



A new species of *Vanilla* (Orchidaceae) from the North West Amazon in Colombia

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Abstract

A distinctive species, *Vanilla denshikoira*, is described from the North West Amazon, in Colombia, within the Guiana Shield region. The species has morphological features similar to those of species in the *Vanilla planifolia* group. It is an important addition to the vanilla crop wild relatives, bringing the total number of species in the *V. planifolia* group to 21. *Vanilla denshikoira* is a narrow endemic, known from only a single locality, and highly vulnerable to anthropological disturbance. Under IUCN criteria it is categorized CR. The species has potential value as a non-timber forest product. We recommend a conservation program that includes support for *circa situm* actions implemented by the local communities.

Introduction

The natural vanilla flavour is derived from the cured seedpods of orchid species in the genus *Vanilla* Plumier *ex* Miller (1754: without page number). Vanilla is one of the most economically important crops for low-elevation humid tropical and sub-tropical regions, and global demand for this natural product is increasing. The principal crop species, *Vanilla planifolia* Andrews (1808: 538), was domesticated in Mexico and is now cultivated globally (Soto Arenas 2003). The vanilla crop is almost exclusively vegetatively propagated, resulting in narrow genetic diversity (Besse *et al.* 2004; Schluter *et al.* 2007; Bory *et al.* 2008), and a high susceptibility to disease (Hernandez-Hernandez 2011; Xiong *et al.* 2015). Crop wild relatives (CWR) constitute an important resource for combating the genetic bottleneck associated with domestication, as well as providing a source of favorable traits for cultivar improvement (Hajjar & Hodgkin 2007; Heywood *et al.* 2007; Roux-Cuvelier & Grisoni 2011; Flanagan *et al.* 2018). The vanilla crop has been neglected in terms of research for cultivar improvement, however in recent years interest in wild species of *Vanilla* has increased.

The genus *Vanilla* comprises, to date, approximately 120 hemi-epiphytic to epiphytic species (Flanagan *et al.* 2018). *Vanilla* species that produce aromatic fruits are contained in *Vanilla* subgenus *Xanata* section *Xanata* Soto Arenas & Cribb (2010: 358). This so-called 'aromatic clade', representing the secondary gene pool of the vanilla crop (Flanagan *et al.* 2018), has a natural Neotropical distribution. To date, section *Xanata* contains 44 species, distributed into six groups, based on morphological characters (Soto Arenas & Cribb 2010). The largest of these groups is that containing *Vanilla planifolia*. Soto Arenas & Cribb (2010) established 14 species for this group, and recent taxonomical work has added a further six species (Koch *et al.* 2013; Sambin & Chiron 2015; Fraga *et al.* 2017; Azofeifa-Bolaños *et al.* 2017), bringing the total to 20 taxa, including a hybrid, *Vanilla* ×*tahitensis*.

The species in the *Vanilla planifolia* group are characterized by leaves with conspicuous petioles, and a concave labellum with a verrucose or papillose apical ventral surface (Soto Arenas & Cribb 2010; Fraga *et al.* 2017). Most species also possess a pilose region on the ventral surface of the column directly below the stigma, although *Vanilla appendiculata* Rolfe (1895: 178), *V. capixaba* Fraga & D.R. Couto in Fraga *et al.* (2017: 64) and *Vanilla labellopapillata* Koch *et al.* (2013: 975), have columns with a glabrous ventral surface. Those South American species affiliated to *Vanilla cristagalli* Hoehne (1944: 125), including *V. capixaba* and *V. aspericaulis* Sambin & Chiron (2015: 311), have a more ornate, recurved lip apex. This bears a conspicuous tuft of trichomes covering most of the surface, which is connected to the penicillate callus by rows of tuberculate papillae or retrorse trichomes (Sambin & Chiron 2015; Fraga *et al.* 2017).

