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José Mariano Mociño's "Flora de Guatemala" in the Real Jardín Botánico de Madrid

M. A. Giménez, J. M. Losa and J. L. Valverde
R. Losa, translator

Introduction

During the 18th century, the Spanish Crown financed several scientific expeditions to America in order to study its vegetation, animals and minerals and to enrich scientific knowledge by recording the native peoples' uses of those resources. The expeditions to Peru and Chile respectively directed by Hipólito Ruiz and José Pavón and to New Granada by Celestino Mutis have been studied in depth, but there are few studies of the botanical expedition to New Spain between 1788 and 1803, and most of the firsthand accounts of the expedition remained unpublished. The dispersion of the original scientific documentation of the New Spain expedition already had begun when the voyagers returned to Spain; this circumstance was compounded by the lack of governmental support to complete the work of the expedition and the exodus of many documents from Spain, all of which made the concluding analysis of the investigations impossible. In addition, references to the New Spain expedition can only be found in some specialized Spanish language magazines of limited publication and distribution. For these reasons it is difficult to evaluate the expedition's importance. This dissemination accounts for the inconclusive nature of the Sessé and Mociño works published in Mexico at the end of the 19th century—and also for the inconclusive nature of our own study of Mociño's manuscript. The basic aim is to generally inform readers of the existence of a large body of original, unpublished documentation of the expedition to New Spain while focus-

ing on Mociño's unpublished manuscript "Flora de Guatemala," which we recently discovered in the Archive of the Real Jardín Botánico de Madrid.

The purpose of the expedition to New Spain, sponsored by King Carlos III and directed by Dr. Martín de Sessé (1751–1808), who also paid part of the expenses, was to continue the research of King Felipe II's *protomedicus* Dr. Francisco Hernández (1514–1587). In addition to Sessé, one of the expedition's outstanding members was José Mariano Mociño (1757–1820). Mociño was born in Temascaltepec, Mexico, and studied at the Seminario Tridentino de México. In 1788 he obtained a degree in Medicine; he began his studies in Botany at the Jardín Botánico de México and became one of the most outstanding students. In 1789, in the opening speech at the Real y Pontificia Universidad de México, he discussed the Linnaean system. Sessé was impressed by this young scientist and proposed to him a position as field assistant. Mociño accepted his offer and became a member of the New Spain expedition in 1794.

In 1795 the viceroy of New Spain appointed Mociño director of the botanic campaign through Guatemala, during which members of the expedition studied the natural history of the territories from Oaxaca to Ciudad Real de Chiapas and Guatemala, continuing in 1797 to San Salvador. The aim of this campaign was the botanical study, collection and classification of plant specimens and the recording of the native peoples' uses of the plants. Mociño was helped by José Longinos and Juan

Villar, two scientists, and the painter Vicente de la Cerda.

At the end of the 19th century, after numerous diplomatic negotiations, the Sociedad de Historia Natural de México obtained from the Real Jardín Botánico de Madrid copies of the manuscripts *Plantae novae Hispaniae* and *Flora Mexicana*, which were written by Sessé and Mociño as accounts of that expedition. The Society published these works as appendixes in their magazine *La naturaleza* between 1887 and 1890 (in 19 issues). The Secretaría de Fomento del Gobierno de México ordered a second edition of *Plantae novae Hispaniae* in 1893 and of *Flora Mexicana* in 1894. Only the second editions of the works exist, and they are the only firsthand accounts of the expedition to be published—albeit posthumously, unedited and without the intended illustrations.

Several scholars, including Barras de Aragón, Arias Divito, Álvarez López, and Ramírez, have paid some attention to this expedition in their articles, but most of the original documents written during the trip remain—with little study—in the Real Jardín Botánico de Madrid, and the drawings are dispersed in several institutions. We, however, discovered an exceptional unpublished document from the botanical expedition to New Spain in the Garden's Archive. (The manuscript was found in bookcase 1, fourth division, number 13.) It consists of 133 double folios written in Latin and titled "Flora de Guatemala y otros lugares de América"—the written account of Mociño's journey through Central America, southern Mexico and the Old Kingdom of Guatemala. This Flora possibly was begun in 1796 (it is not dated) and was based on Mociño's original field notes, drawings and specimens collected during the expedition, and it can be considered the first botanic work on Central American flora.

