Phytotaxa 253 (3): 219–222
http://www.mapress.com/j/pt/

Correspondence

ISSN 1179-3155 (print edition)
PHYTOTAXA
ISSN 1179-3163 (online edition)

http://dx.doi.org/10.11646/phytotaxa.253.3.6

Clusia nubium (Clusiaceae): a new species from cloud-forests of southwestern Ecuador

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Clusia nubium from southwestern Ecuador is described as a species new to science. It grows as a hemiepiphyte in lower montane cloud forest. The species belongs to *Clusia* sect. *Retinostemon*, a largely Andean group characterized by male flowers with a resin-secreting synandrium of completely fused stamens and sometimes also anthers and staminodes. It differs from all other species in that section by the combination of creamy-white petals; male flowers with a dome-shaped synandrium with numerous fused stamens surrounding a group of resin secreting staminodia; and large fruits with 9–15 peltate stigmata forming a ring.

Key words: Andean region, *Clusia* sect. *Retinostemon,* endemism, resin excreting flowers

Clusia nubium, del suroeste de Ecuador, es descrita como una nueva especie. Esta nueva especie crece como hemiepífita en bosque montano bajo. La especie pertence a la sección *Retinostemon*, caraterizada por tener flores masculinas con un sinandrio resinifero, compuesto de estambres y a veces también anteras y estaminodios completamente fusionados. La nueva especie se distingue de otras especies en la sección por tener la combinación de pétalos blancos-cremosos, flores masculinas con un sinandrio de numerosos estambres fusionados rodeando un grupo de estaminodios resiníferos; y frutos grandes con 9–15 estigmas peltados, formando un anillo.

Palabras clave: Región Andina, *Clusia* sect. *Retinostemon,* endemismo, flores resinosas

Introduction

The genus *Clusia* L. (1753: 509) is distributed throughout most of the Neotropics, with the highest species diversity in the northern Andes (Gustafsson *et al.* 2007). Planchon & Triana (1860) divided it into a number of sections, several of which have been supported as monophyletic by molecular phylogenetic studies (Gustafsson & Bittrich 2003, Gustafsson *et al.* 2007). All species occurring above 1500 m a. s. l. in the Andes belong to the either the *C.* sect. *Anandrogyne* Planch. & Triana (1860: 323) or *C.* sect. *Retinostemon* Planch. & Triana (1860: 320), both of which are very large and poorly known taxonomically. Continuing molecular analysis of Clusiaceae (Gustafsson, unpublished data) suggests that these sections comprise several clades of genetically similar species that may, however, be morphologically highly distinct. Here, we describe a distinctive new species of *C.* sect. *Retinostemon* from southwestern Ecuador.

Taxonomy

Clusia nubium M.H.G.Gust. & Borchs. *sp. nov.* (sect. ***Retinostemon***) (Fig. 1)

Clusia nubium M.H.G. Gust. & Borchs. is distinct from all other species of sect. *Retinostemon* in the combination of creamy-white petals, turning yellowish brown with age; the presence of a dome-shaped synandrium with well over 150 numerous fertile anthers surrounding a small number of central (15–40), resiniferous staminodia; and large fruits over 5 cm long with 9–15 peltate stigmata arranged in a ring.

Type:—ECUADOR. El Oro province: Sambotambo, km 11.5 on dirt road going north from main road Piñas–Machala, 8 km past Piñas, remnants of montane rainforest along small river, surrounded by pastures, 1700–1800 m elevation, 13 August 2004 (fl. ♀; fl. ♂; fr.), *M.H.G. Gustafsson, F. Borchsenius & P. Trénel 569* (holotype QCA!, isotype AAU!).

Epiphytic or terrestrial shrubs or small trees up to 7 m tall. Latex in branches and leaves white to cream-colored, in centre of branches darker; soon turning brown. Young branches with cuticle regularly peeling off in tiny, transverse strips. Leaf

