

Mar 2010, Namibia Tripp Report

This report with photos can be seen at:

http://rsabg.org/acanthaceae/index.php?option=com_content&view=article&id=61&Itemid=76

Wednesday, 17 Mar

At present, I'm listening to Swedish National Public Radio over the satellite TV, doing DNA alignments, and waiting in my hotel room for the sun to rise (I made the mistake of thinking about coffee, which I hauled from the US, when I awoke at 03:00 under the influence of heavy jetlag). After 35 hours in transit, only 21 of which were in air, I reached Windhoek, Namibia late last night. I am here to collect species of Acanthaceae, as part of a recently launched NSF project on the systematics and evolution of the Ruellieae lineage. Specifically, I am drawn here by one plant group that has undergone a spectacular radiation contained almost wholly within the borders of Namibia: the genus *Petalidium*. In the field, we will attempt to find and study as many of the ca. 30 species of *Petalidium* as possible; I am also targeting the genus *Ruelliopsis*, *Ruellia*, and several other genera in Acanthaceae. The eventual goal is a worldwide synthesis of evolutionary relationships and diversification in Ruellieae, with relevant taxonomic revisions where necessary.

Today I will visit the WIND Herbarium at the National Botanical Research Institute to make contact with the local botanists and then go retrieve the research permit from the Ministry of the Environment and Tourism office. This evening I will be joined by my colleague Dr. Kyle Dexter, based at CNRS (Centre National de la Recherche Scientifique) in Toulouse, France. Given his research interests and experience, Kyle is sure to provide an interesting ecological evolutionary perspective on the *Petalidium* we will collect. Tomorrow morning we will go fetch the camping-equipped 4x4 that we rented for the work, then shop for food, a drum of water, fuel, and away we go.

Friday, 19 Mar

Kyle and I haven't even been in the field 24 hours, and already we have found and collected three species of *Petalidium* (including *P. rautanenii*, *P. engleranum*, and one as yet unidentified), two *Monechma*, two *Barleria*, one *Blepharis*, and *Megalochlamys*. Two of the species of *Petalidium* were growing side by side, i.e., in "sympatry." We have also seen baboons, warthogs, kudu, a shaft-tailed wyndah, a plain-backed sunbird, and several common African grey hornbills. Despite being in one of the driest countries on Earth (indeed the driest in the Southern Hemisphere), we got caught in an awesome, torrential downpour just south of Otjiwarongo while trying to pitch camp last night. So we put the pitching on hold and seized the opportunity to bathe.

Today we are en route to Grootfontein to collect previously documented Acanth populations we have learned of via visits to various herbaria worldwide. This area hosts one of the world's richest deposits of a diversity of minerals, and is also site of the largest meteor to have struck the planet: the Hoba. We are lucky to drive under a ceiling of thick grey clouds. It looks a bit like California here (everything is transiently green) that there are next to no people and almost all

the roads are sans pavement. Often we are the only ones on the road, which is a good thing given that both of us struggle with driving on the left-hand side. Occasional, extraneous honking sets one into paranoia that she is on the right (wrong) side again.

Sunday, 21 Mar

It is Namibian Independence Day and again, delightfully cloudy. We spent the morning pressing plants that we collected in the Grootfontein area, including the monotypic, regionally endemic, grass double *Ruelliopsis* that I was keen on finding, several *Hypoestes*, the miniature-flowered *Blepharis maderaspatensis*, and the first two species of Old World *Ruellia* I have ever seen “in the cellulose”: *R. otavensis* and *R. patula*. We were joined by a local man, Petra Ambrosias, who walked up to inspect our activities with curiosity. We spent the morning together and taught him about our research activities, what we were doing, and why biodiversity is important to us. He learned quickly, and helped us press plants for the duration.

Tuesday, 23 Mar

It has been a 24-hour Acanth fest. Yesterday, we passed thru Etosha National Park for some nice game and bird watching, en route to Kaokoland (northwestern Namibia). On the other side, west of Kamanjab, we were surprised by an unexpected landscape of large sedimentary mesas whose slopes were provisioned abundantly with *Petalidium* a golden sunset, and a high elevation pass perfect for camping. These are the Grootberg Mountains near the Hoas Conservancy. There are a number of new *Blepharis* and *Barleria* here, too, including the orange sherbet-flowered *Barleria senensis*. The highlight was discovering that Acanths, as it turns out, are 100% capable of producing flora aromas in the Old World (the family is generally considered to be odorless). One magnificent yellow-flowered and yellow-bracted, *Petalidium giessii*, smelled strongly of sweet jasmine. Nearby was the closely related *Petalidium luteo-album*, similar but with larger flowers and different bract and inflorescence morphology.

