

# SCIENCE

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## THE ORIGIN OF THE CYCADS<sup>1</sup>

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THE widest gap in the evolution of plants used to be the one between the ferns and seed plants; but the researches of the past thirty years have bridged the gap so completely that the two groups are now separated only by the artificial definitions of the taxonomist.

The Cycadofilicales, which our British friends prefer to call the Pteridosperms, are the bridge. They looked like ferns and were naturally mistaken for ferns; and there is no doubt that their immediate ancestors were heterosporous ferns which had gradually developed the seed habit.

The forms already discovered have seeds much larger than the sporangia of any known heterosporous fern and almost as highly developed as those of the living Gymnosperms; but when the more primitive members shall have been discovered, we predict that the seeds will be comparatively small, developing from small ovules, containing still smaller female gametophytes, which will have little free nuclear division, or even none at all.

But the forms already discovered have the characters necessary to qualify them as the ancestors of the rest of the cycadophyte line; that is, the "fossil cycads" of the Mesozoic, more precisely known as the Bennettitales, and the living cycads, the Cycadales.

That the Paleozoic Cycadofilicales have given rise to the Mesozoic Bennettitales, or "fossil cycads," is practically certain. Researches upon the Paleozoic forms, especially by British botanists, and the magnificent researches of Wieland upon the Mesozoic Bennettitales have established this connection beyond any reasonable doubt. These Bennettitales were called "fossil cycads" because they were supposed to be the ancestors of the living cycads.

The living cycads, with one family, nine genera and about one hundred species, form a natural assemblage; but their geographic distribution, as well as their morphological characters, make it evident that the various genera have been separated for a long time, perhaps during most of the Mesozoic.

*Dioon*, with three species, is probably confined to Mexico.

*Ceratozamia*, with two species, may also be confined to Mexico. It has been reported beyond the

<sup>1</sup> Address of the vice-president and chairman of Section G—Botanical Sciences—American Association for the Advancement of Science, Washington, D. C., December, 1924.

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