Accepted by Carlos Lehnebach: 1 Feb. 2016; published: 29 Mar. 2016

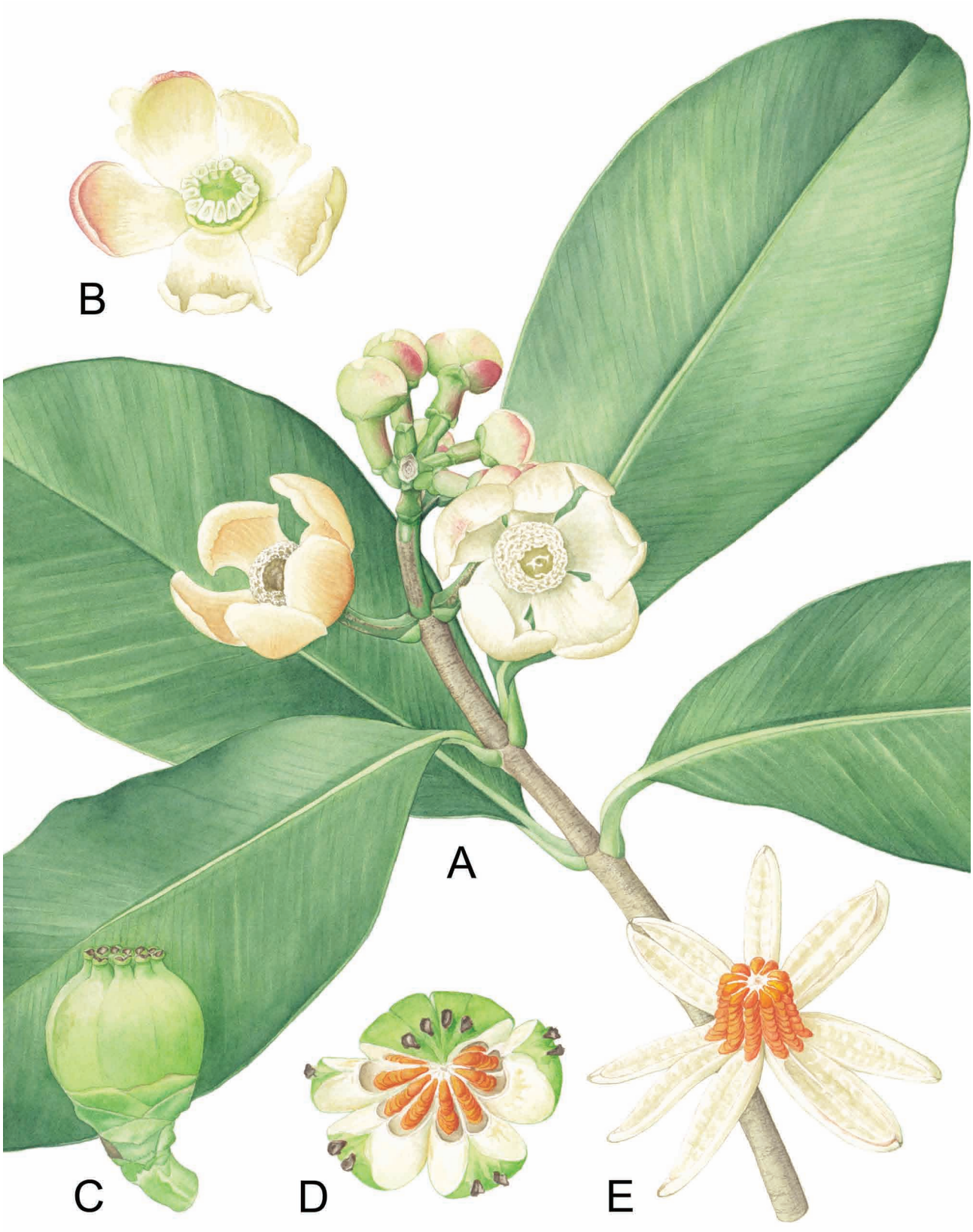

FIGURE 1. *Clusia nubium*. A—Branch with male flowers; B—Female flower; C—Fruit; D—Partially open fruit; E—Fully mature, open fruit with seeds. Drawn from the type. Scale 1:1.

