

Understanding *Cyrtandra*

Story and Photographs by John R. Clark

Avoiding big mosquitoes in search of small trees

Stopping to catch my breath, I signal to my two Fijian companions to wait a moment. I swat at a giant mosquito, collect myself, and then ask Alivereti Naikatini, my collaborator from the University of the South Pacific, “how much further?” He replies, “Not much.” The ruggedly good-looking fellow takes a seat on a fallen tree. He is dressed in nothing but a tee shirt, shorts and a pair of gum boots; the mosquitoes do not seem to bother him and he is clearly happy, comfortable and content. “How could he be comfortable,” I ask myself, “with all these monstrous bugs?” I curse the mosquitoes swarming my face as the Fijians quietly sit and wait. The other guy, our local guide who looks to be in his mid-forties and very fit, glances at me with his calm, bright eyes and smiles. He is as relaxed and comfortable as Alivereti. After we rest a moment, they softly speak to each other in Fijian; both laugh, and then begin to move on. I swat at another mosquito in vain and struggle to catch up from behind.

We trudge on through the thick jungle. Up and over the next ridge, across a swiftly moving stream, and up another ridge, we finally come to what we have been looking for: a short, scraggly tree with small white flowers. I immediately become elated, forget about the bugs, and I am reminded that this strange little tree is why I am here. “Here” happens to be the inland tropical forest of Viti Levu Island, Fiji.

As you may have noticed from my complaining, I am not exactly a fan of mosquitoes. I do, however, love plants. My name is John R. Clark and I am a botanist from the United States. I grew up in the temperate Midwest US but somehow along the way fell for the allure of the equatorial jungles and tropical plants. Too much TV perhaps. Despite my aversion to mosquitoes, I can not stay away from the tropics and now find myself deeply entrenched in botanical fieldwork. Over the past four years, I have been stumbling around the Pacific in search of the small trees I have mentioned, all species of the genus *Cyrtandra*.

Cyrtandra belongs to the plant family Gesneriaceae, or gesneriads as the family is often called, a group of about 3400 species found throughout much of the world’s tropics. Commonly known gesneriads include African violets (genus *Saintpaulia*) and the lipstick plant (genus *Aeschynanthus*).

Gesneriads are particularly diverse throughout Melanesia with centers of diversity in Borneo, Papua New Guinea, and the Philippines.

Cyrtandra is the most diverse gesneriad genus having as many as 600 species scattered across much of Southeast Asia and the Pacific. *Cyrtandra* goes by many names including “mamolea” in Samoan, “ha`iwale” in Hawaiian, and “makamakandora” in Fijian. These names are often in reference to the plant’s stems that break easily, despite being conspicuous woody shrubs or trees. Although *Cyrtandra* can be found pretty much anywhere suitable wet, tropical forest habitat exists, individual species are not widespread and are usually limited to small areas such as a single island. As Marika Tuiwawa from the South Pacific Regional Herbarium in Fiji has noted, *Cyrtandra* species are good indicators for plant inventory completeness and habitat disturbance; if plant inventories do not turn up *Cyrtandra* species in an area where they should be, it means one of two things: 1) either the area survey is incomplete or 2) the habitat has been damaged in some way that has eliminated *Cyrtandra*. I am interested in exploring areas where *Cyrtandra* species and other gesneriads should exist to further complete our knowledge of where they are found, understanding what factors are affecting their long-term survival, and understanding the evolutionary relationships among gesneriads.

Present-day Melanesia is a particularly rich area for studying *Cyrtandra* and other gesneriads. Melanesia represents the confluence between two major bio-regions, Asia and Australia and with it two distinct lineages of gesneriads. Asia and Australia had been separated for millions of years until the last 50 million years or so, when the northward-drifting Australian continental plate began colliding with the Asian plate bringing together these two distinct biomes. The area where these bioregions generally intersect, between Borneo and Sulawesi and south of the Philippines, is now known as “Wallace’s line,” after Alfred Russell Wallace who first described the divide. Many species, particularly animals, remain restricted to one or the other side because of poor dispersability and other factors. However, many plants including gesneriads have been able to bridge this gap well. The Asian gesneriads, in particular,

can be found interspersed on both sides of Wallace’s line. However, only one of these, the genus *Cyrtandra*, has bridged the gap into the Pacific. Why *Cyrtandra* has somehow managed to island hop not only across Wallace’s line, but also through eastern Melanesia and out into the remote Pacific, while a diverse group of other gesneriads have not, is one of the great mysteries in plant dispersal and diversification.

