



Notes on Mesoamerican orchids. I: *Vanilla*, with a new species

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Abstract

The genus *Vanilla* has one of the most important orchid species worldwide, however, despite its economic impact, there is still much to discover. Members of the genus are distributed in tropical zones of America, Asia and Africa but aromatic vanillas are found only in the Americas. Informally, the genus can be divided into two groups, one with tubular lip and elongated gynostemium and another one with wide and somewhat flat labellum and wide gynostemium. The non-aromatic species presented here belongs to the latter. It is described, illustrated and compared to its closest relative, *Vanilla inodora*. Before we remond of the systematic placement of the genus as well as its infrageneric organisation.

Résumé

Le genre *Vanilla* P.Miller abrite l'une des espèces d'orchidées les plus importantes au monde, mais, malgré son impact économique, il reste bien à découvrir. Les membres du genre sont présents dans les zones tropicales d'Amérique, d'Asie et d'Afrique mais on ne trouve les vanilles aromatiques qu'en Amérique. De manière informelle, le genre peut être divisé en deux

groupes, l'un présentant un labelle tubulaire et un gynostème allongé, l'autre un labelle large et plutôt plat et un gynostème large. L'espèce non aromatique présentée ici appartient à ce dernier groupe. Elle est décrite, illustrée et comparée à *Vanilla inodora*, l'espèce morphologiquement la plus proche. Auparavant, nous rappelons la position systématique du genre et son organisation infragénérique formelle.

Resumen

El género *Vanilla* posee una de las especies más importantes a nivel mundial y a pesar de su impacto económico todavía hay mucho por descubrir. El género se puede encontrar en los trópicos de América, Asia y África pero las vainillas aromáticas se encuentran únicamente en el continente Americano. En términos generales el género *Vanilla* se puede dividir en dos grupos, las que poseen flores con labelo tubular con gynostemium alargado y las que poseen flores con labelo ancho y algo plano, con gynostemium ancho. Se presenta una nueva especie no aromática, miembro del grupo de hojas membranáceas y labelo aplanado y ancho gynostemium ancho y aplanado. Para su validación se presenta su descriptor, ícono botánico y diagnosis, y se compara con la especie más cercana, *Vanilla inodora*. Anteriormente recordamos la sistemática del género y su clasificación infragenérica.

Keywords: Guatemala, new species, Orchidaceae, taxonomy, Vanilloideae, Vanilleae.

Mots clés: Guatemala, nouvelle espèce, Orchidaceae, taxinomie, Vanilloideae, Vanilleae.

Palavras-clave: Guatemala, nueva especie, Orchidaceae, taxonomia, Vanilloideae, Vanilleae.

Taxonomic notes

For many centuries man has been concerned to know their environment, from the primary knowledge to the dialectical philosophical analysis that has allowed to systematize and verify that this knowledge is correct. The *Vanilla* species have been used since old times, as proved by ancient texts such as the Codex Badiano (Archila *et al.*, 2018) and their use as an ethnobotanical element in the preparation of sacred drinks such as milkshake or Cacao (Archila & Lancerio, 2010).

The subfamily Vanilloideae was first described by Szlachetko (1995), and is today generally accepted as one of the subfamilies of Orchidaceae. According to the same author, it is comprised of 6 tribes and 15 subtribes:

Pogoniinae	Duckeellinae	Arethusinae
Sobraliinae	Triphorinae	Monophyllorchidinae
Palmorchidinae	Vanillinae	Lecanorchidinae
Galeolinae	Nerviliinae	Gastrodiinae
Wulschlaegeliinae	Stereosandrinae	Epipogiinae

One of these subtribes, Vanillinae Lindley (1840), belonging to the tribe Vanilleae Blume (1835), contains five genera:

Clematepistephium N.Hallé (1977) with only one species from New Caledonia, *Dictyophyllaria* Garay (1986) with again only one species, from eastern and southern Brazil,

Epistephium Kunth (1822) comprised of 28 species, all of them from tropical America,

Eriaxis Reichenbach f. (1876), with a single species endemic to New Caledonia, *Vanilla* Plumier ex P.Miller (1754), a very large (over 120 species) and widely distributed genus (American, Asian and African tropics).

Based on analysis of herbarium material Szlachetko & Rutkowski (2000) mention much similarity of the genus *Dictyophyllaria* with the genus *Vanilla* – and some authors place the former within the latter; unfortunately material is too scarce to get a definitive opinion.

