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Revisión | Review

The botanical explorations in Colombia: A review of the written botanical heritage with analyses of Lamiaceae collections as studied case

[Las exploraciones botánicas en Colombia: Una Revisión al legado botánico literario con análisis de las colecciones de Lamiaceae como estudio de caso]

Daniel Antonio Villamil-Montero & Lin Chau Ming

**Department of Horticulture, Faculty of Agronomic Science, State University São Paulo (UNESP), Brazil
(Laboratorio of Medicinal Plants and Ethnobotany)
Contactos / Contacts: Daniel Antonio VILLAMIL MONTERO - E-mail address: dvillamontero@fca.unesp.br**

Abstract: A chronological review of botanical explorations in Colombian was made through the revision of notes and publications from early 1500's to late 1990's. Complementary, herbaria photographs of Lamiaceae collections from botanical explorations in Colombia, deposited in the New York Botanical Garden Herbarium were analyzed in order to have a clear idea about the researches that were involved with collections in Colombia during the last 150 years..

Keywords: New Granada, Historical Botany, Naturalist, Expeditions, Collectors, Labiatae.

Resumen: A través de la consulta a notas científicas y publicaciones de varios autores fue hecha una revisión de la historia botánica de Colombia desde los años de 1500's hasta 1990's. Complementariamente, fueron analizadas fotografías de ejemplares de herbario de las colecciones de Lamiaceae provenientes de Colombia, depositadas en el Herbario del Jardín Botánico de Nueva York. Las especies, nombres de los colectores y sus instituciones de afiliación fueron comparadas y son presentadas seguidas de una breve discusión relacionada con el legado botánico de Colombia.

Palabras clave: Nueva Granada, Botánica Histórica, Naturalistas, Expediciones, Colectores, Labiatae.

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Early records of neotropical flora

In the timeline of the Americas flora, the written history probably begins with the first records made by Oviedo (1526) in his attempt to document the natural richness of the new world. In 1514, Oviedo traveled from Spain to *El Darien* region, a vast jungle between Colombia and Panama. From the beginning Oviedo's activities were related with gold extraction and reduction of the native cultures in name of the Spanish King, Carlos V; but his curiosity about nature lead him to write the *Sumario de la natural historia de las Indias* published in 1526, also known as "the Summary" (Fondo de Cultura Economica, 1950). The work of Oviedo is full of empiric descriptions of plants and animals mainly from the costal and island ecosystems of the Caribbean. Trees, herbs and fruits like coconuts, pineapples and avocados (among many others) were first mentioned in "the Summary", as well as the landscape and the indigenous cultures. In 1532 Oviedo obtained financial support from the Spanish monarchy and three years later he published the first part of the *Historia general y natural de las Indias*, an impressive composition of a life's work. In four of its 50 volumens, he talks about botanical matters in the following order: VII-Fructiferous Trees, IX-Wild Trees, X-Medicinal plants, XI Herbs and seeds brought from Spain.

After Oviedo, Cieza de Leon may be the second oldest author who wrote about the flora from the new world. It is believed that he could have traveled from Spain to Cartagena (Colombia) in 1532. He worked as a servant under the Spanish administration and made several official travels to learn about the social structure and costumes of the peoples from the Andes. Cieza de Leon returned to Spain in 1551 and two years later in 1553 published *La crónica del Perú* in which remarkable descriptions of the natural world are found. According with Pinto (1983) the others authors that wrote about the flora during the first two centuries of the Spanish occupation in today's Colombian territory were: Acosta (1500) with *Historia Natural y Moral de Indias*; De las Casas (1561) with *Historia General de las Indias*; Machuca (1599) with *Milicia Indiana y descripción de las Indias*; Castellanos, with *Elegía de varones ilustres de Indias* first published in 1589; Aguado with *Recopilación historial* (published in 1918); Simon with *Noticias historiales de las conquistas de tierra firme en las Indias occidentales* from (published in 1892); Serra, who wrote *Maravillas de la naturaleza* (published in 1956); L.

Piedrahíta with *Historia general de las conquistas del Nuevo Reino de Granada* (published in 1881); Antonio Julian with *La perla de America provincial de Santa Marta* (published in 1854); Rosa with his *Floresta de la santa iglesia catedral de la ciudad y provincia de Santa Marta* (published in 1945).

