



Varieties of *H. caribaea*: Where do they come from?

By Paul Yoshioka, HSPR Member

My hobby of collecting heliconias began after seeing inflorescences of *Heliconia caribaea* in Hawaii in 1982. Even after amassing about 100 types of heliconias over the intervening years, *H. caribaea* has remained my favorite, partly because it is the first heliconia that caught my attention, partly because it occurs in Puerto Rico, and mostly because of its exceptional appearance in terms of color, shape and size. My interest in *H. caribaea* soon turned into a desire to learn more about its distribution, if only to determine where to collect the various varieties of this species. This commentary describes the fruits of my efforts to date. My firsthand information about the distribution of *H. caribaea* varieties is limited to Puerto Rico, Dominica, St. Lucia and Grenada so I will largely limit my thoughts to these islands. Grenada is excluded from this discussion because Bob Lankford and I were unsuccessful in finding wild *H. caribaea* on this island. However, the absence of *H. caribaea* in Grenada raises an interesting side issue because according to Berry and Kress (1991) several *H. caribaea* x *H. bihai* hybrids are native to this island.

As reviewed by Bryan Brunner and Bob Lankford in previous HSPR newsletters, *H. caribaea* with predominantly red inflorescences are found in the southern Caribbean, while yellow forms occur in the northern islands. More specifically, red forms occur from the Leeward Islands southward to possibly St. Vincent. Yellow varieties occur possibly from Martinique northward to Hispaniola, and possibly to Jamaica and Cuba. Thus, *H. caribaea* inflorescences from Puerto Rico are predominantly yellow, while all inflores-

cences in St. Lucia are red. Dominica is interesting because it lies approximately at the center of the overlap between yellow and red varieties. Dominica is also interesting because it is the only island where young inflorescences can be predominantly green. To my knowledge Dominica is also the only island where combinations of red, yellow and green inflorescences such as 'Flash' are found. It is clear from the geographic patterns described above that inflorescence color only approximates the source of a particular variety of *H. caribaea*. For instance, the yellow variety known as 'Cream' could originate from Puerto Rico, Dominica, or some other island in the northern part of the West Indies. In this commentary I describe characteristics that can be used to identify the island where a *H. caribaea* variety comes from, and possibly even to the specific region within an island in exceptional cases.

A key feature distinguishing *H. caribaea* varieties is the curvature of the bract tip. Tips of the terminal bracts of young inflorescences from Dominica are almost always curled, while those from St. Lucia and Puerto Rico are straight. Thus, young red inflorescences with curled terminal bracts come from Dominica, while inflorescences with straight terminal bracts originate from St. Lucia. I focus on young inflorescences and terminal bracts because more basal bracts tend to become curled with age. However, curvature of the more basal bracts may provide additional clues about the origin of the *H. caribaea* variety. Another important feature is bract dimensions. Bracts from Dominica have a wide and stubby appearance, while those from

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Dates to Remember

- HSPR Meeting, 10:00 am, Sunday, September 13, 2009. Jardín Botánico y Cultural, Caguas, PR.
- Heliconia Society International Conference, July 15-18, 2010. Grande Copthorne Waterfront Hotel, Singapore.

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Puerto Rico and St. Lucia look more slender. Measurements of the two lower bracts (excluding the basal bract) indicate that the stubby/slender appearances arise from differences in bract lengths and widths, especially with the length/width ratios. Bract lengths increased from Dominica (5.8") to Puerto Rico (7.25") to St. Lucia (9.0"). Bract widths increased slightly from Puerto Rico (2.3") to Dominica (2.4") to St. Lucia (2.9"). Because differences in lengths are disproportionately greater than widths, length/width ratios are considerably greater for St. Lucia (3.1) and Puerto Rico (3.15) compared to Dominica (2.4), thereby giving the stubby appearance of Dominican bracts compared to those of St. Lucia and Puerto Rico. Thus, yellow inflorescences from Dominica and Puerto Rico can be distinguished respectively by the curled vs. straight bract tips, as well as the stubby vs. slender appearance of the bracts.



Morphological diversity in *Heliconia caribaea* clones.

In terms of general principles in ecology and evolution, the occurrence of different varieties on different islands is not surprising since the populations of *H. caribaea* are isolated from each other, thereby allowing the development of different characteristics. A more detailed question is whether different varieties of *H. caribaea* can occur in different locations within an island. I have been unsuccessful in finding regional differences of *H. caribaea* in Puerto Rico. In other words, I cannot determine whether an inflorescence comes from El Yunque or Maricao. Similarly, although different color varieties occur in Dominica, I could not identify any regional patterns - red, yellow and green varieties (and their combinations) can be found growing alongside each other in Dominica. The situation is quite different in St. Lucia. Inflorescences on the west coast of this island are dark red, while essentially all of those on the east coast were a lighter shade of red.