The manuscript provokes botanical interest for us today because of the great care evident

in the detailed descriptions, which often refer to the corresponding drawings of the plants. (It has not been possible for us to compare descriptions with drawings as most of the drawings have not been kept in Madrid.¹) A detailed study of the manuscript proves it equal in importance to *Plantae novae Hispaniae* and *Flora Mexicana*. Because it was written after those works, it can be considered a complement of them. Both of those works have been well-studied because they were the only works published about Spanish expeditions to that American region in the 18th century, and there was no knowledge of the existence of a Central American flora by Mociño.

Many of the plants considered in "Flora de Guatemala" had already been identified and studied in *Plantae novae Hispaniae* and *Flora Mexicana*, and in his manuscript's prologue Mociño acknowledged that repetition: "Nobody would consider it exceptional that the plants collected in New Spain [now Mexico and northern Central America] constitute the main part of the catalogue of Guatemala and for that reason they have been described again" (p. 7).² Mociño also made it clear in the prologue that only distinctive characteristics of the plants that had not been described before would be transcribed in his manuscript. He explained that he took care to represent those differences with illustrations and also tried to preserve specimens of the plants. Unfortunately, a great part of his herbarium was lost when his house at Servatoropolis, Guatemala, was destroyed during an earthquake. He had begun an ambitious study comparing similar plants from different regions, but at the time he wrote "Flora de Guatemala" his herbarium was in great disarray. He also indicated, therefore, that classifications for many of the original drawings had been lost and that he would add them in later works.

"Flora de Guatemala" was the result of a scientific pursuit of new plants and knowledge carried on in spite of, as Mociño wrote in the

prologue, the severe conditions of the expedition: "We walked 4,000 miles . . . more than eighty miles were across steep and rocky mountains, without any kind of help, with the absence of any kind of resource and needful of absolutely everything . . . we saw the most loyal of the servants work with a malignant erysipelas and part of his skin ripped up without being able to find anyone who would care for him" (p. 8). This anecdote conveys a sense of the severe conditions under which his expedition was made.

Material and Method

In "Flora de Guatemala" Mociño related and classified the species of plants he found during his journeys through Central America according to the sexual system of Linnaeus in *Species plantarum*.

We aim to compare the classes, arrangements, genera and plant descriptions in Mociño's manuscript with those of Linnaeus in *Species plantarum* and *Systema vegetabilium*. It can be observed that Mociño probably used those two works in his determinations, as their influence on his descriptions is visible. When a species was characterized and a definition and description were used to differentiate it from another species, it is likely that this characterization and differentiation were written by Mociño. Later in the manuscript, the species were related by him to those in *Plantae novae Hispaniae* and *Flora Mexicana* in order to determine which were new species or genera. There are some references in the text to an "epitome" which we have not found in the files of the Real Jardín Botánico de Madrid. Perhaps there are other references to genera and species of plants housed in that Archive, but we have no notice of them.

Mociño's manuscript has been transcribed and translated from the original Latin text in 18th-century calligraphy to Spanish. In his manuscript Mociño used the botanical names

of genera and species without placing much importance on correct spelling; this explains some irregularity in the spelling of some genera or species in this article. We have spelled classes, orders, genera and species exactly as they were spelled in his manuscript and have used "[sic]" to denote those orthographic irregularities.