The next morning, we proceeded to find four additional species of *Petalidium* including one with white flowers and magenta and yellow stripes in the throat (*Petalidium rossmanianum*). We also collected a lovely *Ecbolium* (*E. clarkii*) before stopping to pitch camp and press plants just south of Opuwo, which in the Herero and Himba languages means "The End". In the Kunene political region, at the junction between the physiogeographic Kaokoland and Damaraland, *Petalidium halimoides* is eaten by rhinos and other game, and a decoction from its roots is drunk by humans for stomach pains. Its name in Damara is !nahais (with the ! representing one of the four lingual clicks). In addition to this species, many other *Petalidium* are major food sources for grazing goats, cows, and wild game.

Our Toyota Hilux is fully equipped for camping, complete with a tent mounted to the top, a compressor for tires, a second car battery to power the cooler for cold camp beer, cheese, and vegetables, a propane stove for cooking, folding chairs and a table, and, although the dust does a fine job keeping hair grease in check, a giant water tank for much welcomed daily showering.

Thursday, 25 Mar

Two days ago, we set out for the hot, mountainous, and roadless Kaokoland, home to the Himba and Herero people and the greatest diversity of *Petalidium* on Earth. There are only 4 x 4 tracks, a GPS with plenty batteries, and good note-taking to navigate one's way to Kaoko's most northwesterly reaches: the desert Hartmann Mountains and the verdant Marienfluss to their east. This was our destination. We made it only halfway. As we came to learn, it was too great a risk coming here with only one vehicle (trucks almost always travel in caravans in the event of a breakdown), with only one spare, and with only mediocre ground clearance. Prior to departure, we were relying on seeing other safari trucks pass on occasion... but nothing. The safari season starts in April, and it was clear we were the first truck out in 2010. After a 200 km approach, we reached the treacherous 13 km long Van Zyl's Pass, which is said to be traversable only from east to west. We successfully completed its first few obstacles, but got hung up on a steep, rocky descent boasting a drop too great for our clearance. Our options were to try it with the awful and likely possibility of busting the radiator (thus having to abandon the truck and hike a great distance out), or attempt the reverse: Van Zyl's from west to east. We opted for the latter. It was the wise choice. After a few hours of manual modifications of the "road" (shuffling rocks around to facilitate our exit), we began our slow easterly retreat, with mixed feelings of relief and defeat.

But the good news is twofold. First, we now know how to attempt it next time: go with a caravan, higher ground clearance, a high-lift jack, and two spares. Second, we weren't out much botanically: we learned upon arrival that Kaoko has been extremely dry this year compared to other parts of Namibia and very little was in flower. While stuck in the gut of the pass, we did manage to collect two different species of *Petalidium* (the regional endemics *P. ohopohense* and *P. physaloides*) and a couple of other Acanths including an interesting *Barleria* (*B. rogersii*).

Friday, 26 Mar

Today we retreated southward towards Sesfontein then took a 100 km northwest detour towards Purros. Staring out across a series of scorched, slaty, and soil-less mountain slopes, we expected to find little acanthaceous but were once again met with wonderful Namibian surprises. We found both the large red-flowered *Ruellia marlothii* and the large red-flowered *Petalidium coccineum* in full halation. They were high on my "to see" list. We also found a mysterious ruellioid with large white and purple-striped flowers and an extremely unusual-shaped lower corolla lip. It will most likely turn out to be an undescribed species of *Ruellia*, sympatric with, vegetatively similar to, but otherwise markedly distinct from *R. marlothii*. Fascinating. Genetic variation might well be the stuff of evolution, but morphological variation is the stuff of selection, at least by botanists. The following morning we conducted and filmed pollinator observations. The curve-billed Dusky Sunbird was the most frequent visitor to the red *Ruellia* and also to a second species of *Petalidium* we found later that day, *P. variabile*. [Perching sunbirds are, in a way, the Old World ecological counterpart to hovering New World hummingbirds].

