



Venation patterns of neotropical blueberries (*Vaccinieae*: *Ericaceae*) and their phylogenetic utility

PAOLA PEDRAZA-PEÑALOSA^{1*}, NELSON R. SALINAS^{1,2} & WARD C. WHEELER³

¹*The New York Botanical Garden, Institute of Systematic Botany, Bronx, NY 10458, U.S.A.*

²*City University of New York, The Graduate Center, 365 Fifth Avenue, New York, NY 10016, U.S.A.*

³*American Museum of Natural History, Division of Invertebrate Zoology, Central Park West at 79th Street, New York, NY 10024, U.S.A.*

*Corresponding author: ppedraza@nybg.org

Abstract

The description of venation patterns in neotropical *Vaccinieae* has been problematic because of the lack of an operational definition. Moreover, the underlying homologies remain unknown across and within lineages, thus precluding the use of venation characters in phylogenetic analyses. Venation patterns are often obscured in herbarium and living specimens due to the characteristic coriaceous and thick nature of *Ericaceae* leaves. Therefore, to obtain an unobstructed view of the veins, leaf clearings of 16 putative generic lineages of *Vaccinieae* were prepared and described. The main venation patterns were then defined and traditional definitions of venation were discussed in the light of the observed patterns. Selected characters were scored and the evolution of venation characters was discussed using a phylogenetic framework derived from molecular data analyzed under Maximum Likelihood. Venation descriptions and photographs are provided for 33 species.

Introduction

Neotropical *Vaccinieae* (30 genera, ca. 800 species) is one of the most diversified groups of *Ericaceae* and an important component of the biological diversity of the rich tropical montane ecosystems (Luteyn 2002). The venation of their leaves, the most commonly observed/collected organs, is mostly described as either pinnate or plinerved (e.g. triplinervis for leaves with 3 strong nerves, 5-plinerved for those with 5, etc.) (see Smith 1932). However, the current definition of these main venation frameworks is loose and rather informal, leading to contradictory and subjective assignment of venation types in *Ericaceae*; this has made difficult the exploration of venation characters in both taxonomy and phylogenetics. Disambiguation between venation types is fundamental for the accuracy and standardization of morphological descriptions and the understanding of the underlying homologies in neotropical *Vaccinieae*.

In neotropical *Vaccinieae*, the primary venation is some times determined by employing both vein diameter and hierarchy as criteria, while in other occasions the vein course is the most determining factor; thus, an unambiguous and unified criterion is currently lacking. Luteyn (1983, 1996), who followed Smith's venation nomenclature throughout his many years of taxonomic work with neotropical *Ericaceae*, further elaborated that pinnate leaves are camptodromous while plinerved leaves are those that are acrodromous. Here, plinerved is then defined as an over-broad concept that includes palmate-acrodromous leaves with multiple primary veins of equivalent diameter, as well as leaves with a single midvein (as in pinnate) flanked by one or more pairs of basal nerves that stand out in both gauge and course (ascending; as in for example, triplinervis). The nature and origin of these basal, lateral, prominent, and ascending nerves are at the heart of the problem; there is not an operational definition that allow us to unambiguously say whether they are