I am greatly interested in understanding how, when and why *Cyrtandra* made it out into the Pacific Islands. And I am not alone. My research is part of a global effort to understand the origins, diversification and dispersal of this amazing plant group. A great number of researchers are currently conducting research on *Cyrtandra*. Melanesians have been studying *Cyrtandra* on a regional basis, most notably in Fiji where Marika Tuiwawa and his daughter Senilolia (a.k.a. Fiona), have been looking at the distribution and identity of Fijian *Cyrtandra*. Researchers at the Royal Botanic Gardens Edinburgh in Scotland have a long history of gesneriad research in Southeast Asia and have been conducting evolutionary and taxonomic research on *Cyrtandra* and other gesneriads throughout Indonesia, Papua New Guinea, and the Philippines. Warren Wagner from the Smithsonian in Washington DC, Michael Kiehn at the University of Vienna, Art Whistler at the University of Hawaii, David Lorence and staff at the National Tropical Botanical Garden in Hawaii, and Eric Roalson and I at Washington State University, have all been looking at the origins and evolution of Pacific *Cyrtandra*. This combined effort by a large number of researchers is warranted because *Cyrtandra* is one of the most widespread plant genera in the world and understanding where and why it exists will be a major milestone in understanding plant evolution. Also, *Cyrtandra* species are quite vulnerable to habitat disturbance and deforestation making them a conservation priority requiring detailed surveys on distribution and habitat status, an effort that will take major collaborations at a regional and global scale.

My principal focus is now centered on the area of southeastern Melanesia where other gesneriads reach their eastern-most extent and only *Cyrtandra* exists further into the Pacific. This area, including the Solomon Islands, Vanuatu, New Caledonia and Fiji, and the Polynesian

islands of Samoa, represents an “interface zone” between Melanesia and the remote Pacific Islands. Among islands of the interface zone, Fiji and Samoa appear to be a crossroads for *Cyrtandra* into and out-of the remote Pacific, but little effort has gone into studying this phenomenon until now.

I have come to Fiji to begin to explore the interface zone and to gain support and expertise from those Melanesians already looking at *Cyrtandra* here. I am also apparently here to torture myself with insect bites.

Alivereti and our guide take a seat on the ground while I start photographing the small tree. I think it is *Cyrtandra anthropophagorum*, but I am not sure. I also collect fruit and flower samples, a few branches for a herbarium specimen, and a small tissue sample that I will later use for DNA analysis. I finally smile at my Fijian friends indicating that

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I am ready to go; they smile too as they rise from their break. I collect my gear and newly acquired samples and we move on. Both Alivereti and our guide are great at spotting *Cyrtandra*. It soon becomes clear to me that these Fijians know their plants! There is much work to do and more specimens to collect, but with their expert assistance, we make short work of it and Alivereti and I prepare to return to Suva later that afternoon.

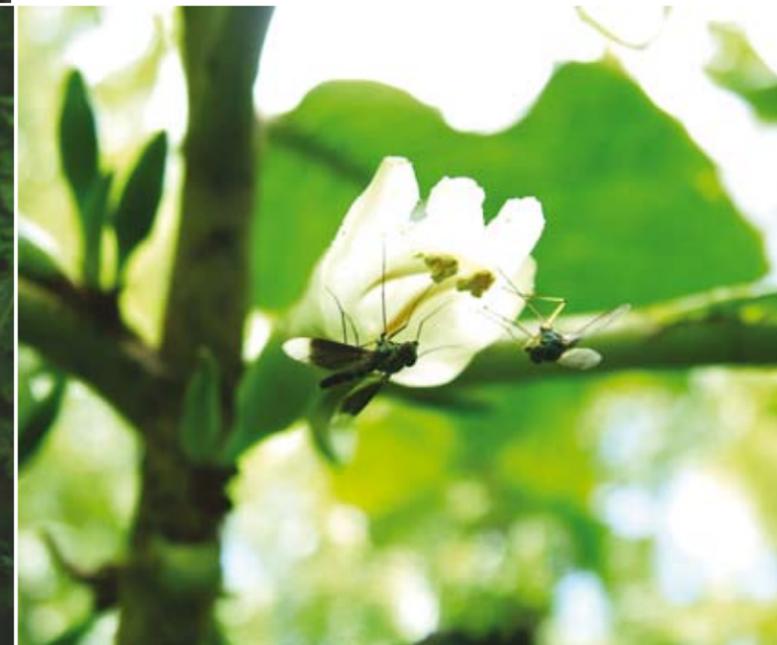
Back in Suva, I spend the next several days preparing specimens, sorting through herbarium sheets and working to identify my newly collected bounty. I am fortunate: there are several experts at the herbarium including Isaac Rounds and Senilolia Tuiwawa who help me to identify the plants as well as to discuss future study and fieldwork. These people enjoy their work, they know plants well, and they love Melanesia. I am indeed lucky to have these capable botanists by my side.

Later, I have discussions with Marika Tuiwawa and



contributing to this project. The plan is to orchestrate detailed field surveys to collect *Cyrtandra*, other gesneriads, and other plant species, throughout the interface zone. This effort will directly serve to answer the important questions about how and why *Cyrtandra* has dispersed into the Pacific but not other gesneriads; the work will generate important distribution information for these and other poorly known plants of the region contributing to our understanding of Melanesia. Local people will have opportunities to participate in field research and gain valuable education and training. This project will also provide funding for training new scientists and conservationists both in country as well as potentially abroad as interns and graduate students.

