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A New Cleistogamous Variety of *Encyclia chloroleuca* (Hooker) Neumann From Colombia.

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A New Cleistogamous Variety of *Encyclia chloroleuca* (Hooker) Neumann From Colombia.

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Abstract

A new cleistogamous variety of *Encyclia chloroleuca* (Hooker) Neumann is described from the municipality of Yocoto, Valle del Cauca, Colombia.

Cleistogamy was originally regarded as a rare occurrence, however the production of cheistogamous flowers may be more common than previously believed (Richards, 1997). Cleistogamy is present in 693 angiosperm species, distributed over 228 genera and 50 families (Culley et al, 2007). Cleistogamy has been considered a 'fail-safe' reproductive strategy (Diaz & Macnair, 1998). They point out that the advantages of cleistogamy are that the structures for attracting pollinators are reduced to a minimum … with less resource allocation to attraction mechanisms. Some cleistogamous species have the ability to detect environmental conditions and respond by expressing the most effective breeding system for the conditions. Cleistogamous species can continue to flower and produce seeds under conditions that are not adequate for the production by normal flowers. The disadvantage of cleistogamous species is the reduction in seed production and the resulting inbreeding.

Darwin regarded cleistogamous flowers as secondarily adapted for self-fertilization and an adaptation against seed failure, since in unfavorable conditions insect-pollinated flowers may not be fertilized (Darwin, 1877). He considered the primary significance of cleistogamy was in its efficiency in producing a large number of seeds with the minimum expenditure of energy for floral development and pollen production. However, Darwin was skeptical about reported cases of complete cleistogamy and recommended further study under natural conditions to ensure that chasmogamous flowers are not produced.

There are several species in the genus *Encyclia* Hook. which, are reported to be cleistogamous. *Encyclia gravida* (Lindl.) Schltr. (Type: Mexico), *Encyclia sintenisii* (Rchb. f.) Britt. in Britt. & Wils. (Type: Puerto Rico), *Encyclia monticola* (Fawc. & Rend.) Acuña (Type: Jamaica) and *Encyclia isochila* (Rchb. f.) D. Dod (Type: Dominican Republic). Ackerman (2015) only recognizes two cleistogamous species of *Encyclia* and gives a broad distribution for each. He gives the distribution for *E. gravida* as Cuba, Jamaica, Haiti, Dominican Republic, Puerto Rico, Mexico, Guatemala, Nicaragua, Costa Rica, and Panama and for *E. isochila* he gives Cuba, Jamaica, Dominican Republic and Puerto Rico as their distributions. All of these species have been poorly investigated and it can not be determined with certanity if they are synonynomus. It appears that *E. cloroleuca* var. *yotocoensis* is the only known cleistogamous population of *Encyclia* within a larger population that produces chasmogamous flowers.

Cattleya (Guarinthe) aurantiaca (Batem. ex Lindl.) P. N. Don during favorable environmental conditions will produce chasmogamous flowers and out-cross (pers. observation). However, under environmental stress, such as drought conditions, the plants will produce a reduced number of flowers, which can be autogamous or cleistogamous (pers. observation).

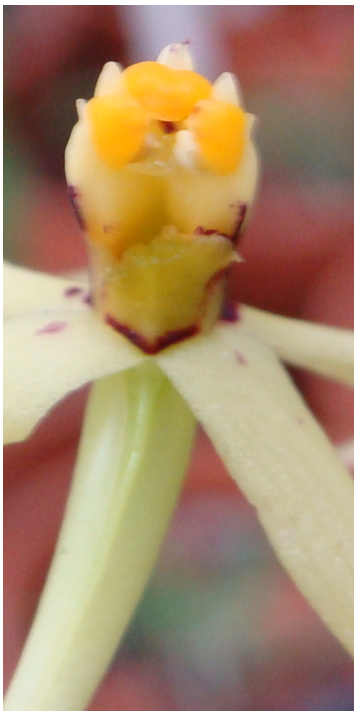
Epidendrum nocturnum Jacq. in Florida and in the Bahama Islands also demonstrates a reaction to environmental conditions. The plants normally produce chasmogamous flowers but under environmental stress the plants will be cleistogamous (pers. observation).

Epidendrum nocturnum with cleistogamous capsules.

In Florida *Anacheilium (Prosthechea) cochleatum var. triandrum* (Ames) Sauleda, Wunderlin & Hansen is autogamous, not cleistogamous and only autogamous forms are found. In the Bahama Islands both the autogamous and normal forms are present. The autogamous forms are vegetatively smaller and produce fewer flowers compared to the out-crossing forms; this is typical of autogamous populations. In this case the two forms are distinctly different morphologically.

In these four examples we find a population that is solely cleistogamous (*Encyclia chloroleuca* var. *yotocoensis*), a population that produces autogamous or cleistogamous flowers depending on the severity of the environmental stress (*C. aurantiaca*), a population that produces solely cleistogamous flowers with environmental stress (*E. nocturnum*) and a population that is solely autogamous with three anthers and lacking a rostellum (*A. cochleatum* var. *triandrum*).
All of the possible combinations are found in the Orchidaceae.