blades broadly obovate or rounded oblanceolate, (4–)6–30(–35) cm long; petiole 7–15 mm long, not winged, but strongly widened basally; leaf surface often dull except when young, dark green, venation somewhat obscure in fresh leaves, secretory channels appearing as slightly undulating, fine lines abaxially, mostly crossing the veins at a steep angle, parallel to the midvein except near margin. Inflorescences terminal, the staminate ones with up to 10 flowers, the pistillate ones with 1–5 flowers; bracts and bracteoles decussate, similar in size and shape, ca. 5 mm long, broadly sessile, rounded at apex. Flowers 4–5 cm diam., cup-like in shape; sepals 4–5, to 10 mm long and 15 mm wide, depressed-ovate green to purplish red, with a translucent margin; petals 5–6, 25–32 × 20–32 mm, concave, often broader than wide, sometimes irregularly lobed, at first white to cream-colored, later darkening to brownish yellow; resin in flowers of both sexes brightly yellow; staminate flowers with a dome-shaped synandrium, ca. 9 mm tall and 13–14 mm diam., with 150–250 fertile, tetrasporangiate stamens and 15–40 central resiniferous staminodia, some of which may bear rudimentary anthers; stamens and staminodia almost completely fused but anthers and tips of the staminodia free; pistillate flowers with an undivided, resin secreting, staminodial ring surrounding the base of the globular to cylindrical ovary, which is greenish with a ring of 9–15 peltate, white stigmata, each ca. 6 × 4 mm, minutely papillose, their base positioned ca. 8 mm below the apex of the ovary. Mature fruit a green, fleshy capsule, to 5 cm long or more; seeds ca. 15 per carpel, 4–6 mm long, 1.5–2 mm wide, bright red, embedded in a single, cylindrical mass formed by the brightly orange arils; seeds of each carpel closely positioned in a vertical row, endocarp scarcely lignified. Stigmata persistent on the fruits.

Additional specimen examined (paratypes):—ECUADOR. Loja province: 3 km past Celica on road to Mercadillo, pasture with remnant vegetation, 1900–2000 m elevation, 4°5'S 79°59'W, 12 August 2000, (fl. ♀; fr.) *M.H.G. Gustafsson, S. Calderon & K.S. Kyed 381* (AAU, QCA); Finca of the Calderón family, taking a trail NE from Mercadillo towards the crest, cloud forest remnants, 1700–1800 m elevation, 4°0'S 79°57'W, 12 August 2000 (fl. ♀), *M.H.G. Gustafsson, S. Calderon & K.S. Kyed 382* (AAU, QCA); 19 km from Olmedo on road to Balsas, pasture with scattered trees, 1400–1500 m elevation, 3°53'23''S 79°38'44''W, 12 January 2004 (fr.), *M.H.G. Gustafsson & P. Trénel 5*66 (AAU, QCA).

Discussion:—The new species clearly belongs to *C.* sect. *Retinostemon*, which is distributed in Central America, the Andes region and western Amazon, up to 2000 m elevation. The section is characterized by male flowers with a resin-secreting synandrium of completely fused stamens and sometimes also anthers and staminodes. Resin functions as a pollinator reward and is collected by certain groups of bees that use it in nest construction, an adaptation known from only four angiosperm genera (Armbruster 1984, Gustafsson & Bittrich 2003). The flowers of *Clusia nubium* are unusual within the section in being creamy-white at first. As in several other species they turn yellowish brown with age. Petal color in *C.* sect. *Retinostemon* is otherwise either bright white, or various shades of pink, red, purple or black. The species is further unique in having a dome-shaped synandrium with numerous fertile anthers surrounding a number of central, resiniferous staminodes. Usually the same stamens produce both resin and pollen. The high number of peltate stigmata in the female flowers is also highly distinctive. Finally, fruits are larger than usual for *C.* sect. *Retinostemon*.

Habitat and conservation:—*Clusia nubium* occurs in lower montane cloud forests of Southern Ecuador. The montane forests in the Sambotambo area are situated on the western slopes of the Andes just outside the mouth of the dry valley of Piñas, and are frequently covered by clouds formed by the rise of moisture laden air blowing in from the Pacific Ocean. The new species appears to be endemic to this region that is also home to a variety of other narrowly endemic plant species (Borchsenius 1997). Given the few existing collections it is difficult to assess its conservation status with certainty, but the apparently limited range and high degree of deforestation in its area of occurrence suggest it might be vulnerable.

Etymology:—The new species has been named "*nubium*" meaning "of the clouds", a reference to the habitat of the species.

Acknowledgements

We are grateful to the herbarium of the Pontificia Universidad Católica del Ecuador, especially Dr. Hugo Navarrete and Dra. Katya Romoleroux, for fruitful collaboration, and to the Ministerio del Medio Ambiente, Ecuador, for granting the necessary permits for field work. Katja Anker made the illustration. Field work was funded by the Carlsberg Foundation, Denmark.

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