Explorations in Nueva Granada

During the XVII century some explores called the naturalist (usually men of science with academic formation) worked in the flora of *Nueva Granada* (a territory than comprised the lands of modern Colombia, Venezuela, Ecuador, Panama, Nicaragua, and north Peru and part of north-western Brazil). According with Pinto (1983) among the first naturalist that describe the flora of the *Nueva Granada* were *La Feuille*, how visited the Caribbean cost in 1704; *Jussieu* with the *Codamide* expedition in 1735 and *Jacquin* who published the *Selectarium Stirpium Americanum* in 1763. Linneus student, *Loebling* explored the *Orinoco* River (Colombia and Venezuela border) in 1754 where he unfortunately perished. By other hand, the local naturalists usually were monks with academic formation. Those men dedicated their work to the studies of natural history and some of their representative names were: Mercado with *Historia de la Provincia del Nuevo Reyno y Quito de la Compañía de Jesus* published in 1917, Riveiros (1736) with *Historia de las Misiones de los Llanos del Casanare y los Ríos Orinoco y Meta* and Gumilla (1741) with the *Orinoco Ilustrado. Historia natural, civil y geográfica de este gran río y de sus caudalosas vertientes*.

In this point, to understand not just the scientific heritage but also the political history of Colombia it's necessary to talk about Mutis and his botanical expedition in the *Nueva Granada*. Mutis was born in 1732 in Cadiz, Spain. He studied medicine and traveled to *Nueva Granada* in 1760 as the doctor of *Messias de la Cerda* (Diaz, 2002). From his arrival, Mutis felt in love with the exuberant biodiversity of the neo-tropic and started to collect plants and animals that were brought to him. In 1783, with the official support of the Spanish monarchy, Mutis managed to begin an enterprise that took over 33 years and had a direct impact in the history of Latin America (Diaz, 2002). The Royal Botanic Expedition conceived by Mutis had the objectives of collect and classify the plants, animals and minerals of *Nueva Granada*, as well as high quality illustrations, observation of astronomic events and topography description. To accomplish his goals

Mutis brought a massive library from Europe, opened a school of science and art, set together a team of botanists, artist, astronomers, zoologists, mineralogist and “field experts”, and started to describe the natural world with abnegated dedication. For eighteen years Mutis exchanged correspondence with Linnaeus, who presented novelties to the scientific community based on many works from Mutis. In *Supplementum Plantarum* (1782) the genus *Mutisia* L.f. (ASTERACEAE) was dedicated in recognition of his botanical achievements. In 1801 Humboldt and Bonpland decided to visit Mutis and after leaving the port city of Cartagena, following the Magdalena River for several weeks arrived at Bogota. They were

well received by an old but enthusiastic man who shared his vast knowledge about the flora of the region, which later was incorporated at *Nova genera et Species Plantarum* the master work of Humboldt, Bonpland and Kuth. The works of Mutis made such an impression in Humboldt and Bonpland that they dedicated *Plantae equinoxiales* to the memory of Mutis in the year 1808 (Figure 1). Francisco Javier Mutis, an artist of Mutis expedition also made a remarkable impression and his paints and drawing of the flora were considered by Humboldt like the best he had seen in the world. The genus *Mutisia* Bonpl. (MALVACEAE) was also dedicated to the artist in 1808 by Bonpland in *Plantae equinoxiales* (1808).



Figure 1

Photography of the illustration of Jose Celestino Mutis in *Plantae equinoxiales* (published in 1808) and the words of Bonpland as follows in English translation: To Don Jose Celestino Mutis. Chief Director of the Botanical Expedition in the Realm of New Granada, the royal astronomer of Santa Fé de Bogotá, like a truthful mark of admiration and recognition; A. Humboldt and Aime Bonpland. Original found can be consulted free at <http://www.botanicus.org/title/b1200408x>

Regardless of his quality as naturalist, Mutis didn't published his work and after his dead in 1808,

his nephew Sinfodoro Mutis assumed his place as director of the Expedition. In 1814 an inventory

revealed an impressive number of 24.000 herbarium specimens from over 130 Families and 6.840 illustration of the highest quality. Unfortunate, in 1816 many artist and intellectuals were exiled or assassinated by the Spanish Royal Army and the collections of the Botanic Expedition were send to Madrid where it remains until today. According with Vezga (1860), only four member of the expedition survive the Spanish intervention: Sinfodoro M. (Mutis nephew), Valenzuela, Zea (who became an important politician after Bolivar's revolution) and Matis the artist, who keep shearing and teaching his botanic knowledge to the new generation of Colombian botanist, like, Céspedes, Bayón, Quijano, Acosta and Triana. To follow Vezga (1860) some other participated in the field of botany from 1816 to 1859. Vezga commented that it was thanks to Zea's mission in Paris that the services of scientist in France were secured with the objective of teaching sciences and run a museum in Colombia; and from this agreement Riveiro, Boussingault, Boulin, Goudot and Bourdon came to the country and worked with different areas, sometimes related with the flora neo *granadina*. Linden, Karsten and Rampon also traveled through the nation during the decade of 1850's (Vezga, 1860).