Vanilla, first proposed by P. Miller based on Plumier's notes, had at that time three species, not correctly named as Miller did not adopt the Linnaean binomial system. The type species is *Vanilla mexicana* P.Miller (1768). The genus is pantropical, only absent from Australia, with the largest diversity in tropical America (ca. 70 species), whereas we found respectively 34 and 24 species in Asia and Africa. That is half the number of species belonging to the subfamily. The first infrageneric classification was proposed by Rolfe (1896), with two sections: section *Foliosae* and section *Aphyllae* and then amended by Portères (1954). However these systems were not satisfactory, in particular because the subsections proposed by Portères were invalid (neither Latin diagnose nor type species). Besides these subdivisions are not congruent with the molecular phylogenetic analysis. For example, the section *Aphyllae* contains all the leafless species whereas this condition appeared independently a number of times during the evolution, so that the section is not monophyletic. It is considered as a

plesiomorphic condition for the clade that contains the Caribbean and Paleotropical taxa, in which the leafless species are included (Pridgeon *et al.* 2003). Consequently, Soto Arenas & Cribb (2010) published a new classification, with two subgenera, *Vanilla* and *Xanata*, the latter divided into two sections, *Xanata* and *Tethya*.

For Guatemala, up to the end of century XX, three species were recognised (Ames & Correll, 1953-1954): *Vanilla inodora* Schiede (1829: 574), *Vanilla planifolia* Andrews (1808: t. 538) and *Vanilla pompona* Schiede (1829: 573), the authors listing a fourth species, *Vanilla pfaviana* Reichenbach f. (1883: 230), treated nowadays as a synonym of *V. inodora*. Then Archila added a number new species, *Vanilla cobanensis* Archila (1999: 47) and *Vanilla guatemalensis* Archila (1999: 46), *Vanilla esquipulencis* Archila & Chiron (2012: 6). Finally, in recent Guatemalan orchids checklists (Archila, 2014; Archila *et al.*, 2018), nine species are recorded, with the addition of *Vanilla hartii* Rolfe (1899: 133), *Vanilla insignis* Ames (1934: 101) and *Vanilla odorata* C. Presl (1830: 101). In recent botanical explorations it was possible to collect a plant that did not fit the morphology of the species already described for the Neotropics. After analyzing it and comparing it with all the more similar taxa, we decided to treat it as a new species. It is here named, described, illustrated and compared to *Vanilla inodora*, its closest relative.

Vanilla rebecca* Archila & Chiron, *sp. nov.

Type: Guatemala, Alta Verapaz, municipio de Cobán, 800 m asl, col. Fredy Archila, flowered in 07/2010, FA-sn (BIGU).

Etymology: in honour of Dr Rebeca Menchaca, researcher in the genus *Vanilla*.

Haec herba Vanilla inodora similis est sed foliis ellipticis 25-28 cm longis et ca. 12 cm latis, sepalis petalisque applanatis, sepalo supero elliptico obtuso (vrs. lineari tortili) ca. 3.7 cm longo et 1.2 cm lato, sepalis lateralibus falcatis obtusis (vrs. linearibus tortilibus) 3.5 cm longis et 2-2.5 cm latis, petalis oblongo-linearibus cum apicem orbicularem leviter undulatis 3.9 cm longis et 0.9 cm latis (vrs. linearibus tortilibus), labello trilobato 3 cm longo et 2.2 cm lato, lobo medio laminare nervato orbiculato 2 cm longo et 1.4 cm lato. (vrs. convexo cum apicem emarginatum), ovario leviter curvato (vrs. recto) 3.6 cm longo et 0.4-0.5 cm lato, gynostemio curvato (vrs. recto) 2.7 cm longo et 0.5 cm lato, capsula lineari curvata ca. 18 cm longa et 0.9 cm lata, differt.