The within island differences in the distribution of *H. caribaea* varieties between St. Lucia compared to Puerto Rico and Dominica is best explained by Stiles' (1979) study of the re-

productive biology of heliconias. Hummingbirds, the principal pollinators of heliconias, are territorial and confine their movements within a small area (<1 km), often along riverbanks. Similarly, birds consuming heliconia fruits (seeds) tend to move upstream and downstream and do not fly across intervening mountain ridges. Thus, genes cannot be exchanged between adjacent heliconia populations if habitat conditions are unfavorable for the plants where river drainages join. I believe this is the case for St. Lucia. River drainages on this island run directly to the sea and habitat conditions along the coastline are unsuitable for *H. caribaea*. Thus, *H. caribaea* populations in river drainages of St. Lucia are isolated from each other, allowing different varieties to evolve within each drainage. This pattern is reflected by Stiles' (1979) observation that heliconias differ "where adjacent watersheds are apt to be separated by steep, rugged ridges." Alternatively, populations can be intermixed if habitat conditions are suitable at drainage junctures. This is apparently the situation for Puerto Rico and Dominica since rivers often join at higher elevations where habitat conditions are favorable for *H. caribaea*. These differences between Puerto Rico, Dominica and St. Lucia suggest that geomorphology plays a critical role in the distribution of *H. caribaea* varieties within of Caribbean islands. In terms of finding new varieties of *H. caribaea*, these considerations indicate that the collector should concentrate on areas where heliconia populations are genetically isolated from each other.

The topic of genetic isolation raises the question of factors maintaining the integrity of different color varieties of *H. caribaea* in Dominica. Given cross-pollination and the presence of red, yellow and green inflorescences in a single location shouldn't the final product of genetic exchange be a muddy brown or multicolored inflorescence such as 'Flash'? The muddy brown variety occurs in Dominica. Bob Lankford and I did not collect it because of its unattractive appearance. The major factor preventing this genetic mixing is probably because self-pollination within plant is probably more prevalent than cross-pollination among plants. Self-pollination is important for seed collectors because seeds collected from a given color variety should usually, but not always, produce plants with the same color variety.

Temeles and Kress (2003; see also Temeles et al., 2000) describe another factor that reduces the probability of cross-pollination between inflorescences of different colors in Dominica. The principal pollinator of Dominican heliconias is a hummingbird, the purple-throated Carib. The female hummingbird has a longer, more curved bill than the male; and red varieties of *H. caribaea* have longer, more curved flowers compared to the yellow varieties. Thus, the female hummingbird tends to pollinate the red varieties while the male pollinates the yellow varieties, thereby reducing cross-pollination between these color varieties. The pollination biology of *H. caribaea* in Dominica has some exciting implications for

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HSPR members interested in developed new varieties. Because the purple-throated Carib does not occur in Puerto Rico the situation with pollination will probably differ. Puerto Rican hummingbirds probably react differently to the Dominican varieties of *H. caribaea* compared to the purple-throated Carib. This raises the possibility that cross-pollination in Puerto Rico between Dominican varieties of *H. caribaea* may produce varieties that do not occur in Dominica.

LITERATURE CITED

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From Our Last Meeting

Close to 90 persons attended the June HSPR meeting. A dozen new members joined our society. We give them a cordial welcome.

After listening to everybody's remarks and gathering an informal consensus among those present, our June meeting was definitely a success. Our morning educational lecture was held in an open air, comfortable, rural communal center, in Sector Hormigas, on top of a breezy mountain with a panoramic view overlooking the Caguas Valley down below, all the way East to El Yunque!

Yolanda Reyes, our Treasurer, gave a report on the society's finances. According to her balances (up to that date), we have \$1,095.24 in our account. To this amount we have to add the money generated from the Raffle and membership dues, which amounted to approximately \$700.00. Therefore, we currently have a new balance of around \$1,800.00.

Dr. Raymond Jerome followed up by giving us a brief report on the progress of our website www.heliconiasocietypr.org. He is in charge of digitizing, identifying and adding over 800 new color photographs to our internet site. The wealth of information found here is overwhelming. With the help of webmaster Dr. Bryan Brunner, and other members who contribute, in a short span of time, our web site has become the top site in the internet for those wanting to learn about heliconias. Amazing! Our society has grown in stature, ceasing to be a local group. Now we have an international presence, accessible to everyone on the planet.

Continuing with our on-going tradition of educating our members about "other" exotic tropical flowers worth collecting, to add to our ever-growing private collections of zingiberales, our invited Guest Speaker, Mr. Efrain Vega, gave us a one hour lecture on the topic of bromeliads. Mr. Vega illustrated the origins of the species, their different genres, their means of propagation, treatment for diseases, how to fertilize them, and much more. The mesmerized audience participated by asking questions, to which Mr. Vega provided all the answers.

