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A New Natural Hybrid of *Encyclia* Hook. from the Bahama Islands and Cuba.

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ABSTRACT

A new natural hybrid of *Encyclia rufa* (Lindl.) Britt. and Millsp. and *Encyclia altissima* Schltr. from the Bahama Islands and Cuba is described.

Hybridization, the production of viable offspring from interspecific matings, occurs in 25% of plant species according to Baack *et. al.* (2007) and 10% to 30% according to Mallet (2005). Stebbins (1950) first stated, "Occasional hybridization between recognizable species ... is the rule in flowering plants". He suspected that certain groups of plants were more susceptible to hybridization than others (Stebbins, 1959). The most comprehensive observation from floristic surveys is that hybridization is unevenly distributed taxonomically (Ellstrand *et. al.*, 1996), with hybrids reported in approximately 40% of families and 16% of genera (Whitney *et. al.*, 2010a).

With hybridization several distinct outcomes (Abbott, 2013) are possible. Only a single isolated individual resulting from hybridization is usually found without further reproduction occurring (Sauleda and Adams, 1990). In rare cases a stable persistent population may result which outcrosses and operates as a species (Sauleda and Adams, 1984). In most cases a hybrid results with introgression in only one direction (Sauleda, 2016b).

Genome-wide analyses of introgression (defined as the transfer of genes between species mediated primarily by backcrossing) in plants ranging from oaks to orchids show that a substantial fraction of their genomes are permeable to alleles from related species (Baack *et. al.*, 2007). Hybridization is potentially a creative evolutionary process, allowing genetic novelties to accumulate faster than through mutation alone (Anderson and Hubricht, 1938; Martinsen *et. al.*, 2001). Mutations are rare, around 10^{-8} to 10^{-9} per generation per base pair (Abbott *et. al.*, 2013). Thus, it is likely to take considerable time for novel adaptations to evolve via mutation and natural selection within a species. Hybridization and introgression can lead to speciation in much less time. However, there are harmful effects from hybridization, with or without introgression. Hybridization can be especially detrimental for rare species that are sympatric with other species that are more abundant (Allendorf, 2001). The rarer species can become extinct by being absorbed into a hybrid swarm.

Natural hybrids are common in the Orchidaceae subtribe *Laeliinae* and especially in the genus *Encyclia* (Rodriguez Seijo, 2009; Sauleda and Adams, 1983; 1984; 1990; Sauleda, 2016; 2016a).

In the Bahamas there are eleven species of *Encyclia* distributed throughout the archipelago. Eight of these species are involved in hybridization (73%) and three demonstrate varying degrees of introgression (27%) (Sauleda and Esperon, 2016). Almost three times more hybridization occurs in the encyclias in the archipelago than what Baack et al. (2007) and Abbott *et. al.* (2013) reported. Eight natural hybrids have been recognized. One of the hybrids *Encyclia xraganii* has formed a viable population on South Andros, Bahama Islands. Introgression resulting in phenotypic variation is apparent in *E. correllii, E. xadamsii* and *E. plicata*. The other hybrids are isolated occurances and introgression does not appear to be occurring at this time.

In the Bahama Islands, on several islands, occurs a natural hybrid between *Encyclia altissima* Schltr. and *Encyclia rufa* (Lindl.) Britt. and Millsp. *Encyclia altissima* has the widest distribution, occurring on twenty-one islands, followed by *E. rufa* occurring on twenty islands (Sauleda and Adams, 1983). This natural hybrid is common and easy to recognize. It more closely resembles *E. altissima* both vegetatively and florally but with a bright yellow labellum and yellow sepals and petals. The hybrid has been found on several islands where the parents are sympatric but introgression does not appear to be occurring in the Bahama Islands only isolated plants are found.