We also collected population-level samples of *Petalidium variabile* with the hope of developing appropriate molecular markers for the genus in the future. Because we are probably witnessing "speciation in progress" in *Petalidium*, traditional molecular markers in plant systematics (i.e., species-level and above species-level markers) will likely provide insufficient data to attempt understand taxon delimitation, gene flow among populations, and ultimately, barriers to (or the

lack of barriers to) reproductive isolation among populations. That is, population-level markers will be needed in this system.

Our workdays have been long, and sleep has been short, but we have been fortunate to find ourselves beneath some magnificent sunsets and have enjoyed several dry, breezy evening runs across uninhabited dirt roads underneath all that color. Plant pressing, which commences immediately following dinner, generally lasts well after midnight because we are pressing many replicate specimens for other institutions and are also collecting various tissue samples along with relevant data for further lab study. Given the black skies, bright Southern Cross, and most terrific Acanths, the long nights are tolerated effortlessly.

Sunday, 28 Mar

In the majority of habitats containing *Petalidium* here, there are literally thousands of individuals. They as well as other Acanths, namely *Barleria* and the well-armed *Blepharis*, are very often the dominant plants characterizing the landscape: the manzanitas of Namibia. They literally blanket the hillsides. This contrasts sharply with most New World habitats, which frequently contain Acanths but not in such great abundance. Further, sympatry of congeneric species is not at all uncommon here. One additional difference from New World plants seems to be nectar production and concentration. Almost all flowers that we attempted to pipette nectar from lacked it; those that contained nectar had very high sugar ratios. For example, hummingbird pollinated plants in the neotropics typically have dilute (but copious) nectar, with percent sucrose averaging in the low 20s. Here, bird-pollinated flowers such as those of *Ruellia marlothii* typically contain nectar with > 30% sucrose. This could be due to greater evaporation... different ecological strategies... chance / sampling error... all hypotheses yet to be tested.

Two days ago, we departed Kunene Province southbound towards the next set of localities in Damaraland. On our way, we spotted a rare desert elephant and, perhaps more notably, its enormous, grass-scented feces (the grass diversity, afterall, is impressive here: you can't blame him). The sheer bleakness of a thousand square kilometers of near lifeless dunes and relentless sandstorms beckoned our alternative route choice through the Skeleton Coast Park towards Brandberg Mountain. We found another species of *Petalidium* (one with endearing, miniature brick-red flowers: *P. lanatum*) and *Blepharis* (*B. grossa*) along the way, growing among the *Welwitschia* just east of the Park entrance. In the Park, we saw shipwrecks and saltroads and lichens clinging a bewildering diversity of rocks, but little else.

Wednesday, 31 Mar

We completed our field collections for the trip over the course of the last three days because we needed time to return to the herbarium to dry plants and identify our specimens with the good reference collection at WIND. Our first stop was the foothills of the Brandberg Mountains, famous not (yet) because of their Acanths but because of the mysterious White Lady rock painting, dated to ca. 16,000 ypb, and said to have been the product of the first observance of fair skin by the ancestral Damara group here. We collected several different species of Acanthaceae, including the striking *Petalidium canescens* with its inflorescence heads achieving the size of softballs and consisting of perhaps hundreds of fruits (=very unusual in Acanthaceae). We also

collected a *Ruellia* (in fruit only, precluding its identification) whose leaves smelled exceptionally of citronella.

When collecting plants car-style, I generally stop to dry them in hotel rooms overnight with a brought along space heater. The thermometer near the Brandberg trailhead registered 47°C (116°F). As such, our combined approach of strapping plants to the top of the car while driving mixed with removing and piling hot rocks among small stacks of them (“the spa treatment”) cooked them up just right. After Brandberg, we passed through the Erongo Mountains to collect, and then made a slow retreat back to Windhoek via one of three passes that cuts through the beautiful Khomas Hochland mountain range. We took the northern route through the steep and scenic Bosua Pass, where we happened upon the 14th (and our final) species of *Petalidium* on this trip (the attractive *P. setosum*), which smelled of musky honeysuckle and was visited abundantly by honeybees. This species is morphologically interesting because its style is held in a “rugula” (a groove of sorts in the upper corolla lip), which in general characterizes many species in the *Justicieae*, not *Ruellieae*, lineage.