The center of diversity for the *V. planifolia* group is in South America, east of the Andes, where 15 of the 20 known species occur, with natural distributions across the Guiana Shield, the Brazilian Atlantic forest, and in the Amazonian basin (Table 1). This group is of particular interest, as historically, species including *V. appendiculata* and *V. odorata* Presl (1830:101) were recognized for their aromatic fruits (Rolfe 1895), and these and other related species may have commercial potential. The several recent new species discoveries (Koch *et al.* 2013; Sambin & Chiron 2015; Fraga *et al.* 2017) indicate further botanical exploration of this region is warranted.

TABLE 1. Diversity and distribution of species in the *Vanilla planifolia* morphological group.

Species	Type Location	Known biogeographical distribution	Reference
<i>V. appendiculata</i> Rolfe	Guyana	Guiana Shield, Amazon	Rolfe 1895 (in Soto Arenas & Cribb 2010)
<i>V. aspericaulis</i> Sambin & Chiron	French Guiana	Guiana Shield	Sambin and Chiron 2015
<i>V. bahiana</i> Hoehne	Bahia State, Brazil	Atlantic Forest	Hoehne 1950 (in Soto Arenas & Cribb 2010)
<i>V. capixaba</i> Fraga & D.R. Couto	Espirito Santo State, Brazil	Atlantic Forest	Fraga <i>et al.</i> 2017
<i>V. cristagalli</i> Hoehne	Amazonas State, Brazil	Amazon	Hoehne 1944 (in Soto Arenas & Cribb 2010)
<i>V. denshikoira</i> sp. nov. Flanagan & Ospina-Calderón	Guainía Department, Colombia	Guiana Shield	This study
<i>V. dubia</i> Hoehne	Espirito Santo, Minas Gerais, Rio de Janeiro States, Brazil	Atlantic Forest	Hoehne 1944 (in Soto Arenas & Cribb 2010); Fraga 2002
<i>V. dungsii</i> Pabst	Rio de Janeiro State, Brazil	Atlantic Forest	Pabst 1975 (in Soto Arenas & Cribb 2010)
<i>V. fimbriata</i> Rolfe	Guyana	Guiana Shield	Rolfe 1899 (in Soto Arenas & Cribb 2010)
<i>V. helleri</i> A.D. Hawkes	Nicaragua	Central America	Hawkes 1966 (in Soto Arenas & Cribb 2010)
<i>V. inornata</i> Sambin & Chiron	French Guiana	Guiana Shield	Sambin and Chiron 2015
<i>V. insignis</i> Ames	Honduras	México; Central America	Ames 1934 (in Soto Arenas & Cribb 2010)
<i>V. labelloapillata</i> A. K. Koch, Fraga, J. U. Santos and Ilk.-Borg	Pará State, Brazil	Amazon	Koch <i>et al.</i> 2013
<i>V. odorata</i> C.Presl	Guayaquil, Ecuador	México; Central America; Chocó (Colombia, Ecuador); Amazon	Presl 1830 (in Soto Arenas & Cribb 2010)
<i>V. paulista</i> Fraga & Pansarin	Espirito Santo State, Brazil	Atlantic Forest	Fraga <i>et al.</i> 2017
<i>V. phaeantha</i> Rchb. f.	Cuba	USA; México; Central America; Antilles; Northern South America (Venezuela, Colombia)	Rchb. 1865 (in Soto Arenas & Cribb 2010)
<i>V. planifolia</i> Andrews	West Indies (Cult.)	Cultivated worldwide. Native México; Central America; Chocó (Colombia)	Andrews 1808 (in Soto Arenas & Cribb 2010)
<i>V. ribeiroi</i> Hoehne	Matto Grosso State, Brazil	Guiana Shield; Amazon (Brazil, Colombia)	Hoehne 1910 (in Soto Arenas & Cribb 2010)
<i>V. schwackeana</i> Hoehne	Minas Gerais State, Brazil	Atlantic Forest	Hoehne 1944 (in Soto Arenas & Cribb 2010)
<i>V. sotoarenasii</i> M.Pignal, Azofeifa-Bolaños & Grisoni	Costa Rica	Central America	Azofeifa-Bolaños <i>et al.</i> 2017
<i>V. ×tahitiensis</i> Moore	Raiatea, French Polynesia	Probable anthropogenic translocation to French Polynesia	Moore 1933 (in Soto Arenas & Cribb 2010)