In Cuba natural hybrids and hybrid swarms are common. Several *Encyclia* populations have been recently described as hybrid populations with introgression occurring in some cases. *Encyclia grahami* (Hook.) Bosmenier *et. al.* (Synonym: *Encyclia navarroi* Vale and Rojas), *Encyclia xosmentii* Sauleda and Esperon, *Encyclia xbrevifolia* (Jenn.) Ackerman and Muj. Benitez and *Encyclia xcamagueyensis* Rodriguez Seijo, *et. al.* Several other names in the literature and some recently named species from Cuba are also suspected to be natural hybrids or morphs of a hybrid swarm. *Encyclia grahamii* has a high number of different morphs (Bosmenier *et. al.*, 2014), which may eventually lead to speciation by adaptive radiation.

In Camaguey, Cuba, by the boundary of Sierra de Cubitas National Park, a population of plants very similar to *E. altissima* with mostly yellow labella has been found. It appears to be the same hybrid between *E. altissima* and *E. rufa* that occurs in the Bahama Islands. *Encyclia altissima* is relatively common in the area, however *E. rufa* has been found near the area but is very rare and possibly now extinct or nearly extinct. *Encyclia rufa* was found at Nuevitas and Nuevas Grandes, Camaguey (Esperon and Sauleda, 2012). The population of the hybrid, by the boundary of Sierra de Cubitas National Park, exhibits individuals with strong yellow color in the labellum and also individuals with varying amounts of yellow in the labellum. The yellow color of *E. rufa* is dominant in the first generation hybrid as can be seen in a hybrid of *E. rufa* and *Encyclia correlli* Sauleda (*Encyclia xbajamarensis* Sauleda and Adams) that is found in the Bahama Islands. All of the first generation individuals resulting from artificial propagation have yellow labella, which are smaller than a typical *E. altissima*. The reason for the varying amounts of yellow in the labella, from artificial propagation have yellow in the labella of the hybrid in Cuba may be due to introgression. The plants more closely resemble *E. altissima*, further supporting the idea of introgression with *E. altissima*.

We are here describing this new natural hybrid based on a plant where it was first discovered.

Encyclia xesperonii Seijo and Sauleda, hyb. nov.

Encyclia altissima Schltr. X Encyclia rufa (Lindl.) Britt. and Millsp.

TYPE: *R. P. Sauleda, R. P. Wunderlin, B. Hansen and D. S. Correll, 3245.* Great Abaco, Bahama Islands, north side of Snake Cay road, 2.2 mi east of jct. with main road. (Holotype: USF two sheets, 142524 and 142525).



Holotype of Encyclia xesperonii Seijo and Sauleda at USF.

DESCRIPTION

Plant epiphytic or epilithic, rhizomatous, to 180 cm tall; roots many, slender to thick, velamentous or canescent; primary stem or rhizome short, stout, creeping or ascending, enclosed by imbricating scarious sheaths; secondary stem modified into pseudobulbs, erect, clustered, elongated, lanceolate, attenuate, to 55 cm long, 5 cm thick, enclosed by scarious imbricating sheaths, to 3-leaved at apex; leaves coriaceous to rigid, linear to lanceolate, acute, to 50 cm long, 5 cm wide; inflorescence terminal, to 125 cm tall, peduncles slender, erect, distantly several0sheathed, paniculate above, with erect lateral branches, to 40 flowers; floral bracts ovate-triangular, acute, to 3 mm long, 3 mm wide; ovary pedicellate, slender, to 2.5 cm long; sepals yellow with dark brown striping, elliptic, acute to 2.2 cm long, 7 mm wide; petals yellow with reddish-brown striping towards apex, oblanceolate, acute, to 2 cm long, 4 mm wide; labellum free, deeply 3-lobed, to 2.4 cm long, 2 cm wide, lateral lobes yellow with radiating purple lines, oblong obtuse, erect, embracing column, midlobe yellow with undulating margin, marked with purple radiating lines, callosity under column is two lateral erect keels joining at midlobe, two undulate lamellae parallel keels on midlobe; column yellow, streaked and suffused with purple, elongate, to 1.8 cm long, 5 mm wide, with membranaceous incurved rounded auricles, anther yellow; capsule pendent, to 2.5 cm long, 2.5 cm thick.