Friday, 2 Apr

Back in Windhoek, Kyle and I sorted plants, got them into the driers for the final desiccation, and worked on identifying our collections in the herbarium for two days. In total, we made over a hundred *Acanth* collections (most of them of different species) in duplicates of six or seven so that specimens can be distributed to natural history museums worldwide (i.e., in addition to Rancho Santa Ana Botanic Garden and NBRI in Windhoek, specimens will be shipped to Missouri Botanic Garden, The United States National Herbarium / Smithsonian, The New York Botanical Garden, California Academy of Sciences, and The Royal Botanic Gardens, Kew). Kyle has been a tremendous help and I couldn't have asked for a better “field assistant” as well as traveling companion.

We corresponded with Ezekiel Kwembeya (the head curator), Esmeralda Klaassen (a botanical researcher), and other herbarium staff, and thanked them for their very kind assistance. The staff and facility here are most welcoming and indeed Namibia has been a terrific place to work. I am in communication with Ezekiel and a student / herbarium technician here, Hendrina Hasheela, about the prospects of getting started on a treatment of *Acanthaceae* for Namibia. Hendrina is interested in the family and would like to work with me on the project, and because the *Acanthaceae* among the most dominant and diverse plant families in Namibia, Ezekiel is keen on getting that house in order. If and when grant funds are procured, the intention is to return to Namibian for additional field trips and bring Hendrina along for the work. The present trip was a short but productive one. Importantly, it was also insightful in terms of what to do differently next time.

The herbarium closed for Good Friday, and because Kyle and I had to return presses and have all our plants in the driers before quitting time Thursday evening, we wound up with a day of vacation. So like the majority of other tourists to Namibia, we punched it down to Sesreim and Sossusvlei to see, at 300 m, the tallest sand dunes in the world (Namib-Naukluft Park). Unlike the majority of other tourists to Namibia, we were still looking for *Acanthaceae*, and saw at least six different species (that we hadn't yet collected) along the way. We camped just outside the

Park the night before the dunes, under another phenomenally black starry sky, this one punctured by an uninterrupted three-hour heat lightning episode. The next morning, we drove the additional 80 km to the dunes. The shadows cast by their curves across such smooth and uniform surfaces is an image like no other. We enjoyed a couple of blistering hot, barefoot hikes up their ridges before our return drive to Windhoek via the western outskirts of the vast, flat Kalahari Desert.

Saturday, 3 Apr

The geology has been most impressive on this trip (as have been the overall litter-free roads and friendliness of the people). My working hypothesis is that such diverse geological substrates, from volcanic rocks to dolorite, sandstones, slate, and red clay have combined with a mountainous terrain to help facilitate speciation in *Petalidium* — a hypothesis to be tested. At present, I am en route to Addis Ababa, Ethiopia, for the second half of the Africa collecting trip. There, I am to meet up with Dr. Ensermu Kelbessa, Curator at the National Herbarium, Professor at Addis Ababa University, and Acanthaceae specialist. He will join me for fieldwork near the Kenyan, Somalian, and Sudanese borders. Ethiopia is going to be very different. Time to celebrate diversity.

We saw a lot of animals, on the trip the birds, particularly the ostriches and the black-winged stilt, were my favorites; the nocturnal bat-eared fox, with its peculiar rooting around the ground for termites, topped my mammal list. Those that we bothered to identify are listed below.

Mammals:

Kudu

Baboon

Warthog

Black-faced impala

Giraffe

Hartmann's mountain zebra

Plains zebra

Blue wildebeest

Springbok

Gemsbok

Red Hartebeest

Steenbok

Black-backed jackal

Meerkat

South African ground squirrel

Rock hyrax

Caracal

Springhare

Desert elephant

Aardwolf

Bat-eared fox

Homo sapiens

various small rat-like things

Birds:

Scarlet-chested sunbird

Shaft-tailed wyndah

African grey hornbill

European bee-eater

Swallow-tailed bee-eater

Ostrich

Kori bustard

Black-winged stilt

Blacksmith lapwing

South African shelduck

Abdim's stork

Bronze-winged courser

Ludwig's bustard

Shikra (little banded goshawk)

Helmeted guineafowl

Red-billed francolin

Swainson's spurfowl

Northern black korhaan

Black-bellied bustard

Cape turtle dove

Grey go-away bird (lourie)

Lilac-breasted roller

Pied crow

Southern yellow-billed hornbill

Damara hornbill

Rock martin

Acacia pied barbet

Bare-cheeked babbler

Crimson-breasted shrike

Burchell's starling

Ruppel's parrot

Black stork