

Isotomous Branching at the *Zamia furfuracea* Cone Axis

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Our single-stemmed specimen of *Zamia furfuracea* coned during fall 2010, with the cone disintegrating just after new years in 2011. Immediately thereafter, two new flushes of leaves appeared simultaneously on either side of the cone axis (Fig 1). This cycad stem appears to be dividing dichotomously at the cone axis, much as do many woody monocot stems. This does not appear to be an example of adventitious budding insofar as both nascent leaf flushes appeared at the same time, at the same distance from the cone axis, and were the same size (isotomous). Pseudo-dichotomous apical branching in cycads can also occur when a seed germinates in detritus near the apical meristem or bases of young leaves, as occasionally happens in *Cycas revoluta* (Norstog and Nicholls 1997). But this could not occur here because we only have one plant, hence no pollination could occur. This plant is in a greenhouse at Carleton University in Ottawa, Canada, so there is no chance of errant pollination.

Isotomous branching is known from only a few cycad species, all in the genus *Cycas*, e.g. *C. elongata* and *C.*

swamyi (Wang and Chen 1996; Whitelock 2002; Walters and Osborne 2004; Singh and Radha 2008). This appears to be the first report of isotomous vegetative branching in any other genus of cycad. Smoot *et al.* (1985) reported dichotomous branching in the Middle Triassic cycad *Antarcticycas schoffii*, but this branching was later ascribed to a vegetative stem with a coning stem (Hermsen *et al.* 2009). In fact, Dennis Stevenson (1988) has hypothesized that all cycad cones are formed from (anisotomous) dichotomous branching in which initially growth of the vegetative axis is suppressed while the cone grows and then later vegetative growth resumes once the cone stops growing. In that same paper, Stevenson also hypothesized how multiple cones could form at a single stem apex, with multiple circumferential anisotomies. Could that explain what is occurring in the *Zamia furfuracea* pictured here, albeit with multiple vegetative stems and one coning stem, rather than one vegetative stem and multiple coning stems? I have not sectioned the stem of the pictured plant, at least not yet.

Literature Cited

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Fig. 1. *Zamia furfuracea* branching at its cone axis.