This natural hybrid is named in honor of Pablo Esperon to acknowledge his continuing contributions to the orchid flora of Cuba.

DIAGNOSIS

Encyclia xesperonii resembles *E. altissima* vegetatively and florally. It differs from *E. altissima* in the color of the flowers. *Encyclia xesperonii* has bright yellow sepals, petals and labella where *E. altissima* has more reddish-brown sepals and petals and a white labellum sometimes with light yellow or purple suffusion at the margins. Also *E. xesperonii* usually has purple parallel or radiating lines on the midlobe of the labellum. The labellum of *E. xesperonii* is smaller and large mature plants have inflorescences with the upright lateral branches typical of *E. rufa*. In addition the pseudobulbs are shorter and more lanceolate and the leaves are broader and shorter than *E. altissima*. *Encyclia xesperonii* Sauleda, *Encyclia xbajamarensis* Sauleda and Adams. However, the plants of *E. xbajamarensis* always have the distinctive character of *E. correllii* that the abscission layer at the base of the leaves is absent. All of the hybrids of *E. correllii* have this distinctive character.



This specimen at NY, collected by Percy Wilson, no. 7589, in the Bahama Islands (without specific locality), demonstrates several of the characteristics of *Encyclia xesperonii*. Broader leaves and smaller flowers than *E. altissima*, inflorescence with erect lateral branches as in *E. rufa*. However, the color of the flowers cannot be determined, therefore it not here listed as a type.

Two different populations of *E. xesperonii* have been found in Cuba. The one at the boundary of the Sierra de Cubitas National Park has pseudobulbs, which are intermediate between *E. rufa* and *E. altissima*. This is a large population in which introgression appears to be occurring. The other population of *E. xesperonii* is at Los Orientales - Finca Habana on a serpentine substrate near to where another hybrid *E. xcamagueyensis* Rodriguez Seijo et al. was found. Only about 6 plants were found at this population, the pseudobulbs look like typical *E. altissima*, but with the bright yellow flowers. The inflorescences are longer and with more flowers. There are many populations of *E. altissima* in other locations in Camaguey, but *E. xesperonii* has not been found at any of those locations.





Encyclia altissima Schltr. from Great Abaco, Bahama Islands.



Color variation in Encyclia rufa (Lindl.) Britt. and Millsp. from Andros Island, Bahama Islands.



Encyclia xesperonii Seijo and Sauleda from Great Abaco, Bahama Islands.



Encyclia xesperonii Seijo and Sauleda from Andros Island, Bahama Islands.



Encyclia xesperonii Seijo and Sauleda from Cat Island, Bahama Islands.



Encyclia xesperonii Seijo and Sauleda in situ at airport, Great Abaco, Bahama Islands.



Encyclia xesperonii Seijo and Sauleda from the boundary of Sierra de Cubitas National Park, Camaguey, Cuba.



Encyclia xesperonii Seijo and Sauleda from the boundary of Sierra de Cubitas National Park, Camaguey, Cuba.



Encyclia xesperonii Seijo and Sauleda from the boundary of Sierra de Cubitas National Park, Camaguey, Cuba.



Encyclia xesperonii Seijo and Sauleda. Plant resembling *E. fucata*.

Encyclia xesperonii Seijo and Sauleda. Plant resembling *E. altissima*.



Encyclia xesperonii Seijo and Sauleda from the boundary of Sierra de Cubitas National Park, Camaguey, Cuba with introgression.



Encyclia xesperonii Seijo and Sauleda from the boundary of Sierra de Cubitas National Park, Camaguey, with introgression.



Variation in Encyclia xesperonii Seijo and Sauleda in Cuba.



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