatris ohlingerae* (Blake) Robins., *Lupinus aridorum* McFarlin ex Beckner, *L. cumulicola* Small, *Nolina brittoniana* Nash, *Osmanthus megacarpus* Small, *Paronychia chartacea* Fern., *Persea humilis* Nash, *Polygala lewtonii* Small, *Polygonella ciliata* Meisn. var. *basiramia* (Small) Horton, *P. myriophylla* (Small) Horton, *Prunus geniculata* Harper, *Quercus inopina* Ashe, *Sabal etonia* Swingle ex Nash, *Stylisma abdita* Myint, *Warea amplexifolia* (Nutt.) Small, and *W. carteri* Small (see also James, 1961; Harper, 1949; Ward, 1979). Even the striking geniculate-thorny habit of *Ziziphus celata* is present in several other characteristic scrub taxa, such as *Prunus geniculata*, *Bumelia lacuum*, *Ximenia americana* L. and a distinctive local variant of *Crataegus flava* Ait.

The authors suggest that systematic studies of the endemic species of the Central Florida Ridge are urgently needed. The natural plant communities of the region are rapidly being destroyed by agricultural and urban development, with the only significant remnants of native flora existing in the Ocala National Forests in the north and Archbold Biological Station in the south. Very likely *Ziziphus celata* is now extinct; most of the natural vegetation near Sebring has been destroyed, and the species has never been collected since, despite repeated searches by D. Burch, D. Ward and the authors. It is feared that many additional taxa of this area (e.g., *Warea amplexifolia*, *Lupinus aridorum*, *Stylisma abdita*, *Nolina brittoniana*, *N. atopocarpa* Bartl., *Eryngium cunifolium*, and *Hypericum cumulicola*) may soon become extinct thus rendering future studies of their ecology and systematics impossible or very difficult to accomplish.

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