In the *Plantae novae Hispaniae* introduction, Sessé stated the work criterion that guided the scientific research of the expedition: "We only accept as belonging to a single genus those species which seemed to us well determined[,] reserving many others for a later and more detailed study when no author had mentioned the genus to which they belonged . . . guided by this criterion, we take care not to establish any new genera, presenting only those species that have already been characterized . . . for careful study and experience have shown us that many of the plants that we used to consider new had been already examined and described by some other botanists" (p. 8). His remarks explain why generic names are absent in the main part of the descriptions and why all new genera usually were placed at the end of their respective classes, in an appendix.

The arrangement of plants in "Flora de Guatemala" was ordered following the method stated in its prologue: "When the differentiating characteristics assigned to the species by our predecessors in Botany corresponded exactly to the characters we found, we have transcribed them without any modification, as well as the references to the illustrious names that appear in Linnaeus' works, translated to Spanish by Palau . . . and when we found any discrepancy in our specimens, in particular in those characteristics that result in a major differentiation of species, we have indicated that" (p. 8). This reverence for Linnaeus and reluctance to diverge from him were prevalent among 18th-century botanists and may explain why when describing what he thought were new genera or species Mociño never

named them, although sometimes he indicated the numbers of the corresponding icons. In the few instances in which he did propose a name for a new genus, he wrote "genus novum" before each description.

Despite the difficulties posed by our present interpretation of the descriptions, we have attempted the taxonomic identification of all the plants described. For this identification, it would have been ideal to study the drawings to which Mociño's text refers, as well as to examine the corresponding herbarium sheets, as Mociño had intended, in order to develop a more exact and thorough interpretation of the descriptions. These factors will be taken into account in our future investigations. We would be very grateful, however, to receive any help from the botanic centers that have herbarium sheets of this expedition and from the institutions that hold the icons and illustrations of the respective species. This information will facilitate the correct identification of all the plants before the nomenclatural and taxonomic study is begun.

The Manuscript's Contents

The text consists of two volumes. The folios were numbered and paged by Mociño, but the first folio we have is number 9. Two folios with part of the preface to "Flora de Guatemala" were found in another file. The first volume includes folios 9 to 77 and 120 to 133 and descriptions of Linnaean classes from Monandria through Icosandria. The second volume includes folios 78 to 119 and descriptions of the classes Polyandria through Gynandria.³

In the manuscript, the classes are found in the numbered folios as follows: Monandria, 9–11; Diandria, 12–15; Triandria, 15–19; Tetrandria, 19–26; Pentandria, 26–54; Hexandria, 54–61; Octandria, 61–65; Enneandria, 65–67; Decandria, 68–124; Dodecandria, 124–129; and Icosandria, 129–133. There is

a gap in the original numbering of the folios between 77 and 120. The second volume begins with class Polyandria, 78–83; Didynamia, 83–95; Tetradyndamia, 95; Monadelphia, 96–102; Diadelphia, 102–112; Polyadelphia, 112–114; Syngenesia, 114–115; and Gynandria, 116–119.

There is no correlation in the text between folios 66 and 67. We suppose that the description of another taxon should have begun in the gap and that half of a folio probably is missing.

Mociño recognized 43 new genera and placed them at the ends of their respective classes, in an appendix. Sixteen of them had references to their respective icons, and Mociño added a question mark to the name—i.e., *Anacardium nicaraguense* (?)—when it seemed dubious to designate a *genus novum*.

We distinguish between two types of description used by Mociño: one strict and minimal and the other more complete. There are more specific than generic descriptions. Specific descriptions do not always correspond to new species; Mociño used these descriptions as a basis for comparison with other plants, complementing the plain Linnaean definition in *Species plantarum*. Many species described as existing in Guatemala have been described in previous Mexican floras.

Summary of the Contents of the Manuscript

Mociño's manuscript begins with folio 9 in which he placed the genus *Canna* in the first class, Monandria Monogynia. In describing *Canna bimaculata* J.M. (the only species in the entire manuscript to which he adds his initials), he referred to *Canna glauca* and *Canna indica* in *Plantae novae Hispaniae*. He mentioned six genera and a total of 12 species and described *Maranta capitata* and *Boerhaavia* [*sic*] *pentandra* as new, ending his discussion of the first class with the description of a *genus novum*,

a plant that he did not name and only identified by the numeral 1.