The Fluvial Star of Inírida, on the border between Colombia and Venezuela, marks the confluence of the middle Orinoco River with the Guaviare River, flowing from the North Eastern Andes, and the Atabapo River, draining from the Guiana Highlands in southern Venezuela. This region lies in the transition zone between the tropical humid forests of the Amazon region, and the plains of the more northerly 'Llanos' of the Orinoco basin. In 2014, the Ramsar Convention

recognized the Fluvial Star of Inírida as a wetland of international importance. In Colombia, the Department of Guainía lies directly on the Precambrian igneous foundation of the Guiana Shield geological formation, with consequently low soil nutrient availability (Etter 2001).

The majority of the population of Guainía pertains to indigenous communities, principally the Puinave, Curripaco, Sikuani and Piapoco. The Puinave ethnic group comprises approximately 6,500 people, living mainly along the Inírida River, including in the Puinawai National Nature Reserve of 1,092,500 hectares in the upper Inírida watershed. The ethnic territory of Remanso-Chorrobocón, constituted in 1989, with an area of 73,680 hectares, unites the communities of Cerro Nariz, Samuro, Remanso, and Chorrobocón, located along the middle and lower reaches of the Inírida River. The communities largely depend on slash and burn subsistence agriculture, periodically opening new plots in the forest around their settlements to plant cassava and plantain crops. Extraction activities, including fishing, hunting and wild fruit collection are also important (Etter 2001). The adoption of innovative, more sustainable livelihood activities would be of benefit to these communities and the ecosystems they depend on.

Ecologically the region is heterogeneous, comprising a mosaic of 'terra-firme', riparian, and seasonally flooded forests, white sand savannahs or 'catingas', and Precambrian igneous outcrops or tepuis. Elevations range from 100 m on the plains, to up to 800 m.a.s.l on the higher tepui rock formations. The mosaic of habitats, together with the restrictive edaphic conditions and phreatic fluctuation, has resulted in the presence of species with limited distributions, and high-levels of endemism (Etter 2001; Cardenas-Lopez *et al.* 2009). Cardenas-Lopez *et al.* (2009) carried out a floristic inventory for the region, in which 833 vascular plant species from 123 families and 402 genera were registered, including nine species of orchids. No species of *Vanilla* were recorded in this study; however, the remoteness of the region has hindered more thorough exploration. A more recent study focused only on the Orchidaceae brings the register to 42 species for this family, including three species of *Vanilla* (Ospina-Calderón *et al.* 2017): *Vanilla bicolor* Lindley (1838: 37), *Vanilla pompona* Schiede (1829: 573) and *Vanilla denshikoira*, described here.

Materials & Methods

This study was carried out in the department of Guainía, Colombia. The climate is tropical warm and humid, with a single dry and wet season each year. The mean temperature is 26°C (23–28°C), although daily oscillations of between 15 and 20°C (min 18°C, max 38°C) are registered. The majority of the total 3,000–3,500 mm annual precipitation falls in the months May through July, with over 500 mm per month, and with a minimum of less than 100 mm in January to February (Etter 2001).

Vanilla plants were located by members of the Remanso-Chorrobocón community (L.T.G.A. & M.M.) in collaboration with co-authors, and were followed over a period of 12 months until flowering. All morphological data were obtained from fertile plants. The floral descriptions and illustrations of the new species are based on fresh and alcohol-preserved material. The morphological features were compared with relevant taxonomic literature (Fraga 2002; Soto Arenas & Cribb 2010 and references therein; Soto Arenas & Dressler 2010; Koch *et al.* 2013; Sambin & Chiron 2015; Barros *et al.* 2016; Fraga *et al.* 2017) (Table 2). *Vanilla* specimens in the following Herbaria BM, CAUP, COAH, COL, CUVC, HPUJ, K, M, MA were consulted. Coordinates are not reported in order to ensure conservation of the two known plants of the Type population. The conservation status assessment followed the International Union for the Conservation of Nature (IUCN, 2017) criteria.

