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Botanical expedition to Haiti: Revisiting Erik Ekman's 1920s collecting localities





FEATURES

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Flower of Gesneria odontophylla collected in the Rivière Voldrogue, Haiti. See article, page 9. Photo: John L. Clark

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Habitat of gesneriads in Zhejiang Province, Eastern China. See article, page 29. Photo: Hong Xin

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The Gesneriad Society, Inc.

The objects of The Gesneriad Society are to afford a convenient and beneficial association of persons interested in the Gesneriad Plant Family (Gesneriaceae); to stimulate a wide-spread interest in; to gather and publish reliable information about the identification, correct nomenclature, culture, propagation, and conservation of gesneriads; and to encourage the origination, introduction, and conservation of species and cultivars.

The Gesneriad Society, Inc. is the International Registration Authority for the names and cultivars of gesneriads excepting the genus Saintpaulia. Any person desiring to register a cultivar should contact Irina Nicholson, 2512 South Balsam Way, Lakewood, CO 80227 USA hybridregistrar@gesneriadsociety.org.



BOTANICAL EXPEDITION TO HAITI: REVISITING ERIK EKMAN'S 1920S COLLECTING LOCALITIES

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DESPITE HAITI'S STATUS AS A BIODIVERSITY HOTSPOT, AND AT LESS than a thousand kilometers just a stone's throw from the US mainland, this small country remains a biodiversity enigma. In January of 2015 I organized a botanical expedition to the Republic of Haiti for an ongoing research project to study the taxonomy and diversification of the Caribbean members of the Gesneriaceae. This project is supported by a National Geographic Society Research and Exploration grant. The primary objectives of this project are to provide a taxonomic treatment of the Gesneriaceae for Cuba and to produce a molecular-based phylogeny of the near-endemic Caribbean tribe Gesnerieae (Gesneria, Pheidonocarpa, and Rhytidophyllum). Understanding the Cuban members of the Gesneriaceae is contingent on sorting through taxonomic anomalies in Haiti, and that is why this expedition was particularly important. Haiti is an unexplored biodiversity hotspot because there are very few documented collections relative to other countries in the Caribbean. For example, of the 32 native Gesneriaceae species in Haiti (Skog 2012), there are seven species that have only been collected once. Of these rarities, it is astonishing that six species are only known from a single collection from the 1920s by the Swedish botanist Erik Ekman. In contrast, in neighboring Dominican Republic there are about the same number of Gesneriaceae species (33), but none of the endemics

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are limited to a single collection. As I sat in my office in Alabama and imagined searching for a plant species known from a single population collected nearly a century ago, finding a needle in a haystack seemed easier.

There are additional challenges to working in Haiti, such as extreme deforestation that is compounded by poverty and a growing population that depends on severely limited natural resources for cooking and farming. Haiti is ranked as the poorest country in the western hemisphere, and food insecurity and hunger are chronic issues. Before 1920 the human population in Haiti was less than 2 million people (Jefferson 1914) and currently the population is over 10 million, with a predicted growth at current rates that will exceed 20 million by 2014 (Verner 2008). The amount of forested land in Haiti in 1924 was 60% and by 1993 it was less than 1% (Hedges & Wood 1993). These statistics were notable in the original collection localities (AKA "type localities"), where we found only pastures. For example, Gesneria christii was first collected in an area known locally as "Furcy." We walked through Furcy on our way from La Visite National Park to Port-au-Prince. In the landscape (Fig. 1), the steep hillsides have been entirely converted to pastures that rapidly erode during the rainy season. Luckily, Skog and Talpey found Gesneria christii in other forests of Haiti in the 1970s and Tom Zanoni located populations in the Dominican Republic in the 1980s. The nearly complete deforestation and ensuing extreme soil erosion leave little hope of locating Gesneria christii or other rarely collected species from regions where they were first discovered.

Although there are many examples of disappearing forests that once hosted rare species such as *Gesneria christii*, I will focus our expedition's successes in locating plants that could easily have been considered extinct. Despite what is often reported about the dismal conditions of Haiti's natural landscape, there are many examples of inspirational leaders who are working to promote and conserve Haiti's biodiversity. Haiti is one of the few countries in the western hemisphere that lacks a national botanical garden, but that is changing because of the leadership and inspiration of native Haitian, William Cinéa.



