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## A ZAMIA FROM THE LOWER EOCENE

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Although *Zamia*-like foliage is so common and widespread in Mesozoic deposits the world over and more than thirty species of *Zamia* still exist in tropical and sub-tropical America, including two that occur in our Floridian region, the number of cycads that have thus far been discovered in Tertiary deposits anywhere is extremely limited.

Much interest therefore attaches to the discovery of a small-leaved form of *Zamia* in the sandy clays of the upper Wilcox at Meridian, Mississippi. At this outcrop the plant-bearing clays overlie marine glauconitic sand with mollusca of upper Wilcox age. The cycads are associated with an endless number of leaves and other remains of a large new species of *Nelumbo*, with leaves of a fan palm and with species of *Lygodium*, *Sapindus*, *Nectandra*, *Mespilodaphne*, *Ficus*, *Combretum*, *Dalbergites* and *Aralia*. All of these are members of a coastal flora containing many sub-tropical elements and of wide extent in southeastern North America during the early Tertiary.

The new *Zamia* may be described as follows:

### *Zamia mississippiensis* sp. nov.

Leaves elongate, slender and linear. Rachis stout. Pinnules small, crowded, opposite or sub-opposite, bluntly pointed, constricted proximad to a relatively broad inequilateral base, attached to the sides of the top of the rachis. Length 1.25 cm. to 1.50 cm. Maximum width about 2 mm. Margins entire. Texture coriaceous. Venation consisting of from eight to ten longitudinally sub-parallel veins, occasionally dichotomous proximad (text figures 1-3).

This characteristic *Zamia* is represented in the present collections by three specimens, two of which are figured. In the

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one, which shows a portion of the pinnule-bearing part of a rachis 4.4 cm. long, the pinnules are slightly larger than in the other figured specimen and are more scattered, but this is due to the loss of the intervening pinnules. In the other figured specimen a similar pinnule-bearing part of the rachis 4.7 cm. long shows traces of fourteen pairs of pinnules. The rachis is somewhat more slender than in the other specimen and the pinnules are slightly smaller. The unfigured specimen shows 5 cm. of pinnule-bearing rachis with traces of twelve pairs of pinnules.

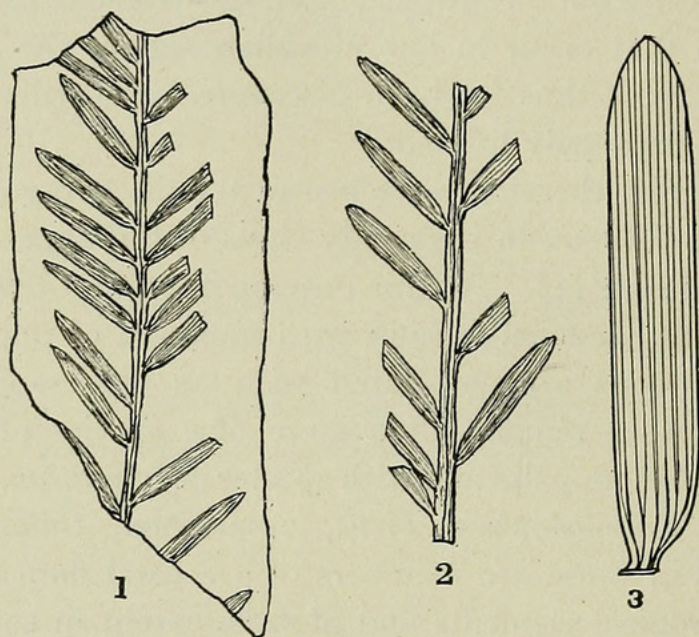


FIG. 1. *Zamia mississippiensis*, for explanation see text.

These evidently represent a *Zamia* with slender graceful leaves and much reduced pinnules somewhat suggestive of the existing *Zamia floridana* DeCandolle which inhabits the so-called flat-woods of the east coast of Florida south of New River.

In my account of the lower Eocene flora of southeastern North America (U. S. Geological Survey, Professional Paper 91) I described as *Zamia* (?) *wilcoxensis* (op. cit., p. 169. pl. 114. f. 2) a single broken pinnule of a cycad which I compared with the existing Floridian *Zamia pumila* Linné. It is interesting to find the remains of a second species somewhat resembling the only other living Florida species at a horizon as old as the lower Eocene. The two, while based on a rather meager amount of



material, are apparently distinct, since *Zamia* (?) *wilcoxensis* has pinnules with more than twice as many veins as have the pinnules of *Zamia mississippiensis*. It is, of course, possible that the two occurrences represent the extremes of variation of a single lower Eocene species, but I do not regard this as probable.

Only five or six other Tertiary species are known and a majority of these are based on not very well preserved or representative material. The only non-European form is an undoubted species of *Zamia* described by Engelhardt\* from the Eocene of Coronel, Chile. The oldest known Tertiary species is *Zamites palæocenicus* described by Saporta & Marion† from the Thanetian of Gelinden, Belgium. Meschinelli described a species from the Stampian of Venetia, Italy, which he referred to *Ceratozamia*, and two species have been recorded from the lower Miocene (Aquitania) of Europe—a *Zamites* from southern France‡ and a well-marked *Encephalartos* from Kumi in Greece.§ Heer recorded a species of *Zamites* from the Helvetian of Switzerland and a species of *Cycadites* from the Tortonian of that country, but both of these are rather doubtful determinations.||

The present species, while based upon a limited amount of material, is sufficient to establish the undoubted relationship of the fossil as the accompanying text figures show, and it is quite possible that future discovery will reveal other members of this interesting family in the later Tertiary deposits of this region since the plants thus far collected from the upper Eocene and lower Oligocene were more tropical in character than those from the lower Eocene.

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\* Engelhardt, H. Abh. Senck. Naturf. Gesell. 16: 646. pl. 2. f. 16. 1891.

† Saporta & Marion, Rev. Fl. Heers, Gelind. 20. pl. 1. f. 4, 5. 1878.

‡ Saporta, Bull. Soc. geol. Fr. (ii) 21: 314-328. pl. 5. 1864.

§ Saporta, Bull. Soc. bot. et hort. Provence, 41-44, 1 pl. 1880.

|| Heer, O. Fl. Tert. Helv. 1: 46. pl. 15; pl. 16. f. 1. 1855.



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