TABLE 2. Comparison of morphological features between *Vanilla denshikoira* and close relatives in the *Vanilla planifolia* group (adapted from Fraga *et al.* 2017).

Characteristic	<i>V. capixaba</i>	<i>V. cristagalli</i>	<i>V. dubia</i>	<i>V. aspericaulis</i>	<i>V. denshikoira</i>
Internode length, cm	4–8.5	2.7–4.5	2.9–9.5	4.5–12	8–14
Leaves, cm	10.4–13.6 × 1.9–2.8	10–16 × 2.8–6.2	5.5–20 × 2.3–3.5	4.5–12 × 2.5–4.5	9.6–10.4 × .5–4.5
Petiole length, cm	0.7–1.4	1.2–2.0	0.5–1.2	0.5–1	0.4–0.5
Inflorescence length, cm	2.2–3.1	3–13.7	2.7–3	3–4.5	2.5–3
Bracts, mm	3–5	3.2–8.3	3–6	8 × 6	6–10 × 4–5

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TABLE 2. (Continued)

Characteristic	<i>V. capixaba</i>	<i>V. cristagalli</i>	<i>V. dubia</i>	<i>V. aspericaulis</i>	<i>V. denshikoira</i>
Sepal & Petal colour	Whitish-green	Yellow	Greenish-white	Greenish-yellow	Greenish-cream
Dorsal sepal, cm	4.7–5.3 × 0.8–1.2	5.0–6.2 × .8–1.2	5.2–7.8 × .8–1.1	5.1 × 1.5	5.3–5.8 × 1.0–1.6
Lateral sepals, cm	4.4–4.8 × 0.7–1.2	5–5.7 × 0.9–1.4	4.8–7.5 × 1–1.4	5.0 × 1.9	4.6–5.6 × 1.2–1.6
Petals, cm	4.7–4.9 × 0.9–1.2	5–5.9 × 0.7–0.9	4.6–7.8 × .6–0.9	5.5 × 1.6	5.0–5.6 × 1.3–1.7
Lip color	Completely white	Yellow	White	Yellowish	Creamy yellow
Lip, cm	4.3–4.8 × 3.5–3.9	4.8–5.9 × 2.5–3.1	4.6–7.2 × 2.2–3.2	4.5 × 4.0	4.1–4.5 × 3.4–3.5
Lip form	Trilobed	Trilobed	Obscurely trilobed	Obscurely trilobed	Conspicuously trilobed, external canal, ventral pillose keel
Lip-midlobe	0.8–1.2 × 0.6–0.8	0.3–0.5 × 0.8–1	0.5–0.7 × 0.9–2	-	0.92–1.2 × 1.3–1.5
Lip-midlobe	entire	bilobed	entire	bilobed	bilobed
Lip margin	entire-undulate	entire-undulate	erose-fimbriate	Crenulate	entire-undulate
Column, cm	2.6–2.8	3–4.2	3.2–5.4	3.2	3.2–3.4
Column-ventral surface	Glabrous	Trichomes over full length	Trichomes over full length	Trichomes apical quarter	Trichomes apical quarter
Stigma	Trilobed	Trilobed	Trilobed	-	Bilobed

Taxonomic treatment

Vanilla denshikoira Flanagan & Ospina-Calderón *sp. nov.* (Figs. 1, 2)

Diagnosis:—The new species is similar to *Vanilla aspericaulis*, *V. capixaba*, and *V. cristagalli*, sharing with them a concave lip base, a more or less tri-lobed lip, and a conspicuous tuft of trichomes on the recurved lip apex that is connected to the penicillate callus by a central area of tuberculate papillae and trichomes. The new species may be easily distinguished by the external longitudinal canal running from the lip base to the apex of the reflexed midlobe, and the papillae and elongated trichomes on the ventral lip surface covering the tuberculous keel and central veins from the base to the penicillate callus.