The second class begins in folio 12 with Diandria Monoginia [sic], in which Mociño referred to 18 species included in 15 genera. In a note on the genus *Justicia*, he wrote the names of several species found at the seaside, indicating that he also had found a plant that he thought was a new species but later doubted belonged in that genus. He described a similar dilemma in classifying another new plant that he related to *Calceolaria* [sic] *perfoliata* as described by Mutis and cited by Linnaeus in *Systema vegetabilium*. The plant in question was described in depth and studied in the manuscript. He did not name it and only included it in an icon. In the genera *Verbena*, *Salvia* and *Piper* he cited several species he had already collected in Mexico and also mentioned a new one, *Vervena* [sic] *jamaicensis*.

The third class begins at the end of folio 15 with Triandria Monogynia, in which he mentioned seven genera and 13 species. We have not been able to identify *Valeriana mexicana*. Mociño included *Moraea graminea* and *Hippocratea volubilis*, which were already described in *Plantae novae Hispaniae* and *Flora Mexicana*. He commented extensively on the genus *Saccharum* in Triandria Digynia, indicating the abundance of Gramineae in Guatemala, and closed his discussion of this class with an appendix that includes descriptions of three new genera lacking specific names and with only the numbers of the icons he drew.

The fourth class, Tetrandria, starts at the end of folio 19. Mociño included 23 genera and 40 species, most of them already described in *Species plantarum*. Writing about the genera *Plantago*, *Buddleia*, *Ixora*, *Hedyotis* and *Galium*, he indicated that other species described as existing in Mexico could be included in those genera. For this reason he did not make extensive or detailed references to many of these genera already studied in *Plantae novae Hispaniae* or *Flora Mexicana*. He considered some

species, such as *Pavetta lanceolata*, *Pavetta nicaraguensis* or *Cissus quinquefolia*, to be new, but he did not describe them. Referring to *Krameria procumbens*, Mociño wrote "differt a precedentis" and specified the differences he noticed. The genus *Cuscuta* was included in Tetrandria Digynia, and the genera *Ilex*, *Sagina* and *Potamogeton* were included in Tetrandria Tetragynia. Mociño only included Linnaean species in both divisions, most of which were not included in his previous works. In the appendix at the end of the fourth class he described three new genera, but we have not been able to identify them without the corresponding icons.

He registered up to 57 genera in the class Pentandria, folio 26, including in Pentandria Monoginia [sic] such genera as *Mirabilis*, *Heliotropium*, *Convolvulus*, *Datura*, *Ehrecia* [sic], *Nicotiana*, *Ipomoea*, *Echites*, *Tabernaemontana*, *Varronia*, *Cordia*, *Tournefortia*, *Cerbera*, *Cestrum*, *Capsicum*, *Solanum*, *Physalis*, *Chiococca*, *Mussaenda*, *Rhamnus*, *Ceanothus*, *Mangifera*, *Ribes* and *Heliconia*. Here he commented both on plants described and others not described in the manuscript but observed in Guatemala. As new plants that had not been described in his previous works, he mentioned *Heliotropium peruvianum*, *Lithospermum lanceolatum*, *Lithospermum hirsutum* and *Convolvulus littoralis*.

In folio 33 Mociño commented on the genus *Ehrecia* [sic], which he thought to be related to *Patagonula americana*, and he remarked that he tried to have its colored iconography made with great care. The rest of the plants of *Ehrecia* [sic] he mentioned had been described in *Plantae novae Hispaniae*. He also described *Phlox carolina* as a new species and only mentioned *Phlox papilionacea*, *Jacquinia lanceolata* and *Cordia cuneifolia*, even though they were not found in *Plantae novae Hispaniae* or *Flora Mexicana*. He described *Varronia guatemalensis* [sic] extensively in folio 32 and *Brunsfelsia chiapensis* in folio 34, but later he rejected

this generic classification and wrote *Spigelia*. Referring to *Solanum nicaraguensis*, Mociño stated that he had previously called it *Solanum lanceolata*.