For the customary Show & Tell Session, I brought five different varieties of inflorescences from my farm. Among these were three heliconias, whose color variations ranged between oranges and yellows. These were samples of the *H. bihai* Caribbean Sunset series and one Caribbean Sunrise. The public was able to appreciate subtle differentiations in bract shape and size. But the surprise of the Show and Tell Session was the "new seedling variation" of the *H. aurea* which had spontaneously sprung up at my farm. It is similar in shape and color to the *H. aurea* 'Sunrise', but has much more red and less orange in the inferior section (the cheek and keel) of the boat shaped bracts. To my surprise, coincidentally, Dr. José "Falín" Abreu also brought a nearly identical specimen. He too had been amazed by the "new discovery". His had a deeper reddish burgundy color. Most probably, these "new variations", which are sprouting up in our farms, could be either variations of the original plants introduced to Puerto Rico as seeds from Ecuador several years ago, or could be a new unnamed variations.

Again, the Plant Raffle was a success. There were many different samples of heliconias, bromeliads, palms, and other exotic collectables up for grabs. The money generated from the Raffle helps to pay (in part) the expenses associated with our on-going educational program, our Newsletter, as well as for future projects.

Afterwards, an exquisite banquet reception was held at Dr. Edgardo Varela Torres' farm. After lunch, Dr. Varela took us all on a guided excursion tour throughout the beautifully landscaped trails of his property. There, we were able to admire his extraordinary private collection of colorful bromeliads (some of them measuring up to four feet in diameter!), zingiberales, orchids, anthuriums, philodendrons, brownias, cactus, ferns, and other exotic trees. Definitely, this is one of the jewels of our precious Heliconia Society International/Heliconia Society of Puerto Rico Conservation Centers.

Our deep felt gratitude goes out to Dr. Varela, for hosting an unforgettable summer meeting. We are all indebted to his generosity. A round of applause goes out to him.

Héctor Méndez Caratini
President, HSPR

**HELICONIA SOCIETY OF
PUERTO RICO, INC.**

www.heliconiasocietypr.org

President: Mr. Héctor Méndez Caratini

Past President: Dr. Raymond Jerome

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Editor/Webmaster: Dr. Bryan Brunner

Assistant Editor: Mr. Bob Castro

Urb. Atlantic View

44 Calle Venus

Carolina, Puerto Rico 00979-4806

Phone: 787-396-6544

Fax: 1-240-238-7366

Email: brbrunner@yahoo.com



HSPR

*Promoting Zingiberales in
Puerto Rico since 1996.*



The Heliconia Society of Puerto Rico, Inc. was founded in 1996. The objectives of the society are to stimulate and promote the enjoyment and understanding of Heliconia and related plants of the order Zingiberales through education, research and communication, and to interact with the Heliconia Society International and other institutions which share similar interests, purposes or objectives.

President's Corner

For our next meeting, distinguished Professor Paul Yoshioka will enlighten us with a one hour illustrated conference on the subject of "Varieties of *H. caribaea*: Where do they come from?" Paul is one of the first HSPR explorers to travel several times to the islands of Saint Lucia and Dominica, in search of the legendary caribaeas from this region. His conference will be held in the wooden school house, located near the entrance of the Jardín Botánico y Cultural de Caguas.

As a tribute to this memorable occasion, HSPR would like to make a donation of *Heliconia caribaea* plants to the Jardín. This will be our legacy to the thousands of school children and adults who annually visit the Jardín; who in turn will be able to admire the rainbow of colors that drive our passions. We're asking our members to help make this conservation project a reality by bringing specific plants or rhizomes to donate (For the time being, ONLY caribaea or caribaea crosses with bihai).

On the other hand, as always, we're also asking our generous members to bring as many other plants and rhizomes as they can for the Raffle; as well as refreshments (no wine nor alcoholic beverages this time, regulations do not permit them) and snacks for the informal potluck lunch. Our customary Show and Tell session will also be held. So don't forget to bring your treasured rare plants for ALL of us to see.

Hoping to see you soon at our next meeting, which promises to be another unforgettable event. If you haven't been to the Jardín yet, this is an excellent opportunity to do some internal island tourism and see one of our ecological marvels. The restored land used to belong to the Hacienda San José -

a nineteenth century sugar cane plantation. There are many historical and archaeological objects to view, such as: the brick chimney, steam machinery and ancient ruins, millenary Taino indian petroglyphs (rock engravings), the Caguas River, thematic trails with lush vegetation, a pond and tropical gardens full of nature everywhere.

The Jardín Botánico has an admission charge of \$6.42 for adults and \$3.21 for children (ages 7 to 12) and senior citizens (over 60 years). Should you desire, while at the Jardín you will be able to take guided tours throughout the gardens, or stroll at your own pace. There is a small cafeteria, shop, and numerous shaded gazebos for relaxing, and ample parking facilities at the entrance.

Start planning ahead and economize for next year's HSI meeting, which will be held in Singapore. There will be a Pre-Conference Tour to Malaysia and a Post-Conference Tour to the remote jungles of Borneo – one of the last places on earth with unparalleled biodiversity, where new discoveries are made every year (361 new species were discovered since 1996!).

A year ago, in Iquitos, Peru, I formally requested that Puerto Rico be considered as the host country for the 2012 HSI Conference. Several HSPR members plan on attending the Singapore meeting, and I promise you that we will follow-up, and work very hard as a group, on this important matter.

Saludos a tod@s,

Héctor Méndez Caratini
President, HSPR