Type:—COLOMBIA. Guainía. Inírida, Resguardo Indígena Remanso-Chorrobocón, medium-dense riparian forest on alluvial ground *c.* 30m from the Inírida River, Elev. 100 m, 16 April 2017, *N.S.Flanagan, M.Mendoza, L.T.García Agapito, H.A.Mateus NSF138* (holotype: CUVC!)

Paratypes:—COLOMBIA. Guainía. Inírida, Resguardo Indígena Remanso-Chorrobocón, medium-dense riparian forest on granite outcrop. Elev. 265 m, 15 April 2017, *N.S.Flanagan, M.Mendoza, L.T.García Agapito, H.A.Mateus NSF90* (paratype: CUVC!).

Hemi-epiphyte, elongated, scandent vine, more than 5 m long, with attaching aerial roots. *Stem* cylindrical, fleshy, glabrous, flexuous, sulcate, dark green, internodes 8–14 cm. *Leaves* alternate, sub-oblongate, obtuse base, apex cuspidate, shorter than internode, 9.6–10.4 long × 2.5–4.5 cm wide; petiole conspicuous, partially-sheathing, caniculate, 0.5–0.7 mm long. *Inflorescence* axillar, racemose, 2 flowers at anthesis simultaneously, ephemeral, ca. 16 flowers opening in succession. *Bracts* sheathing, triangular, 6–10 mm wide at base × 4–5 mm long. *Flowers* conspicuous, pedicellate, sepals and petals greenish-cream on inner and outer, segments spreading, labellum creamy yellow. Ovary 42.5–50 mm long, whitish-cream at the base turning to green in the apical quartile. *Dorsal sepal* 53.7–58.7 × 10–16.3 mm, obovate, concave, apex obtuse, 12 veins. *Lateral sepals* 46.5–56.5 × 12.5–16.5 mm, obovate, slightly concave, asymmetric, apex obtuse, 17 veins. *Petals* 50–50.6 × 13.5–17 mm, obovate, concave, apex obtuse, asymmetric, central longitudinal keel on outer surface, 13 veins. *Lip* tubular, 41.4–45.9 mm long, concave, fused to column from base to

22.5–24.2 mm, unguiculate, margin undulate, trilobed. *Lateral lobes* 12.4–13.5 mm, caliptriform in the apical zone, margins undulate. *Midlobe* 13.5–15.5 mm long \times 9.2–11.9 wide, bi-lobed, conspicuously reflexed. Lip distinguished by a central longitudinal canal on the outer surface, running from the base of the labellum to the apex of the reflexed midlobe, forming a tuberculous keel on the ventral surface, papillae and elongated trichomes (3.2–4.6 mm) covering keel and central veins, dense at base, continuous towards penicillate callus, at 25 mm from the base, 5 transverse imbricate and denticulate scales (2.5–3.5 mm wide \times 3.8–4.4 mm high), connecting with tuberculate papillae and trichomes to enlarged tuft of long (5–6 mm), dense, tuberculated trichomes covering most of apical surface. *Column* 3.2–3.4 mm \times 29–29.5 mm long, apex with vertical truncate and undulate wings, ventral surface presents trichomes in the apical quarter, bi-lobed stigma. Rostellum prominent. Anther versatile, transversely ellipsoid.