He mentioned the presence of *Chrysophyllum cainito*, previously described in *Flora Mexicana*, and described *Chrysophyllum glabrum*. In the treatment of the genus *Rondeletia* he described *Rondeletia triflora* from *Systema vegetabilium*, *Rondeletia volubilis* from *Plantae novae Hispaniae*, and *Rondeletia obovata* and *Rondeletia trifolia*, which had been included in *Flora Mexicana*. The species *Physalis curasabica* [sic], *Coffea arabica*, *Lonicera corymbosa*, *Vitis vulpina*, *Mangifera indica*, *Cedrela odorata*, *Claytonia sibirica*, *Ribes rubrum*, *Heliconia hirsuta*, *Heliconia bihai*, *Atriplex patula* and *Illecebrum capitatum* were cited by him for the first time as present in America, as he did not comment on them in his previous Mexican floras.

Mociño mentioned 18 genera and a total of 26 species in Pentandria Digynia and noted the genera *Cynanchum*, *Chenopodium*, *Eryngium* and *Anethum*. In some of these notes he referred to the aforementioned "epitome" that we have not found in the Garden and that might be lost. He mentioned that he drew an icon of *Swertia diformis* [sic]. He described *Gentiana villosa* (which is not mentioned in *Plantae novae Hispaniae* or *Flora Mexicana*), *Hydrolea longifolia*, *Steris mexicana* and *Steris guatemalensis* [sic]. Mociño indicated that he had previously considered both *Steris* species as if they belonged to the genus *Hydrolea*. He also mentioned *Heuchera americana* and characterized *Gomphrena perennis*, *Eryngium tricuspdatum*, *Hydrocotyle americana*, *Hydrocotyle asiatica* and *Daucus muricatus*. In a note at the end of this arrangement, he stated that he observed many other plants of the Umbelliferae family. He had preserved some of them, with incomplete descriptions, in his herbarium.

In Pentandria Trigynia he classified four genera that included six species, characterizing *Viburnum acerifolium*, *Sambucus racemosa*

and *Rus* [sic] *cominia*, which were not mentioned before in Mexican floras.

In both Pentandria Tetragynia and Pentandria Pentagynia he did not recognize any new species and positioned the genera *Evolvulus* in Pentandria Tetragynia and *Aralia* and *Linum* in Pentandria Pentagynia. In the appendix to that class, Mociño placed the genus *Ruischia* in Pentandria Monogynia, describing *Ruischia mucronata*, of which he wrote that he drew an icon. He also included the genus *Hillia* and a number of other species that he was not sure belonged in that genus. He included five descriptions of unnamed plants, the last one of which was listed as *Boerhaavia* [sic] but without any specific epithet. In a note to this appendix he stated that some plants collected in the Kingdom of Guatemala that represented new genera were described in a field notebook that was lost during the expedition. He remarked that the icons of some of these species had been drawn in the province of Ayuca, in southern Mexico.

The class Hexandria appears on the verso of folio 54. In Hexandria Monogynia 23 genera including 27 species are described. Mociño commented on the genera *Bromelia*, *Tillandsia*, *Tradescantia*, *Loranthus*, *Achras*, *Allium*, *Agave* and *Yucca*, indicating that *Yucca aloefoliae* was used as food in Nicaragua. He extensively described *Bursera gumifera* [sic] and *Achras guatemalensis* [sic] as new species. In Hexandria Digynia he made reference to the genus *Oryza*, indicating that *Oryza sativa* was commonly cultivated in Guatemala.

In Hexandria Trigynia he included the genera *Rumex* and *Veratrum* and included the genus *Petiveria* in Hexandria Tetragynia. In both cases he only included species that already had been described in Mexican floras of the time.