Climbing plant; stems 0.9 cm diameter, with internodes 12-15 cm long; leaves elliptic, thin, membranous, 25-28 cm long, ca. 12 cm broad, sessile, obtuse; ovary ca. 3.6×0.5 cm, slightly curved, flattened, geniculate in the upper part, just before the verticille; dorsal sepal elliptic, ca. 3.7×1.2 cm, obliquely obtuse at the apex; lateral sepals falcate, ca. 3.5×2.25 cm (in the middle), apex obtuse, median vein very pronounced; petals oblong-linear, ca. 3.9×0.9 cm, apex rounded, with a depression in the apical third and two median veins very prominent; lip complex, trilobed, ca. 3×2.2 cm flattened; lateral lobes partially covering the column, semi-orbicular and deeply veined when flattened, presenting, at the point where they bend towards the central part, bulging protuberances; midlobe laminar, flat, ca. 2×1.4 cm, lateral margins undulate unless in the apical part, which is rounded, disc somewhat veined in the middle with two basal protuberances; gynostemium curved, 2.7×0.5 cm, with a pair of rectangular lobules at the apex, viewed from top it has a columnar structure in the center and a pair of winged projections on the sides, and two apically horn-shaped projections, this apical portion 0.8 cm wide; fruit linear, curved, ca. 18 cm long and 0.9 cm diam. Fig. 1, 2 & 3.



Fig. 1. *Vanilla rebecca*
dissected and pressed flower
ph. F. Archila



Fig. 2. *Vanilla rebecca*
gynostemium
ph. F. Archila

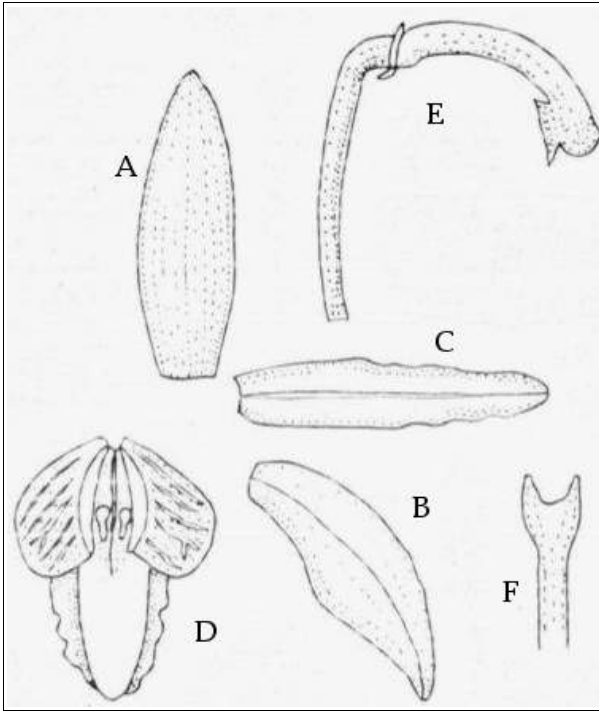


Fig. 3. *Vanilla rebecca*

A. dorsal sepal; B. lateral sepal; C. petal; D. flattened lip; E. ovary and gynostemium; F. apical part of the column – drawing F. Archila

Taxonomic notes: this taxon is somewhat similar to *Vanilla inodora*, with similar leaves, elliptic and twice as long as the internodes, flowers of similar colour, but can be differentiated by some features: flower smaller (up to 3.7 cm long *vs.* 4.5-5 cm), sepals and petals flat (*vs.* twisted), dorsal sepal elliptic (*vs.* linear lanceolate), lateral sepals much wider, strongly veined (*vs.* almost not veined), petals rounded at the apex (*vs.* subobtuse), lip slightly trilobed (*vs.* deeply trilobed) with shorter lateral lobes, midlobe apically rounded (*vs.* sub-acute), ovary somewhat curved geniculate in the upper part (*vs.* straight), fruit shorter (Fig. 4 & 5). Moreover, *Vanilla rebecca* is known hitherto only from Alta Verapaz in the center of the country whereas *Vanilla inodora* is present, in Guatemala, in the departments of the southern coast (Fig. 6).



Fig. 4. *Vanilla rebecca*
ph. F. Archila



Fig. 5. *Vanilla inodora*
flower in spirit, BIGU [ph. F. Archila]