Figure 1. Road near the village of Furcy, which is the original collecting locality (=type locality) for *Gesneria christii*. This was a forest when H. Christ discovered his namesake species in 1899. The road between Parc National Morne La Visite and Port-au-Prince is entirely converted to pastures as shown here.



Figure 2. William Cinéa holding a picture of himself that appeared in a newspaper. Field botanists use newspaper when pressing plants. While collecting during our hike to the summit of Macaya, it was happenstance that we came across a sheet of newspaper that featured an article about William and his heroic efforts to promote the Haitian National Botanical Garden.

Our expedition was greatly facilitated by William who is also an advocate for scientific investigation and promoter of the Haitian National Botanical Garden (Fig 2). William's enthusiasm for plants is contagious and he has expert vision for locating rare species, exemplified by some of our most significant discoveries. William has an advanced degree in Forestry from the Dominican Republic. He has also studied botany at Cornell University and Dr. Walter Judd's Tropical Botany course, taught at the Kampong (University of Florida).

Most formidable during this research were the Haitian administrators who oversaw protected areas, development aid

agencies, local students, and an international network of dedicated biologists. Constituents from all levels of government and academia provided logistical support and encouragement for our expedition. My greatest regret is that I did not learn more Haitian Creole to better express gratitude and sincere appreciation to our host-country guides.

Our expedition resulted in 230 collections of which 56 were Gesneriaceae. The rest were from other plant families (e.g., Melastomataceae, Solanaceae, Erythroxylaceae, ferns, and many others). Outlined below is a summary of our 16-day expedition that includes highlights of the gesneriads that were documented.

Saint Louis de Sud to Grand Frond – On Ekman's trail and our search for *Phinaea pulchella*

Starting near sea level along a busy highway at the town of Saint Louis de Sud, we walked north to the small village of Grand Frond at 300 meters. From there we walked to an elongate ridge that terminated at an abandoned fort ("Bonnet Carre") that overlooks the southern side of the Tiburon Peninsula. We walked nearly twelve hours and covered over twenty miles. It took the entire day to reach a small patch of forest, but long walks are typical for locating vegetation near villages. Native vegetation in Haiti has diminished to isolated areas that are either inhospitable to cultivation (e.g., cliffs) or remote. It is important to note that you can't study Haiti's vegetation by staying near populated areas – you have to get far from roads or urban areas by long walks or traveling via horseback or mule.

Our primary objective in visiting Grand Frond was to relocate the only known Haitian population of *Phinaea pulchella*, which has been collected in Cuba and is known from a single collection in Haiti. The distribution of this species in western Cuba and western Haiti is unusual because it is absent from eastern Cuba. The population of this plant in Haiti was documented during the early 20th century by the Swedish botanist and explorer Erik Ekman (Ekman 1928; 1936). Unfortunately, we were not able to locate *Phinaea pulchella*, but we were satisfied that we located the "shaded cliffs" below the

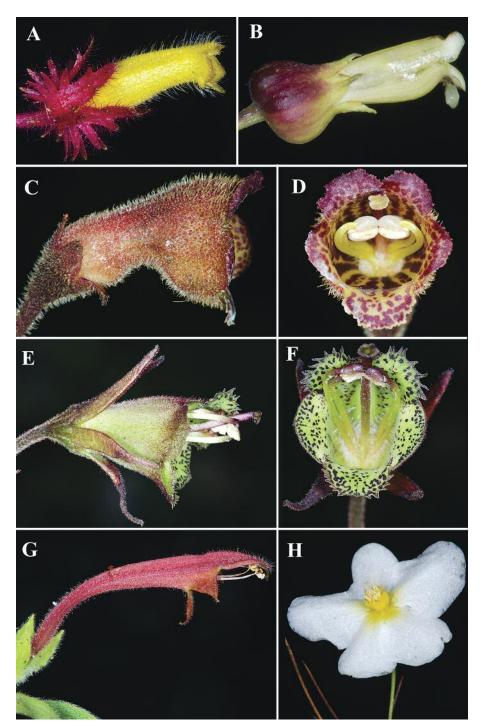


Figure 3. Plants collected along trail between Saint Louis de Sud and Grand Frond. A. Columnea domingensis. $\bf B$. Besleria lutea. $\bf C$ - $\bf D$. Rhytidophyllum auriculatum. $\bf E$ - $\bf F$. Gesneria fruticosa. $\bf G$. Columnea scandens. $\bf H$. Bellonia spinosa.