The class Octandria starts in folio 61. Eleven genera and 14 species are included in Octandria Monogynia. He described *Combretum laxum* even though it also appeared in *Species plantarum*. Mociño also made some notes on the genera *Epilobium*, *Gaura*, *Oenothera* and

Fuchsia. In Octandria Trigynia he included five genera and six species already established. In the treatment of the genera *Paullinia* and *Polygonum* he referred to several descriptions in the "epitome." In the appendix to this class he described a genus found in warm areas of the Chiapa mountains (in southern Mexico), drawn in icon number 9, that seemed similar to *Oenothera*.

In the class Enneandria Monogynia, which begins in folio 65, he included the genera *Laurus* and *Anacardium* with new species found in warm places of the province of Nicaragua, the extract of which was reported to have medicinal properties to aid in treating fevers. Mociño described *Anacardium occidentale*, a species already studied in *Species plantarum*, as a basis of comparison with *Anacardium nicaraguense* (?), the wood of which, he indicated, was used for shipbuilding.

The class Decandria begins in folio 68. In Decandria Monogynia Mociño included 23 genera and 38 species. He extensively described *Bauhinia divaricata*, *Cassia tehuantepecensis*, *Cassia spicata* and *Cassia carao* because those species were considered edible or medicinal. He described *Myroxylon guatimalensis* [sic] because of its medicinal resin and also described *Tribulus chiapensis*, *Heisteria coccinea*, *Melastoma senifolia*, *Melastoma discolor* and *Samyda cathartica*. He included remarks and notes on the genera *Bauhinia*, *Cassia*, *Poinciana*, *Caesalpinia*, *Myroxylon*, *Trichilia*, *Pyrola*, *Melastoma*, *Arbutus* and *Copaifera*, referring to numerous species which had been described previously in other floras.

In Decandria Pentagynia he included the genera *Cotyledon*, *Sedum*, *Oxalis* and *Spondias*, with a total of eight species, and referred to other species already observed in that part of America. In Decandria Decagynia he included the genus *Phytolacca*. He closed the treatment of the class with an appendix in which six new genera were described along with references to their corresponding icons.

The class Dodecandria can be found on the

verso of folio 124. Nine genera are mentioned in Dodecandria Monogynia. Here Mociño included briefly characterized species (16 in this class) and extensively described *Bocconia integriflora*, the genera *Crateva* and *Triumpheta* [sic] and the species *Lythrum chiapensis* and *Lythrum tuxtense*. *Lythrum tuxtense* had been described in *Flora Mexicana* but was included for the compared characterization of *Lythrum chiapense*.

The genera *Heliocarpus* and *Euphorbia* were described in Dodecandria Digynia and Dodecandria Trigynia respectively, and *Euphorbia chiapensis* was included as a new species. His consideration of this class ends with an appendix in which he described three new genera.

The first volume of "Flora de Guatemala" ends with the class Icosandria. In Icosandria Monogynia, which begins in folio 129, Mociño listed five genera and 12 species, among them *Cactus legionensis* [sic] and *Cactus matiari*, both supposedly new species. He also included some notes on the genera *Cactus*, *Myrtus* and *Prunus*. In Icosandria Trigynia he mentioned the genus *Sessubium* [sic] and mentioned four genera in Icosandria Pentagynia, noticing *Rosa* and *Rubus* and extensively describing *Rubus guatimalensis* [sic]. At the end of this class there is an appendix with the description of a *genus novum*.

The second volume begins in folio 78 with the class Polyandria. In Polyandria Monogynia 13 genera and 20 species are mentioned. Mociño described *Trilix* as a new genus, but he did not give any specific epithet nor did he mention any icon. He also described the species *Mammea americana* (included in *Species plantarum*), *Capparis tehuantepecensis* and *Lecythis nicaraguensis* (included in *Flora Mexicana*). Mociño closed this chapter with an extensive description of two new genera (icon 14), and he included two species, *Nymphaea integrifolia* and *Nymphaea dentata* (icon 15).

