

## THE ZAMIAS OF COSTA RICA'S PACIFIC SLOPE

by Michael Calonje

Costa Rica is a destination of choice for botanical exploration. It is rich in biodiversity with an extraordinary range of habitats that are safely accessible and protected by an extensive national park system and many private reserves. Costa Rica is also researcher-friendly, and many international institutions (e.g., the Organization for Tropical Studies) have field stations with lodging, equipment, and contacts that help visiting researchers. Although Costa Rica has been heavily collected, there remains great confusion regarding the taxonomy of its native cycads.

A review of cycad books, websites, and herbarium specimens supports four species of *Zamia* in Costa Rica: *Z. neurophyllidia* and *Z. acuminata* on the Atlantic slope, and *Z. fairchildiana* and *Z. pseudomonticola* on the Pacific slope. The type localities for *Z. neurophyllidia* and *Z. acuminata* are both in Panama, and the relationships of these taxa with those in Costa Rica are not well understood. Some authors consider *Z. pseudomonticola* synonymous with *Z. fairchildiana* (Whitelock 2002, Schutzman *et al.* 2004).

In November 2004, with the kind support of Montgomery Botanical Center (MBC) and the assistance of my brother, Christopher Calonje, and ecologist Heather Hendrixson, I set out on a 30-day expedition to take a closer look at cycad populations on Costa Rica's Pacific slope and collect cycad and palm seeds for MBC's *ex-situ* collection. Our search began on the Osa Peninsula, about 20 km away from the type locality for *Zamia fairchildiana* within Corcovado National Park. A park ranger led us to a *Zamia* population slightly outside the park perimeter but within the same primary forest. After a few minutes walking up a steep slope, we began to see several zamias. This was what we had hoped to find: a large, plentiful population! There were hundreds of zamias of all sizes growing on the steep mountain slope on both sides of the trail. There were not many coning plants, but we saw a few with male cones and finally spotted a female plant with a broken-up cone.

As I excitedly approached the cone, I suddenly noticed something odd. Wrapped around the plant was a conspicuous aluminum tag that read "P1-9". The ranger explained that this population and others in the immediate vicinity were part of a conservation biology study being conducted by Cristina Lopez-Gallego, a University of New Orleans graduate student and MBC collaborator (see page 9). So, in searching for *Zamia*, we encountered the work of another MBC associate! We were not about to interfere in her important research, so we limited

ourselves to taking photographs and notes. Encouraged to realize that there were, indeed, large *Z. fairchildiana* populations on the Osa Peninsula, we headed back to the hotel, hoping that our remaining two days in the region would yield seed for collection.

The next morning we tried a different strategy. Our uploaded GPS coordinates from *Zamia fairchildiana* vouchers in Costa Rican herbaria appeared closer to the coast than the road that traversed the peninsula. We therefore arranged with a fisherman to pilot us along the shore toward some of these points. As we embarked in his motorized canoe, he suggested a diversion for snorkeling at a group of tiny islands. As we approached the larger of the islands and began putting on our snorkeling gear, we noticed an enormous *Zamia* with over two meters of trunk right at the edge of the forest! We quickly replaced our snorkeling gear with notepads, a tape measure, and a camera, and hopped onto the tiny island to take a closer look. We found a total of five adult plants growing close together. Luckily, one of the plants was a female with a few seeds left in a broken-up cone. We wondered how long these large plants had been growing on the island and how the seeds might have made it there from the mainland 300 meters away.



Leaflets and female cones from three *Zamia* populations collected during MBC's 2005 Costa Rica expedition: Left, *Z. sp.* (San Vito type); center, *Z. aff. pseudomonticola*; right, *Z. fairchildiana*