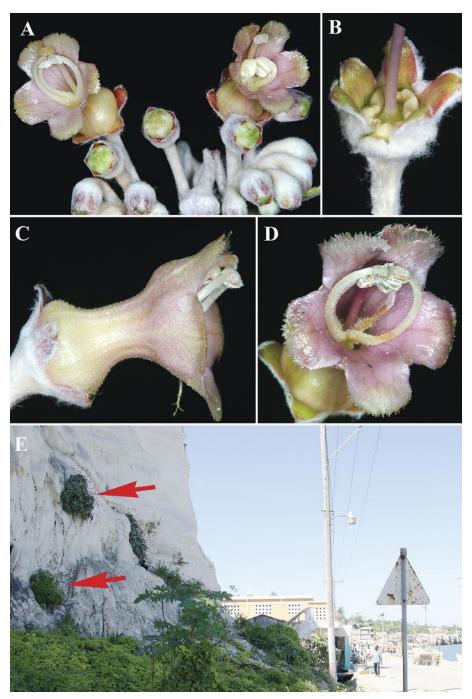


Figure 4. Rhytidophyllum leucomallon. A. Inflorescence showing flower in both mature male phase (left) and mature female phase (right). B. Corolla removed showing annular nectary. C. Lateral view of flower. D. Front view of flower. E. Outskirts of the coastal village of Jérémie where abundant populations (indicated with red arrows) of Rhytidophyllum leucomallon were observed on cliffs.

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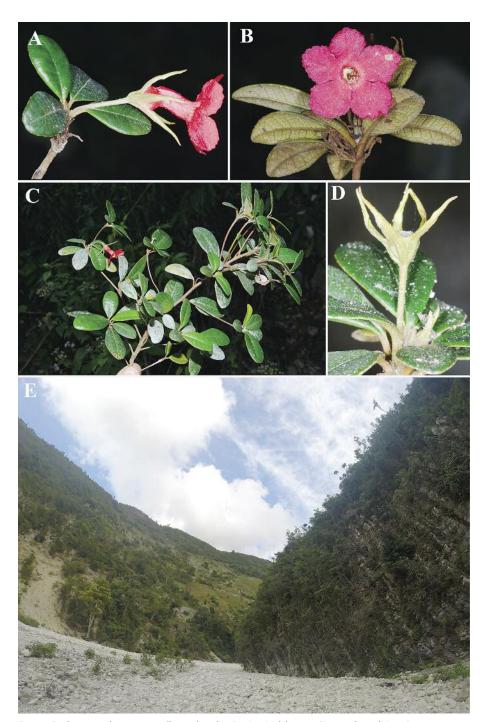


Figure 5. Gesneria haitiensis collected in the Rivière Voldrogue (Dept. Grand'Anse). $\bf A$. Lateral view of flower. $\bf B$. Front view of flower. $\bf C$. Primary shoot. $\bf D$. Immature fruit. $\bf E$. Dry riverbed (Rivière Voldrogue) showing rock bands with primary vegetation on right and landslide with secondary forest on left.

village of Grand Frond that were astutely noted by Ekman when he made the discovery in 1927. We tasked two Haitian students with returning to this area to search for and locate it. Other plants that we found during the foray were *Bellonia spinosa*, *Besleria lutea*, *Columnea domingensis*, *Columnea scandens*, *Gesneria fruticosa*, and *Rhytidophyllum bicolor* (Fig. 3).

Road from Roseaux to Rivière Voldrogue – On Ekman's trail (again) and the re-discovery of Gesneria odontophylla and Gesneria haitiensis

On a two-day road trip we traveled from Les Cayes to the northern side of the Tiburon Peninsula to the town of Jérémie (Grand'Anse Department). A common plant that is easily observed on the limestone cliffs as you enter Jérémie is *Rhytidophyllum leucomallon* (Fig. 4). Populations of 5+ individuals are readily seen near the urban center (Fig. 4E). We found this species to be abundant when we walked along the beach where cliffs were often covered with hundreds of shoots.