In Polyandria Trigynia he included the genus *Delphinium*; in Polyandria Tetragynia he

included the genus *Tetracera*. In Polyandria Pentagynia he included the genera *Aquilegia* and *Nigella*, while in Polyandria Polygynia he included five genera with 12 species, all of them belonging to the Ranunculaceae family and previously described in Mexican floras.

The class Didynamia Gimnosperma [sic] starts in folio 83 with the genus *Teucrium*, including eight more genera, all of the Labiatae family.

In the class Didynamia Angyosperma [sic] he included 20 genera and 29 species, the majority of them described in *Plantae novae Hispaniae*. In folio 86 he included an unidentified genus represented in icon 16. In the genus *Lantana* he described the species *Lantana repens*, *Lantana tuxtensis* and what he thought was another species of *Lantana*. In the genus *Avicennia* he described *Avicennia nitida*, and in the genus *Gesneria* he described *Gesneria tomentosa*. These species had been included in *Flora Mexicana*. The treatment of this class ends with an appendix in which he described a new genus without giving it a specific name.

In the class Tetrodynamia (folio 95), Mociño only made reference to the genus *Cleome*.

In Monadelphia Pentandria (folio 96) he included the genera *Hermannia* and *Melochia*, with a total of three species. In Monadelphia Octandria he described a *genus novum* with no name. In Monadelphia Dodecandria he included ten genera with notes on the locations of *Geranium*, *Bombax*, *Sida*, *Malva* and *Hibiscus*. The species of *Geranium* included in "Flora de Guatemala" had already been described by Linnaeus. Mociño described the species *Sida guatemalensis* [sic], *Vrena* [sic] *typhalaca* and *Vrena* [sic] *lobata*, which did not appear in the floras indicated. Mociño also described in depth *Hibiscus spinifex*, *Hibiscus virginicus* and *Hibiscus maritimus*, which had been included in *Systema vegetabilium*. In the genus *Carolinea* he included the species *Carolinea princeps* (?), which he extensively described and differentiated from the genus *Bombax*. He finished this class with

a description of the genus *Cobea* [sic] and *Cobea* [sic] *obovata*.

The class Diadelphia begins in folio 102 with Diadelphia Hexandria, including the genus *Fumaria*, to which he did not give any name, only stating that he collected it in the littoral areas of Nicaragua. Mociño placed the genera *Polygala* and *Securidaca* in Diadelphia Octandria, describing species such as *Polygala vulgaris*, *Polygala incarnata*, *Polygala diffusa* (not included in Linnaeus' works) and *Securidaca erecta*. In Diadelphia Decandria, Mociño included 21 genera and 36 species, the most outstanding being *Nissolia*, *Erythryna*, *Phaseolus*, *Dolichos*, *Orobis*, *Psoralea*, *Hedysarum*, *Clitoria* and *Indigofera*. He also gave accurate descriptions of *Pterocarpus guatemalensis* [sic] (indicating that it was used for dental care), *Erythryna crista-galli*, *Piscidia erythryna*, *Dolichos guatemalensis* [sic], *Hedysarum biarticulatum*, *Hedysarum nicaraguense*, *Indigofera anil* and *Indigofera tinctoria*.

The class Polyadelphia starts in folio 112 with Polyadelphia Pentandria, in which he described the species *Theobroma guazuma* and *Theobroma petaxtle*, both with edible seeds. In Polyadelphia Icosandria, Mociño treated the genus *Citrus*, and in Polyadelphia Polyandria he treated the genera *Symplocos* and *Hypericum*.

In the class Syngenesia, beginning in folio 114, Mociño included 11 genera in the Compositae family, with notes on the genera *Sonchus*, *Scorzonera* and *Eupatorium*.

The class Gynandria Diandria, beginning in folio 116, included the genera *Serapias* and *Epidendrum*. Mociño described the species *Epidendrum veracruzense*. The second volume ends with the description of the species *Passiflora mucronata* and *Passiflora tuxtensis* (folio 119).