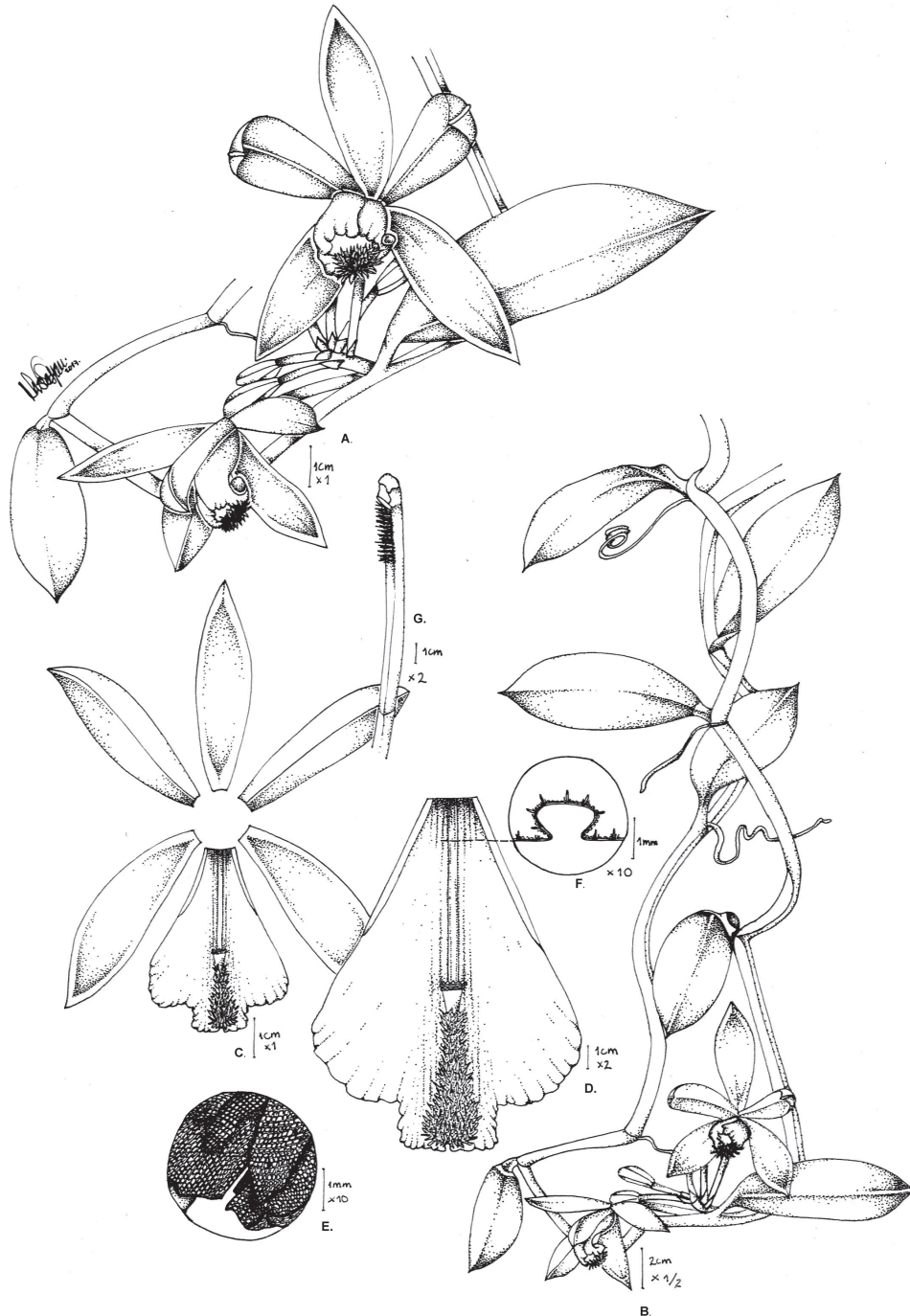


FIGURE 1. *Vanilla denshikoira* Flanagan & Ospina-Calderón. Clockwise from top left, **A.** Inflorescence **B.** Plant habit **C.** Flower **D.** Labellum **E.** Tuft of tuberculate trichomes on the labellum apical surface **F.** Transversal view of central canal and a tuberculous keel running from the base to the apex of the labellum. (Illustration by Nhora Helena Ospina-Calderón).