At the middle of the XIX century, an very important scientific commission called "the choreographic commission" lead by Codazzi was set to explore in a systematic way; in order to describe the richness of the nation and finally made it's completed cartography; a fundamental thing for the country's development. In the commission Jose Jeronimo Triana was the responsible for the inventory of the vegetation and in 5 years of field work he made one of the best collections ever made from Colombia, with over 50.000 samples, 800 collections numbers and many scientific novelties (Diaz, 1994). This collection may not be the biggest from Colombia but is so rich that included samples from almost all the floral formations of the country (Pinto 1983). After finished the work with the commission, Triana traveled to France and worked with J.E. Planchon at Paris and together they published *Prodromus Flora Novogranatensis* in 1862, which is one of the most important piece of work in Colombian botany. While Triana was in Europe, he got the opportunity to revised Mutis collection in Madrid while in his homeland political changes were changing the nation names. The study of Botany in the country while Triana was far away, felt in the hands of Bayon, Hurtado, Uricochea,

Vezga and others (Pinto 1983). This last group formed the first national society of scientist called the *Sociedad de Naturalistas Neo-granadinos*, and among the members of society were important names like Vrolik from the Royal academy of science of Holland, Hornes, director of the Impirial museum of mineralogy in Vienna, the president of the royal academy of science in Madrid and the director of the Zoological Gardens in Brussels, J. Linden. Other characters that made their contribution to the study of Colombian national flora in this period were P. Arango, S. Cortes, C. Márquez, J.A. Uribe and E. Robledo. Meanwhile, foreign explorers in the last part of the XIX century were: C. Bertero, R. White, E. André, Holton L. Née, C. Lehman and A. Millican. Others researchers from international institutions that where send to work in Colombian between the second half of the XIX century and the beginning of the XX were H. Smith and H.H. Rusby.

With the advances of biomedical science botanic collections acquired an increasing interest and many researchers were sent to tropical areas to seek plants with pharmaceutical or industrial interests. Meanwhile, in Colombia the lack of national herbariums made impossible the keeping of duplicates of the materials collected by foreigner scientists and once again like happened before with the gold and emeralds, the Colombian natural treasures were sent away and many type species were deposited only in collections at Europe and the United States. In the beginning of the XX century the foreign collectors that worked in Colombia were Rusby, Pennell, Killip, Smith, Toro, Lawrance and Von Sneidern, later some other researchers like Phillipson, Cuatrecasas, Schultes, Blydenstein, Dumont, Gentry, Humbert, Wood, Haught, Davis, Plowman, Escobar, Van der Hammen and Coppens eventually came to Colombia from different institutions but with the same interests of study the fascinating Colombian flora. Many of these authors wrote publications that had contributed enormously to the development of natural science in Colombia.

Only in 1931 the National Herbarium (National University of Colombia) was funded by Perez Arbeláez and its collections rapidly increased thanks to the works of many good botanists like the same Pérez Arbeláez, who was also the first director of the Instituted of Natural Science and his successor, the professor A. Dugand. Other names related were Jaramillo, García Barriga, Idrobo, Uribe Uribe, Huertas, Camargo, Pinto, Patiño and Cabrera; and finally the last generation of national botanist from

the XX century that have contributed substantially with Colombian botany are Rivera, Forero, Lozano, Hernández, Díaz, Buritica, Soejarto, Rangel, Acero, Betancourt, Roldan and Fernández Alonso and many more others that continue working in the comprehension and characterization of Colombian flora.

Collections of Lamiaceae as studied case in Colombian botany

As a complementary revision to better understand the botanical explorations in Colombia, photographs of the New York Botanical Garden Herbarium collection of Lamiaceae from Colombia were studied through the analysis of the specimen's labels. Collector's names, numbers, records, species and institutions were compared in order to have a clear idea about the researches that were involved with collections of Lamiaceae in Colombia during the last 150 years.