No reference is made in the manuscript to the date when it was written, and there is no authorial indication of its completeness or resolution. We believe it to be unfinished by Mociño and therefore incomplete because there is no account of Linnaean classes 21

through 24 (Monoecia, Dioecia, Polygamia and Cryptogamia, respectively).

Conclusion

Mociño's manuscript is the work of a professional botanist who, nevertheless, consistently leaned on Linnaeus' scientific authority. In the tradition of botanists of his day, he accepted the species described in Linnaeus' works and did not challenge them or propose any other valid classifications. His taxonomic criterion consisted of preserving the Linnaean nomenclature. When he found a specimen not yet collected he wrote a complete botanical characterization accompanied by drawings of the original plant and the number of the corresponding herbarium sheet. In order to identify Mociño's botanic criteria from the existing documentation, it is necessary to follow the method he used for each species, comparing the original description with the corresponding icon and its herbarium sheet. In the case of a species that he described as new, Mociño gave a thorough geographical designation but not much information about its location or character. The complete reference of a new plant found during the expedition should have consisted of a description, drawing and herbarium sheet.

This article, as conceived in its original form, would have been enhanced by the examination of the corresponding plates and herbarium sheets, which would have enabled us to correctly and unequivocally identify the described genera and species. But because we only had access to the manuscript, we have been able to describe it and determine its contents but not do a taxonomic criticism.

Mociño's manuscript is an elaborate draft, not a final version, of "Flora de Guatemala." In the document, the original field notes and drawings were ordered according to the Linnaean classification. There remained a lot of

work for Mociño yet to do, including the critical study of all *genera nova*.

Mociño's manuscript shows how some botanists might have worked at the end of the 18th century. It has an elaborate exposition of data and characteristics in the descriptions and a careful interpretation of them in order to delineate clear differences among the species. As mentioned previously, the question mark was frequently used when Mociño needed to give a critical judgement or to mark a place where he would need to supplement or complete data.

"Flora de Guatemala" can be considered at least equal in scientific value and merit to the manuscripts which served as a basis for the aforementioned *Plantae novae Hispaniae* and *Flora Mexicana*. Mociño's manuscript was written later and might be judged as a contribution that complements those two floras.

It is a pity Mociño did not write a critical work based on the characters expounded in his descriptions, which would have allowed him not only to maintain his considerations but also to gain recognition in the scientific world. Perhaps it was due to indecision or lack of bibliographic media. His work was complicated by the great difficulties of the expedition, including the earthquake that destroyed his herbarium, and a lack of resources. "Flora de Guatemala" is akin to a field notebook, with great exactitude in the determinations and great interest devoted to the preservation of many herbarium sheets of the collected plants for consecutive studies. This manuscript shows basic investigative initiative on the part of Mociño, as it seems to have been written without the help of any of the other members of the expedition to New Spain.

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Notes

1. In exile in Montpellier, Mociño entrusted part of his work to A. P. de Candolle, who studied and copied some of the original drawings of the expedition and published many species in his *Prodromus*. As we were unable to view either those copies or the original drawings now at the Hunt Institute for Botanical Documentation in Pittsburgh, we have only been able to comment on the contents of the manuscript.
2. This prologue was found in two separate folios in another file of the Archive. They were identified as part of "Flora de Guatemala" according to their content, calligraphic characters and the numbering of the pages.
3. If Mociño followed the Linnaean classification in *Species plantarum*, then the genera of the classes Monoecia, Dioecia, Polygamia and Cryptogamia (numbers 21 through 24) seem to be missing from the volumes.

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- Departamento de Farmacia y Tecnología Farmacéutica [MAG, JLV]
 Departamento de Biología Vegetal [JML]
 Universidad de Granada
 Granada 18001 España
- and
- Avda. Dr. Olóriz 2 1º A.
 Granada 18012 España [RL]