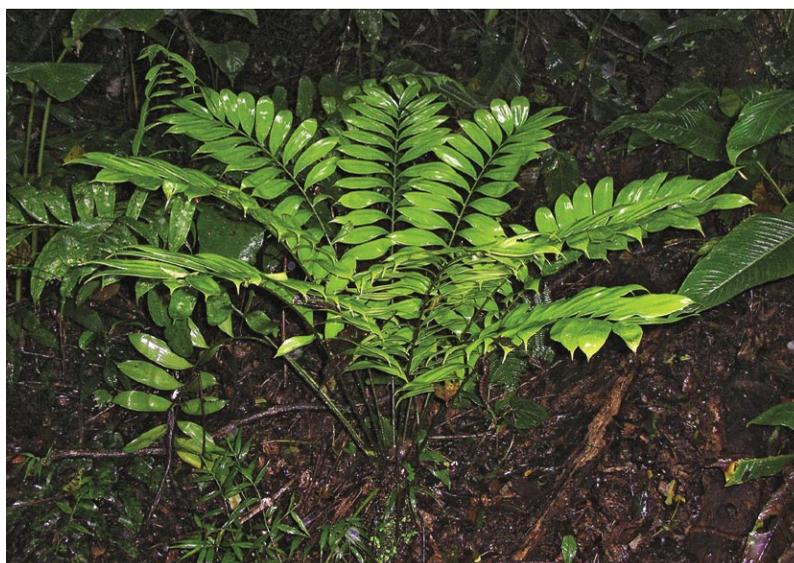
As we left the island and headed back to the mainland, we found several populations growing right by the water. Several plants had branching trunks, probably the result of wind and wave damage from this harsh marine environment. The proximity of the plants to the ocean suggested they may prove to be somewhat salt-tolerant under cultivation. They seemed to thrive in this harsh but sunny environment, as many plants were reproductively active.

Next, we headed to the cool, mountainous region around San Vito, near the Panama border. This very different environment was said to house *Zamia fairchildiana* populations with the type locality for *Z. pseudomonticola* nearby. We were welcomed at the Organization for Tropical Studies' Las Cruces Field Station by the director, Luis Diego Gomez, who originally described *Z. pseudomonticola* and *Z. fairchildiana*. Gomez (1982) described the diagnosis between *Z. pseudomonticola* and *Z. fairchildiana* as unarmed versus armed petioles. Also according to Luis Diego, *Z. pseudomonticola* was very rare in its type locality, and a team sent by Loran Whitelock in 2003 found only specimens of what they considered typical *Z. fairchildiana*.

The following morning we set out to find *Zamia fairchildiana* plants in the premontane rainforests near San Vito. We followed a path deep into the cool, moist forest and after about 20 minutes of walking, we began finding zamias with arborescent trunks up to two meters tall. However, the female cones were remarkably different compared to those of *Z. fairchildiana* from the Osa Peninsula. The cones were dark green rather than light tan; had short, rounded tips instead of long, sharp tips; and were generally wider with bigger seeds. These plants have been known and cultivated for years as *Z. fairchildiana*, but these cool-weather, premontane wet-forest dwellers were clearly distinct from the warm-weather, tropical wet-forest dwellers of the Osa Peninsula.

After admiring the unique plants at San Vito, Luis Diego told us about a population of *Zamia pseudomonticola* he had located 10 km away from the type locality. We were excited at the prospect of clearing up some of the controversy

surrounding this species. The plants we found had trunks to one meter tall, about half as tall as the plants we had seen near San Vito. The leaflets were variable, some obviously acuminate and matching the original description for *Z. pseudomonticola*. The female cones were about half the size of the San Vito cones but were also dark green when mature and had blunt, short tips. These plants and the San Vito plants are obviously closely related to each other yet distinct from *Z. fairchildiana* or any other described *Zamia* species. One detail prevented us from assuming this was the long lost *Z. pseudomonticola*: these plants had heavily armed petioles, unlike the unarmed petioles described for *Z. pseudomonticola*. So, *Z. pseudomonticola* apparently remained unseen, yet a very similar plant remains undescribed. Since few specimens with unarmed petioles were ever observed near the type locality, we wonder if the lone specimen examined in the original description was an aberrant individual of the same cool-growing *Zamia* we were observing.



*Zamia* sp. (San Vito) from a population near the *Z. pseudomonticola* type locality

The opportunity to visit several *Zamia* populations on the Pacific slope of Costa Rica revealed many as-yet undocumented differences among populations. I expected a few minor differences between populations of *Z. fairchildiana*, but certainly did not expect to find plants that do not fit any published description. It is apparent that the taxonomy of Costa Rican cycads is anything but clear, and that further field work and phylogenetic studies are urgently needed to sort out the native species and their relationships within the genus *Zamia*. At least we departed knowing that the carefully documented seed and voucher collections, data, and photographs we collected during our trip may help clarify the situation in the future.

#### References

- Gómez, L. D. 1982. *Plantae Mesoamericanae Novae* II. *Phytologia* 50(6): 401-404.
- Schutzmann, B., A. P. Vovides, and R. S. Adams. 2004. A new *Zamia* (Zamiaceae, Cycadales) from Central Panama. *The Cycad Newsletter* 27(4): 7-9.
- Whitelock, L. M. 2002. *The Cycads*. Timber Press, Portland, OR.

Contact: Michael Calonje, [michael@collectorseeds.com](mailto:michael@collectorseeds.com)