The Lamiaceae is a family of plants consisting mainly in aromatic herbs and shrubs (rarely trees) provided with secreting glands of volatile essential oils. The family has global economic importance, since numerous species are used as medicine, condiment or food and also are prized as

ornamental plants (Fernades-Alonso & Rivera-Dias, 2006). In Colombia, 23 genera and about 203 taxa (between species and subspecies) are found, of which 186 are native and only 17 species are naturalized foreign plants (Fernades-Alonso & Rivera-Dias, 2006) There are also other 21 exotic species widely cultivated in Colombia for various uses (seasoning, medicinal, magical, religious and ornamental). The most diverse genera in Colombia are *Salvia* and *Hyptis* with 83 and 42 taxa respectively. Although Lamiaceae have a wide distribution in Colombian territory, there are some clear trends in distribution and habitats in some genera; like *Salvia* and *Lepechinia* which are typical of the Andean region, preferably associated with Andean forest and the grasslands of subpáramo (Fernades-Alonso & Rivera-Dias, 2006).

According with the label information, eight lead collectors from three different institutions excel in the Lamiaceae collections (Table. 1). The most collected and divers was *Salvia* L. with 29 spp recorded (Table 2). Most collected species were *Salvia carnea* Kunth (19 records) followed by *Marsypianthes chamaedrys* (Vahl) Kuntze. (18 records) and *Ocimum campechianum* Mill. (17 records) (Table.2)

Table 1
Principal Collectors of Lamiaceae in Colombia

Lead Collector	Records	Species	Main Institution
Fernández Alonso	80	34	Herbario Nacional Colombiano
E.P. Killip	41	19	The New York Botanical Garden
F.W. Pennell	38	20	The New York Botanical Garden
R. Toro	11	7	The New York Botanical Garden
J.R.I. Wood	9	8	The New York Botanical Garden
L.U. Uribe	9	9	Herbario Nacional Colombiano
H.H. Smith	8	5	The New York Botanical Garden
F. Roldan	7	3	Universidad de Antioquia

Table 2
The genus of LAMIACEAE collected in Colombia.

Genus	Spp
<i>Hyptis</i> Jacq. !!	10
<i>Coleus</i> Lour.	1
<i>Hyptidendron</i> Harley	1
<i>Lamium</i> L.	1
<i>Leonotis</i> (Pers)R. Br	1
<i>Lepechinia</i> Willd.	7
<i>Marrubium</i> L.	1
<i>Marsypianthes</i> Mart. ex Benth.	1
<i>Minthostachys</i> (Benth.) Spach.	2
<i>Ocimum</i> L.	3
<i>Prunella</i> L.	1
<i>Salvia</i> L.	29

!! = nom. cons.

Table 3
Most collected species of Lamiaceae in Colombia

Species	Records
<i>Hyptis colombiana</i> (Epling)	13
<i>Lepechinia salviaefolia</i> (Kunth) Epling.	14
<i>Marsypianthes chamaedrys</i> (Vahl) Kuntze.	18
<i>Minthostachys mollis</i> (Kunth) Griseb.	15
<i>Ocimum campechianum</i> Mill.	17
<i>Salvia bogotensis</i> Benth.	13
<i>Salvia carnea</i> Kunth.	19
<i>Salvia tolimensis</i> Kunth.	15

The highest number of records holds by the New York Botanical Garden Herbarium is in part explained by the high number of collectors that were sent by this institution to study Colombia's flora. Two of the three collectors with higher numbers of herbarium specimens were from the NY botanical Garden (see Table 1, F.W. Pennell and E.P. Killip). The oldest record in the collection is a specimen of *Salvia* from 1834, unfortunately, locality and collector's name could not be determined. Other older records were the numbers made by Holton in 1853 and Spruce in 1857-9, as well as a collection of unknown date made by Triana purchased in 1982. (Figure 2). An interesting description of collection

localities in the XIX with maps and illustrations could be found in Holton (1857) publication, called New Granada: Twenty month in the Andes. The collections of Pennell and Killip from the first half of the XX century also are considered of particular botanical and historical interests and excellent explanations of the expeditions are given by the same authors in Pennell (1918) and Killip (1928). The Collector that had made the highest contribution to Lamiaceae collection from Colombia associated with the *Herbario Nacional Colombiano* until the beginning of the XXI century is Fernandez Alonso with 80 records, several works and publications.