In 1970 Larry Skog (then a PhD student at Cornell) and Tom Talpey conducted an exploratory research expedition to Haiti. A report of their findings was published in The Gloxinian (Skog & Talpey 1971). Tom Talpey is a former AGGS president (1968 to 1969) and he conducted exploratory research expeditions to collect gesneriads to many islands in the West Indies (Haiti, Puerto Rico, Dominican Republic, and Jamaica). Larry Skog was doing field research for his doctoral dissertation on a revision of Gesneria. One of his goals in Haiti was to relocate Gesneria odontophylla. Erik Ekman collected the sole specimen of this rare species in 1928, later published by Urban (1932). The museum specimens were limited to leaves and immature fruits, which makes it even more puzzling because it is not known from mature fruits or flowers. The vegetative features alone (ovate leaves with deep serrations) were unusual enough for it to be described as a new species. The current peer-review process for publishing plant species would likely reject the description of such a discovery because fertile material was absent. Skog and Talpey failed to locate Gesneria odontophylla. Skog (1976, p. 67) wrote that, "An attempt was made in 1970 to relocate G. odontophylla, but no material was found" Skog elaborated on this taxon, "Based on the habit and vegetative characters ... it may be closely related to either G. clarensis from Cuba or G. cubensis from Cuba and Hispaniola."

Any disappointment by Skog and Talpey in not locating Gesneria odontophylla was probably short-lived because they made an important discovery. In the process of searching for Gesneria odontophylla, Skog and Talpey discovered a new species that was later described as Gesneria haitiensis (Skog 1971) that had not been collected since. We revisited the same area and were pleasantly surprised to locate many populations of Gesneria haitiensis. By the time we arrived in Rivière Voldrogue it was 4:00 PM and we had at least five hours of driving to return to Les Cayes. Our driver waited impatiently as we ran to check a few more bends of the dry river valley. Steep slopes that are frequently disturbed by landslides characterize the valley. Between these disturbed areas are undisturbed rock bands with old growth vegetation (Fig. 5E). It is here that we found abundant populations of Gesneria haitiensis (Fig. 5). Just as we were about to return, William located one individual of Gesneria odontophylla. Relocating a species that has not been collected since 1928 (by E. Ekman) was exhilarating, but finding something that has never been collected in flower made the discovery even more momentous. Images of this remarkable species are included here (Fig. 6). Please note the contrasting bright yellow tube with dark purple lobes. This color combination is not common in other members of the family and the images included here are the first ever for this species.

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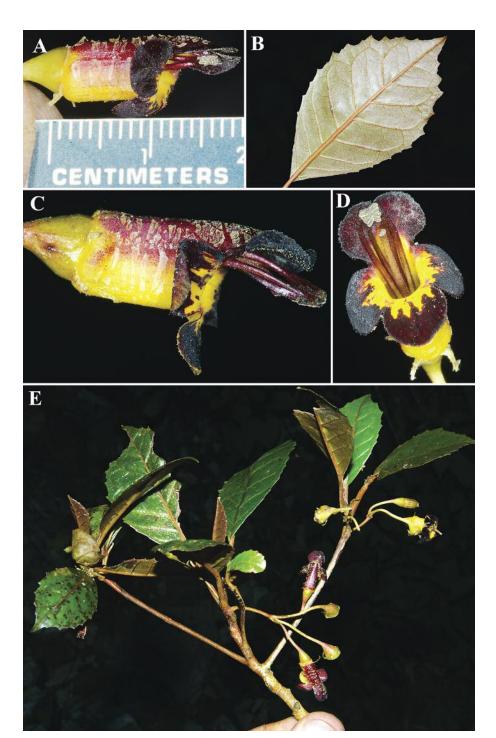


Figure 6. Gesneria odontophylla collected in the Rivière Voldrogue (Dept. Grand'Anse).