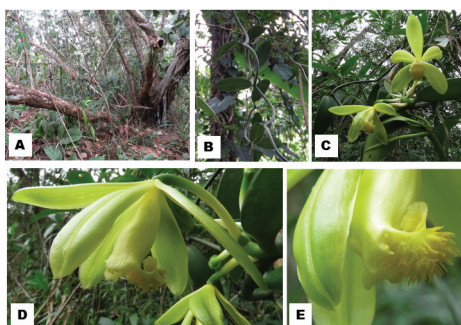


FIGURE 2. *Vanilla denshikoira* Flanagan & Ospina-Calderón in the field. **A.** Vegetation physiognomy of plant habitat. **B.** Vegetative habit of plant. **C.** Inflorescence of the *Vanilla denshikoira* with two flowers open simultaneously. **D.** The whole flower showing the longitudinal keel on outer petal surface, and the concave lip. **E.** Detail of the lip apex of the *Vanilla denshikoira* showing the caliptriform nature of the lateral lobes with ondulate margins in the apical zone, and the conspicuously reflexed midlobe apex with an enlarged tuft of tuberculated trichomes covering most of apical surface. (Photographs by Nicola Flanagan).

Etymology:—The epithet refers to the name of a female figure in the mythology of the Puinave indigenous community, native to the department of Guainía, Colombia. The name ‘*Denshikoira*’ translates in English to “perfumed woman”. *Denshikoira*, also known as the Princess Inírida, occupies a central position in Puinave culture, with her myth representing the freedom and equality of women. The name was chosen by Lucy Teresita García Agapito, a member of the Puinave Indigenous community of Remanso-Chorrobocón.

Distribution and habitat:—*Vanilla denshikoira* is known only from the two fertile plants in the Type locality, the first close to the River Inírida, in seasonally-flooded, medium-height (between 10–20 m), open (< 60% canopy cover) forest at 100 m elevation, and the second also in medium-height, open forest on an igneous outcrop, at 265 m elevation. The floristic composition of these sites is notable for the presence of the following tree species: *Clusia columnaris* Engler in Martius (1888: 432), *Casearia javitensis* Kunth in Humboldt, von Bonpland & Kunth (1821: 366), *Tapirira guianensis* Aublet (1775: 188), and *Chrysophyllum bombycinum* Penn (1990: 588).

Conservation status:—*Vanilla denshikoira* has an apparent highly restricted distribution, apparent rarity, and both known individuals are highly vulnerable to human activities. Based on the IUCN criteria the species is categorized as Critically Endangered-CR: A3c; B1ab (i,ii,iii,iv).

Discussion

Vanilla denshikoira, discovered in the North West Amazon region in Colombia, within the Guiana Shield biogeographic region, represents a valuable addition to the secondary gene pool of the vanilla crop. The species has morphological features that place it in *Vanilla* section *Xanata*, within the *Vanilla planifolia* morphogroup. The flowers are a showy creamy-yellow, with one of the most ornate lips of all species in the *Vanilla planifolia* group.

This new find brings the number of *Vanilla* species reported for Colombia to 23. Nineteen of these belong to the aromatic clade *Xanata*, including this new species, underlining the importance of Colombia as a center of diversity for the secondary gene pool of the vanilla crop (Flanagan *et al.* 2018). Of these 23 species, four are endemic to Colombia: *V. columbiana* Rolfe (1896: 468); *V. espondae* Soto Arenas (2010: 281); *V. rivasisii* Molineros *et al.* (2014: 354); as well as the species described here. The extreme rarity and narrow endemism of *Vanilla denshikoira* is also shared with other recently described species for the *Vanilla planifolia* group (Koch *et al.* 2013; Sambin & Chiron 2015; Fraga *et al.* 2017).