In the end, I leave Fiji with a renewed sense of purpose. I have made some new friends and I am looking forward to our on-going work in the region. Through continued regional and global support, we stand to unravel an important mystery of the world's biological history and we will help to support the ongoing education of local people to understand and protect this world. I am confident that we are on to something big here. So big that those pesky



Top: Alivereti Naikatini, senior plant taxonomist, South Pacific Regional Herbarium, Suva, Fiji in the field. Above left: *Cyrtandra compressa*. Above right: *Cyrtandra richii*.

David Boseto, from the Solomon Islands, about conducting a broad-scale study of the interface zone. To do so is no small task: the effort will take the permission and collaboration of several countries, as well as thousands of dollars, to complete. I am currently working with my new affiliation, the Marie Selby Botanical Gardens in Sarasota Florida, US, to establish this project as a signature research program there and to acquire funding to conduct the work. Marika and I are also collaborating with the National Tropical Botanical Garden to coordinate this and related projects. The Royal Botanic Garden Edinburgh has also expressed interest in

mosquitoes do not seem all that “monstrous” any longer.

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Fiji's Long-legged Warbler thriving

By Vilikesa Masibalavu



Fiji long leg warbler (*Trichocichla rufa*) found in the mountains of Viti Levu.

A recent survey conducted by BirdLife Fiji confirms more new territories of Long-legged Warbler in two of its Important Bird Area's (IBA). A total of three new territories were sighted in the Sovi Basin in December, 2007 and four in the Rairaimatuku Highlands in January 2008. This has brought the total territory of the species to thirty six since it was rediscovered in 2003.

The Long-legged Warbler (or Long-legged Thicketbird) *Trichocichla rufa* is endemic to Viti Levu and Vanua Levu on Fiji. It is known historically from four specimens collected between 1890 and 1894 and a handful of unconfirmed sightings on Viti Levu, and one specimen in 1974 on Vanua Levu. The species was rediscovered in 2003 during a survey undertaken by a partnership of conservation organization in the Wabu Nature Reserve in central Viti Levu.

The BirdLife International Fiji programme undertook a series of field surveys for this and other threatened and endemic birds in 2002-2005 funded by the Darwin Initiative of the UK government. After surveying 18 suitable sites on Viti

Levu and 11 sites on Vanua Levu, the Long-legged Warblers were recorded at just four sites in Viti Levu. Two territories at Monasavu, twelve territories at Wabu, three territories at Sovi Basin and one at Mt Korobaba. The new territories recently sighted are still within these four sites. To date the total territories have increased to six at Monasavu, sixteen at Wabu, thirteen at Sovi Basin and Mt Korobaba still has one because there has not been any further surveys.

What has enabled us to have more sightings is that we now have a much better idea how to survey this species. All recent records have been from old-growth montane forest close to small streams or creeks between 200-800 m. It is exceedingly difficult to find unless calling. Most locations were on steep slopes with unstable land-slide areas where pioneer vegetation, including herbs, *Piper* spp. and tree-ferns, created a dense understory. The Wabu birds were on flatter terrain but the climatic and edaphic effects of the altitude may lead to similar habitat on gentle terrain at 800 m as on very steep slopes at 200 m.

The species appears to be genuinely

localised as there are no records from Mt Tomaniivi which has been visited by many ornithologists, nor from various other montane sites visited by the BirdLife Fiji team after familiarisation with this species at Wabu and Monasavu. However, it could be overlooked at many of these sites, as evidenced by the frequent negative records from the roadside location at Monasavu. It is likely that it is genuinely absent from many areas with its favoured habitat, which have been searched specifically by the BirdLife Fiji team. It has never been recorded away from its favoured habitat of thickets of low vegetation along small streams and creeks, mainly waterfalls and steep slopes.

The Long-legged Warbler had an IUCN Red List status of Data Deficient but this has been re-categorised as Endangered based on this new data which suggests a population that is likely to be <250 birds but without any evidence of a decline. Further surveys are needed at likely sites, especially on Vanua Levu. As a ground species, it may be at risk from introduced predators, notably rats and mongooses. All ground-nesting birds known historically from Viti Levu (up to 15 species of rails and seabirds) have been extirpated by the Small Indian Mongoose *Herpestes auropunctatus* which was introduced to control rats in sugar-cane plantations, and rats may be responsible for otherwise inexplicable declines in arboreal species such as the Red-throated Lorikeet *Charmosyna amabilis*. A pair of Long-legged Warblers with a recently fledged juvenile at Wabu were seen mobbing a mongoose, indicating that some breed successfully in the presence of predators but also that mongoose are present throughout the most remote forests on Viti Levu (and Vanua Levu). Montane forest is being logged in some areas which leads to increased numbers of these invasive alien species but probably does not affect the vegetational suitability of the habitat. The breeding success should be investigated at Wabu and a more disturbed area such as the Monasavu roadside to identify any threats and necessary conservation actions. Most important is active long-term conservation of the key sites, notably Wabu Forest Reserve, the Rairaimatuku Highlands and Sovi Basin.