A. Lateral view of flower with scale. B. Lower leaf surface. C. Lateral view of flower.

D. Front view of flower. E. Primary shoot.

Parc National Pic Macaya – Multi-day expedition to the remote summit of Macaya

Our third segment of the expedition was to a mountainous and remote region in the Parc National Pic Macaya in the Massif [Mountain Range] de La Hotte. The forests of La Hotte harbor Haiti's most endemic flora and they had been predicted to have the richest flora on Hispaniola (Howard 1973). Our expedition would hike to the summit of Pic Macaya in the heart of the national park, which is the most important intact remnant forest in Haiti. Not many people venture to the summit of Macaya because the trail is usually overgrown, there is no water outside the small village of Formon, and it takes an entire day (12+ hours) to gain access to the summit ridge. We hired three people for three days prior to our arrival to clear the trail using machetes, and this greatly facilitated our ability to move quickly and efficiently to a high camp. Walking through heavily vegetated areas was our biggest challenge and could also be considered the biggest risk for our expedition. Even though the temperatures during the day reach 80 degrees Fahrenheit (26+ degrees Celsius) it is imperative to wear long pants and long-sleeve shirts for protection from thorns, stinging nettles, and especially razor sharp leaf blades. Any exposed skin is prone to "paper" cuts caused by leaf blades from the terrible grass, Arthrostylidium haitiense. The only nice thing about Arthrostylidium haitiense is that it is native to Hispaniola (common in Massif de la Hotte, but rare elsewhere). The trail between Ville Formon to the summit of Macaya allowed us to experience one of the only intact cloud forests in Haiti.

The most important commodity on this expedition was water and it was only used for drinking (no bathing or washing dishes). We hired porters to carry gear, water, and food. We ate mostly yams that were cooked directly on a fire. The terrain is steep, and locating flat areas that could accommodate our expedition team of seven (Fig. 7) was only possible on the saddle between Pic Macaya (2347 m) and Pic Formon (2219 m). Specifically, the area where we set up our camp was on a saddle below a steep ridge that had a series of four flat spaces. One of the flat areas was used for cooking and the other three were used for sleeping.



Figure 7. Expedition team on summit of Pic Macaya (2347 m). From left to right: Matteo Sturla, Ingrid Henrys, William Cinéa, Similien Rose Eudia, Adrien Despagne, Pierre Andre, and John L. Clark.

The hike to the summit of Pic Macaya resulted in many interesting collections, but the most significant gesneriads were found near the base of the mountain. The vegetation at the base of the mountain is broad-leaved humid forest on limestone that has been heavily eroded with exposed blocks that stand like jagged monuments. This "dog tooth" limestone is referred to locally as "rak bwa" (see Howard 1973 & Judd 1987). Three plants that were collected from this area remain unidentified and may be new to science. An unidentified Gesneria (Fig. 8A-B) was found on vertical rock faces in shady areas. We were successful in locating numerous populations of this species, but we only found it with mature fruits. The exact identification will remain a mystery until it is documented with flowers. The second unidentified species belongs to Rhytidophyllum (Fig. 8C-E) and if it is new to science then it will be collaboratively published with colleagues from the Montreal Botanical Garden (Simon Joly and François Lambert) who also collected it during an expedition in August of 2014. A third unidentified species was a small tree (2+ m tall) that was collected on the saddle between Pic Formon and Pic Macaya. Other species that were collected in Parc National Pic Macaya include Bellonia spinosa, Besleria lutea, Columnea domingensis, C. scandens, Gesneria fruticosa, G. reticulata, G. viridiflora subsp. acrochordonanthe, Rhytidophyllum auriculatum, and R. bicolor.

Parc National Morne La Visite – An epic trip from wilderness to Port-au-Prince

Our last segment of the expedition was to Parc National La Visite (on the Massif de La Selle). This area is the most heavily botanized region in Haiti. The presence of previous studies (e.g., Judd et al. 1987; Woods & Harris 1986) facilitated what species we expected to locate. We also learned that some species previously reported as common have become extremely rare and are limited to a few patches of remnant forest. James Goetz assisted our work there. Goetz is a native New Yorker, currently working for GIZ (German Agency for International Cooperation), and partnered with Fondation Seguin, a local conservation foundation. One of his main missions is working in the Berak Valley on the west end of the park, directing a forest conservation program that provides direct payments to farmers who protect their forest parcels from clearing and degradation.

A shrub that was previously widespread and is now limited to the Berak Forest is Gesneria ekmanii (Fig. 9A-B). This large shrub (2+ m tall) with stiff leaves was limited to shaded areas of mature forest. At the base of the Berak valley the stony white bed of the Paraisso river, now waterless in the extended dry season, descends to where, in the wet season, water plummets over a treacherous rocky cliff. Where the river drains into the cliff we found a small population (5+ individuals) of Gesneria viridiflora subsp. acrochordonanthe (Fig. 9C-D). Additional species that we collected in Parc National Morne La Visite include Besleria lutea, Columnea domingensis, Gesneria hypoclada (Fig. 9G-H), G. fruticosa, and Rhytidophyllum auriculatum (Fig. 9E-F).