Amongst the 21 species in the *Vanilla planifolia* group, only five species are relatively common or widespread-*V. insignis* Ames (1934: 101), *V. odorata*, *V. phaeantha* Reichenbach (1865: 274), *V. planifolia* and *V. sotoarenasii* Pignal *et al.* in Azofeifa-Bolaños *et al.* 2017: 17)). In Colombia, most *Vanilla* species, similarly to this new species, are known only from one or two field sites or herbarium vouchers (Table 1). Given the rapid anthropogenic landscape transformation in the country, these species are extremely vulnerable to population, and eventual species extinction (Flanagan & Mosquera-Espinosa 2016).

The genus *Vanilla* has not been assessed for the Colombian Red List for Orchid species (Calderón-Sáenz 2007), and the lack of population data for these species hinders a comprehensive threat assessment, however the species should be considered endangered. The new species is known only from two flowering plants located within the ethnic territory of Remanso-Chorrobocón, Guainía, Colombia. Although historically the indigenous peoples may have known and used vanilla pods, cultural change over the last century has led to a loss of traditional knowledge (Etter 2001). Today the indigenous communities pay little attention to the *Vanilla* plants in their territory, and the type locality of *Vanilla denshikoira* is highly vulnerable to anthropogenic disturbance during the process of opening new agricultural plots, known as 'conucos', in the forest. During field exploration for this work, vegetative material of an, as yet unidentified *Vanilla* was found in the debris from a new clearing in the vicinity.

Given the critically endangered status of this species, an integrated conservation program is urgently required, combining *in situ*, *ex situ* and *circa situm* actions (Flanagan & Mosquera-Espinosa 2016; Flanagan *et al.* 2018). To facilitate the monitoring and conservation of populations *in situ*, further exploration is needed to identify more plants of this new species, particularly within the protected area of the Puinawai National Nature Reserve. Additionally, we recommend support for a *circa situm* conservation system, in which conservation actions are undertaken within intervened landscapes (e.g., agroforestry systems or home gardens) within a species' native geographical range (Dawson *et al.* 2013). In this way, conservation actions can be combined with sustainable use of native biological resources as a non-timber forest product (NTFP).

The aromatic *Vanilla* plants native to indigenous territories provide a novel opportunity for income generation. In particular, for forest-dependent communities such as the Puinave, biodiverse agro-forestry systems based on native floristic resources offer potential for sustainable livelihood improvement. Other species of economic value in the Puinave territories include a number of palm species used for both alimentary consumption (*Oenocarpus bataua* Martius (1823–1857: 23):—common name 'seje'; *Euterpe precatoria* Martius in Orbigny (1842: 10):—common names 'manaca' or 'asaí'), as well as for a source of fiber for both roofing and artisan production (*Leopoldinia piassaba* Wallace (1853:17):—'Chiqui chiqui', *Mauritia flexuosa* Linnaeus (1782: 454):—'moriche').

Cuttings have been taken from plants of both *Vanilla denshikoira* and *Vanilla pompona* growing locally, and have been established within a stand of manaca (*Euterpe precatoria*) in the community homegardens. Such community-based cultivation also enhances awareness amongst the local community of the value of the *Vanilla* plants in their territory (Flanagan *et al.* 2012; Flanagan & Mosquera-Espinosa 2016; Flanagan *et al.* 2018). To further promote this initiative, capacity building is now required for the community in both vanilla cultivation methods, including artificial pollination, as well as post-harvest transformation. In countries such as Colombia, it is important that conservation initiatives are developed in a participative manner together with, and for the benefit of local communities. Wild, aromatic *Vanilla* species provide an ideal opportunity to foster such initiatives.

Conclusion

Vanilla denshikoira is an important addition to the secondary gene pool of the vanilla crop. The species offers a valuable resource for promoting sustainable livelihood improvement for the forest-dependent communities in whose territories it was found. Thus, a conservation management plan should include *circa situm* actions. The discovery underlines the rare and vulnerable status of most wild *Vanilla* species, and the urgent need for continued botanical exploration in the Amazon region.

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