Anacheilium (Prosthechea) cochleatum var. cochleatum, out crossing form.



Anacheilium (Prosthechea) cochleatum var. triandrum, triandrous autogamous form.

In Colombia *Encyclia chloroleuca* (Hooker) Neumann is a common species in Valle del Cauca. All of the previously known populations out-cross. Cleistogamous or autogamous populations have not been previously observed.

In Valle del Cauca in the municipality of Yotoco, Juan Carlos Uribe of Orquideas del Valle found a population on large trees that is cleistogamous. The plants demonstrate several morphological differences from out-crossing populations. The plants are smaller overall and are unifoliate, the out-crossing population is bifoliate. Also the plants produce an average of 4-5 flowers, the out-crossing populations produce up to 35 flowers on branched inflorescences. The flowers lack a rostellum, which is one of the mechanisms for self-fertilization and the column has two small appendages on each side facing forward and clasping the anther cap.

Based on these differences, which are consistent throughout the population a new variety is here described.

Encyclia chloroleuca variety *yotocoensis* R. P. Sauleda and J. C. Uribe, var. nov.

Holotype: Epiphytic on large trees, municipality of Yotoco, Department of Valle del Cauca, Colombia, 2017, J. C. Uribe *s. n*., (HPUJ).

Description

Plant epiphytic, rhizomatous to 27 cm tall; roots many, thick canescent; primary stem or rhizome short, stout, creeping, enclosed by imbricating, scarious sheaths; secondary stems modified into pseudobulbs, erect, clustered, ovate, to 4.0 cm long, 1.8 cm thick, basally enclosed by 3 scarious sheath, monofoliate; leaves coriaceous, linear, acute, to 20 cm long, 2.0 cm wide; inflorescence terminal, to 18 cm tall, simple raceme, slender, erect, distantly several-sheathed, 4-5 flowers, floral bracts minute; ovary pedicellate,

slender, verruculose, to 3.6 cm long; sepals green, linear-lanceolate, acute, to 1.2 cm long, 3 mm wide; petals green, obovate, abruptly acute, to 1.1 cm long, 3 mm wide; labellum free from column, deeply 3-lobed, to 1.2 cm wide, 1.2 cm long, green, lateral lobes oblong, obtuse, embracing column, midlobe rounded, slightly apiculate, callosity under column is two lateral erect keels extending slightly beyond apex of column; column white to light green, elongate to 1.0 cm long, 3 mm wide, with two appendages on front of column clasping anther cap, with membranaceous incurved rounded auricles, without rostellum, anther green.

Diagnosis

Encyclia chloroleuca var. *chloroleuca* and *Encyclia chloroleuca* var. *yotocoensis* differ vegetatively in the number of leaves. *Encyclia chloroleuca* is bifoliate and has branched inflorescences with up to 35 flowers, var. *yotocoensis* is monofoliate, and the inflorescence is not branched with 4-5 flowers. The column of var. *yotocoensis* differs from *E. chloroleuca* in having two appendages clasping the anther cap on both sides of the column and lacks a rostellum making it cleistogamous.

The variety is named for Yotoco, which is a municipality, located in the Department of Valle del Cauca, Colombia.

Encyclia gravida (Lindl.) Schltr., a cleistogamous Mexican species that has been reported for Colombia on several lists of Colombian species. *Encyclia gravida* has also been reported for several Caribbean Islands but the name was misapplied and each population was found to be a different cleistogamous species. The reports of *E. gravida* for Colombia appear to be from field observations since no Colombian plants referable to *E. gravida* have been found in the major herbaria. It is possible that this cleistogamous population of *E. chloroleuca* may have been misidentified as *E. gravida*.

Encyclia chloroleuca (Hook.) Newmann.

Encyclia chloroleuca var. *yotocoensis* Sauleda & Uribe inflorescence and individual bud.

Encyclia chloroleuca var. *yotocoensis* column without rostellum, with two appendages on each side of column and pollinia in contact with stigma.

Encyclia chloroleuca var. *yotocoensis* column without rostellum, with two appendages on each side of column and pollinia in contact with stigma.

Encyclia chloroleuca var. *yotocoensis* column with two appendages on each side of column.

Encyclia chloroleuca var. *yotocoensis* sepals and petals.

Comparison of labella of Colombian species of *Encyclia.*

Encyclia aspera

Encyclia ceratistes

Encyclia stellata

Encyclia conchaechila

Encyclia cyprifolia

Encyclia microtos

Encyclia profusa

Encyclia replicata

Encyclia leucantha

Encyclia chloroleuca

Encyclia chloroleuca

Encyclia chloroleuca var. yotocoensis

Encyclia cordigera *Encyclia macrochila*

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