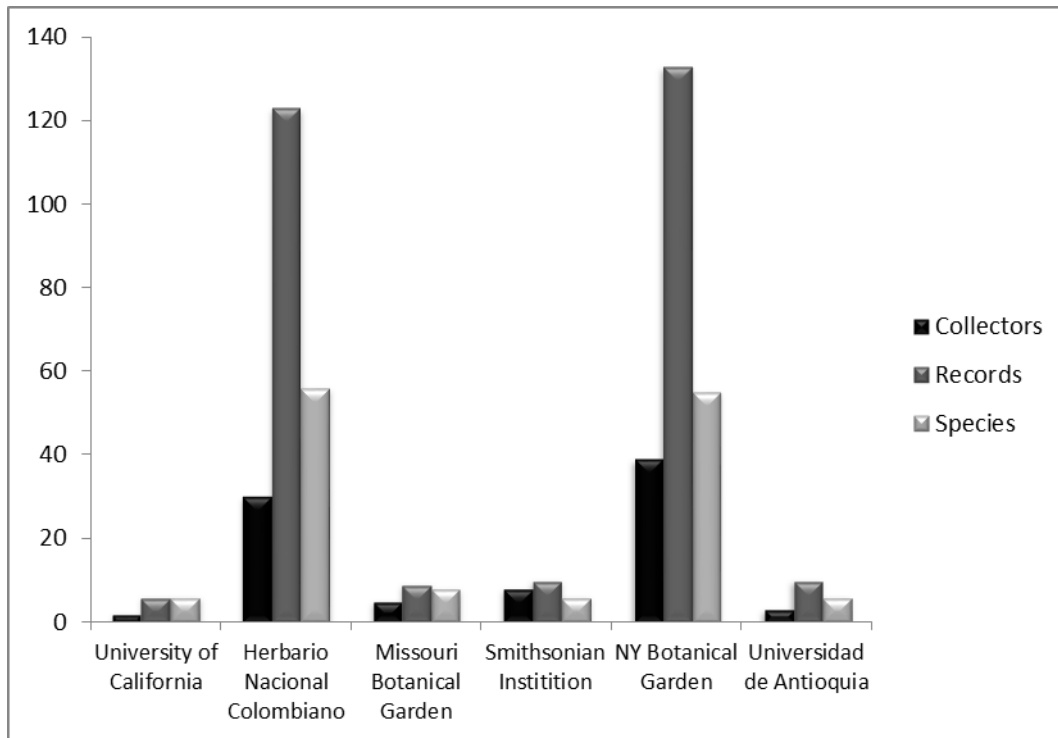


Figure 2
Principal collections of Lamiaceae from Colombia. Comparison of Institutions, their collectors, herbarium specimen (records) and species deposited.

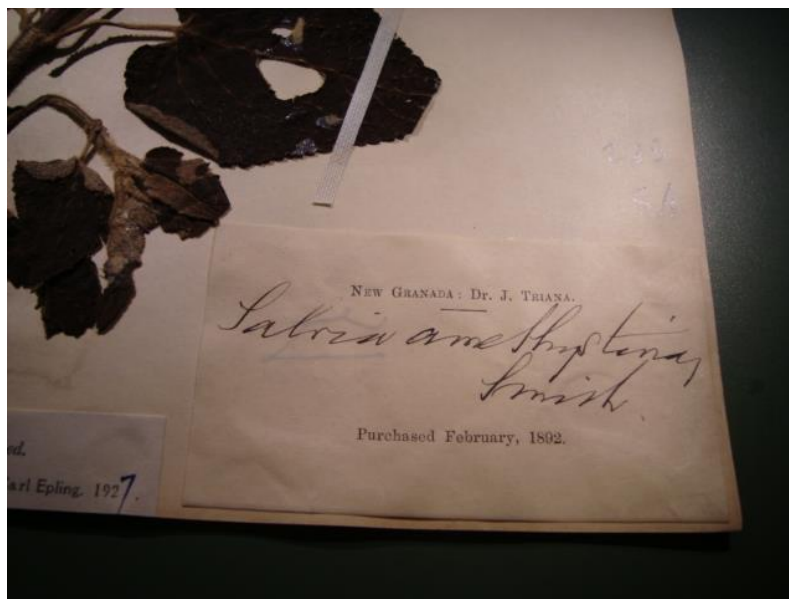


Figure 3
Herbarium specimens collected in Colombia by J. Triana probably before 1858 when the country was called the New Granada. The collection was purchased and deposit in the New York Botanical Garden Herbarium in 1892.

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