The drive from Les Cayes to the southern entrance of Parc National La Visite took more than twelve hours, much of that over rough roads. To return to Port au Prince, we decided that it would be easier to walk out to the north instead of returning by car to the south. On our last day we rented mules and walked five hours along the winding dirt roads towards Furcy. One of the most common plants growing in full sunlight along the cliffs was a yellow flowered population of *Rhytidophyllum auriculatum* (Fig. 9E-F). Most populations that we observed of *Rhytidophyllum auriculatum* have red flowers (Fig. 3C-D), but the populations in La Selle were entirely yellow (Fig. 9E-F). We had hoped to arrive at an area where taxis were readily available, but we ended up in a village that had a nightly truck, which would have gotten us into Port-au-Prince at midnight. We decided to hire a motorbike to transport us the two hours to the next village. From there we jumped into a packed school bus. Naturally, the seats were designed for young school

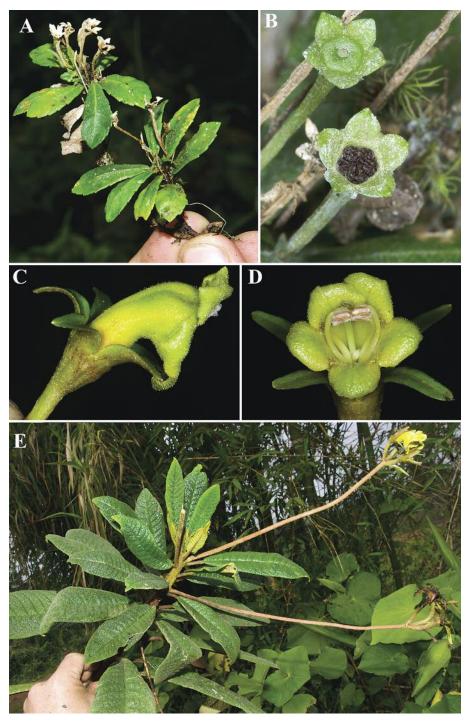


Figure 8. Unidentified collections from Parc National Pic Macaya (in the Massif de La Hotte). **A-B**. *Gesneria* sp. **C-E**. *Rhytidophyllum* sp.

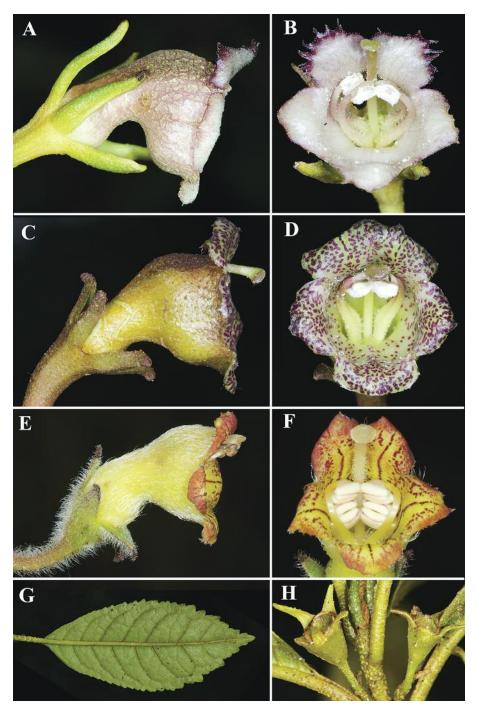


Figure 9. Gesneriads collected in Parc National Morne La Visite (in the Massif de La Selle). A-B. Gesneria cf. ekmanii. C-D. Gesneria viridiflora subsp. acrochordonanthe. E-F. Rhytidophyllum auriculatum. G. Lower leaf surface of Gesneria hypoclada. H. Immature fruit of Gesneria hypoclada.



Figure 10. Map of Haiti showing collecting localities visited on the Tiburon Peninsula. Red arrows indicate areas where collections were made. Base map reproduced from the CIA World Fact Book.

children, but we squeezed in, six adults to a row, the space between neighboring seats bridged by a board across the center aisle. Four hours after leaving our mules we arrived in Pétion-Ville, the relatively prosperous suburb above capital Port-au-Prince. From there we hired a taxi that took us to our hotel. Twelve hours later we were on a plane back to New York.

Acknowledgements

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