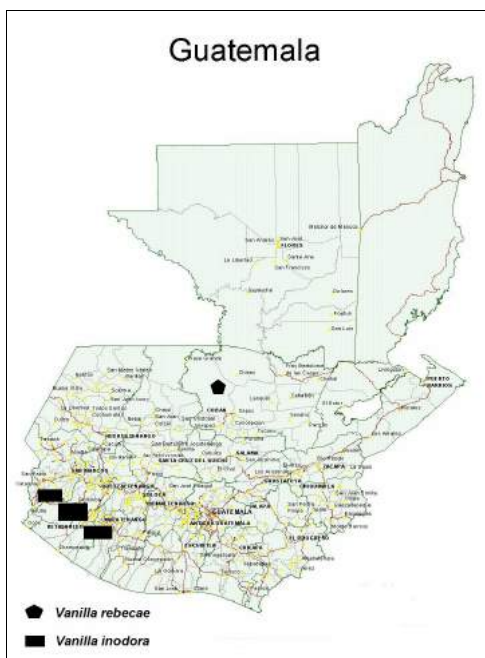


Fig. 6. Distribution of *Vanilla rebecca* and *Vanilla inodora* in Guatemala

References

- Ames, O., 1934. An addition to the genus *Vanilla*. *Botanical Museum Leaflets* 2: 101.
- Ames, O. & D. Correll, 1953-1954. *Orchids of Guatemala and Belize*. Ed. 1985. Dover Publications, New York. 779 pp.
- Andrews, H.C., 1808. *Botanists' Repository, for New, and Rare Plants* 8: t. 538.
- Archila, F., 1999. Hallazgos importantes en *Vanilla*/Orchidaceae de Jussieu, para Guatemala. *Revista Guatemalensis* 2(3): 47.
- Archila, F., 2014. Listado de orquídeas de Guatemala. *Revista Guatemalensis* 17(2): 32-71.
- Archila, F. & G. Chiron, 2012. Addition à la flore du Guatemala: *Vanilla esquipulensis* (Orchidaceae), espèce des forêts xérophytes. *Richardiana* 13: 3-12.
- Archila F. & G. Lancerio, 2010. El batido o Kakao, la bebida de los dioses. *Revista Guatemalensis* 13(1): 1-14.
- Archila F., D. Szlachetko, G. Chiron, M. Lipińska, V. Bertolini & K. Mystkowska, 2018. *Orchid Genera and Species in Guatemala*. Koeltz Botanical Books. Germany. 724 p.
- Blume, C.L., 1835. De quibusdam orchideis e tribu Vanilliarum. *Rumphia* 1: 196.
- Garay, L.A., 1986. Olim Vanillaceae. *Botanical Museum Leaflets* 30: 231.
- Hallé, H., 1977. Flore de la Nouvelle Calédonie et dépendances, 8: 403.
- Kunth, K.S., 1822. *Synopsis Plantarum, quas, in itinere ad plagam aequinoctialem orbis novi, collegerunt Al. de Humboldt et Am. Bonpland* 1: 340.
- Lindley, J., 1840. *Genera et Species Orchidacearum Plantarum*: 429.
- Miller, P., 1754. *The Gardeners Dictionary: containing the methods of cultivating and improving all sorts of trees, plants, and flowers, for the kitchen, fruit, and pleasure gardens,...* ed. 4.
- Miller, P., 1768. *The Gardeners Dictionary* ed. 8, 1.
- Porterès, R., 1954. Le genre *Vanilla* et ses espèces: pp. 94-290. In G. Bouriquet, ed., *Le Vanillier et la Vanille dans le Monde*. Ed. Paul Lechevalier, Paris.
- Presl, C., 1830. *Reliquiae Haenkeanae*: 101.
- Pridgeon, A.M., P.J. Cribb, M.W. Chase & F.N. Rasmussen, 2003. *Genera Orchidacearum* Volume 3. Orchidoideae (Part 2) Vanilloideae. Oxford University Press. 360 pp.
- Reichenbach, H.G., 1876. Orchidiographische Beiträge. *Linnaea* 41(1): 63.

- Reichenbach, H.G., 1883. *Gardeners' Chronicle* 1883 II: 230.
- Rolfe, R.A., 1896. A revision of the genus *Vanilla*. *Journal of the Linnean Society. Botany*, London 32: 439-478.
- Rolfe, R.A., 1901. *Bulletin of Miscellaneous Information, Royal Gardens, Kew* 1899(151-152): 133.
- Schiede, C., 1829. Botanische Berichte aus Mexico, mitgetheilt vom Dr. Schiede. *Linnaea* 4(4): 573-574.
- Soto Arenas, M.A. & P.Cribb, 2010. A new infrageneric classification and synopsis of the genus *Vanilla* Plum. ex Mill. (Orchidaceae: Vanillinae). *Lankesteriana* 9(3): 355-398.
- Szlachetko, D.L., 1995. Systema Orchidaliium. *Fragmenta Floristica et Geobotanica*. Suppl. 3: 48-59.
- Szlachetko, D.L. & P.Rutkowski, 2000. Gynostemia Orchidaliium I. *Acta Botanica Fennica* 169. 380 pp.