

Lectotypification of Cavanilles' names in *Solanum* (Solanaceae)

by

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Abstract

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Lectotypes are confirmed or designated here for the 13 names coined by Antonio José Cavanilles that were either described, or today are recognised as, members of the large genus *Solanum* (Solanaceae): *Solanum betaceum*, *S. elaeagnifolium*, *S. fructotecto*, *S. lanceolatum*, *S. lentum*, *S. parviflorum*, *S. phyllanthum*, *S. pinnatum*, *S. pomiferum*, *S. pygmaeum*, *S. triquetrum*, *Triguera ambrosiaca* and *T. inodora*. A brief introduction assesses the importance of Cavanilles to the botany of his time, and identifies difficulties in lectotypifying names coined by him. The currently accepted name for each taxon is given. Each typification is accompanied by a discussion of the reasoning behind the choice of specimen, and all lectotypes are illustrated.

Keywords: typification, historic collections, America, exploration, Malaspina, Paris, Linnaean.

Introduction

Exploration of the Americas in the late 18th and early 19th centuries brought to European botanical gardens many new plants, both as herbarium specimens and as seeds that were grown out and the plants brought into cultivation. Solanaceae featured prominently in these novelties not only because the Americas are the centre of diversity at both the generic and specific ranks in the family (see Knapp, 2007), but also because many Solanaceae are relatively weedy and easy to cultivate. *Solanum* L., with ca. 1500 species, is the largest genus in the Solanaceae and one of the ten most species-rich genera of flowering plants (Frodin, 2004). As part of the collaborative project "PBI *Solanum*:

Resumen

Knapp, S. 2007. Lectotipificación de los nombres de Cavanilles en *Solanum* (Solanaceae). *Anales Jard. Bot. Madrid* 64(2): 195-203 (en inglés).

Se confirman o designan los lectótipos de 13 nombres de Antonio José Cavanilles que o bien fueron descritos dentro del género *Solanum* (Solanaceae) o son actualmente reconocidos como parte del mismo: *Solanum betaceum*, *S. elaeagnifolium*, *S. fructotecto*, *S. lanceolatum*, *S. lentum*, *S. parviflorum*, *S. phyllanthum*, *S. pinnatum*, *S. pomiferum*, *S. pygmaeum*, *S. triquetrum*, *Triguera ambrosiaca* y *T. inodora*. Se incluye una breve introducción explicando la importancia de Cavanilles para la botánica de su tiempo, así como las dificultades que entraña lectotipificar las especies de este autor. Se indica el nombre aceptado para cada especie. Las tipificaciones se acompañan de una discusión, explicando la elección de los especímenes. Todos los lectótipos están ilustrados.

Palabras clave: tipificación, colecciones históricas, América, exploración, Malaspina, París, Linneo.

a world-wide treatment" (see Knapp & al., 2004; <http://www.nhm.ac.uk/solanaceaesource>), descriptions of all species of *Solanum* together with details of types and nomenclature are being provided via an online taxonomic resource, *Solanaceae Source*. One of the goals of the PBI *Solanum* project is to designate lectotypes for all *Solanum* names, helping to stabilise nomenclature and facilitate further taxonomic research. This paper is the first of a series on the nomenclature of *Solanum* in which lectotypes for the names described by a particular author (rather than for a taxonomic section of *Solanum*) are designated.

Antonio José Cavanilles, eminent Spanish botanist and director of the Real Jardín Botánico of Madrid from 1801 until his death in 1804, described many new

plants, among them 13 species either described as *Solanum* or today recognised as belonging to that genus. Cavanilles was born and educated in Valencia, and became a priest. He was the chaplain and tutor attached to the household of the heir to the Spanish throne. With the household, he travelled to Paris in 1777, where he collected plants and continued his botanical education through making contacts with the great and good of French botany such as A.L. de Jussieu, P. Thouin, and J.B. de Lamarck. He began working in the gardens and herbaria of the Jardin du Roi in 1783, under the auspices of de Jussieu, where he saw plants from all over the world. In the mid-1780s he began to publish his *Monadelphiae classis dissertationes decem* (1785-1790), with discussions and descriptions of the plants of the Linnaean class Monadelphia, most of which are included in the broader Malvales. He became well-known in European botanical circles, for both his publications describing new plants and his philosophical ideas (González Bueno, 2002). In the late 1780s the possibility of a prestigious post for Cavanilles in Spain opened, but never came to fruition, partly due to factionalism in Spanish botany at the time. Cavanilles remained in Paris with the Royal household until it returned to Madrid in 1789. On his return to Spain, Cavanilles brought with him his extensive library and herbarium, and a reputation as one of Europe's botanical elite; he was a corresponding member of societies such as the Linnean Society of London and the Petersburg Academy (González Bueno, 2002). He requested access to the collections of the Real Jardín Botánico, and was eventually granted permission to study, draw and publish the plants cultivated therein, despite fierce opposition from the then director, Casimiro Gómez Ortega, and his supporters such as the botanists Hipólito Ruiz and José Pavón (González Bueno, 2004). Cavanilles began to publish his series of *Icones et descriptiones plantarum* (1791-1801), in which many of the plants sent by expeditionary botanists and grown in the Real Jardín Botánico were described, something Gómez Ortega had failed to do during his long tenure as director of the garden. In June 1797, one of the botanists of the expedition to circumnavigate the world directed by Malaspina, Luis Née, gave his collection of plants to Cavanilles – the description of these was accomplished in the last volumes of the *Icones*. Cavanilles' initial bad opinion of Née's abilities as a botanist soon changed when he examined the collection; half of Née's plants described by Cavanilles were new to science (Muñoz Garmendia, 1992). Cavanilles was finally appointed professor and director of the Real Jardín Botánico in 1801; a fitting tribute to his role in the flowering of Linnaean botany in Spain.

Like many botanists of the 18th century (see Jarvis, 2007), Cavanilles both received material from and gave material to many of his colleagues around Europe. Material in the herbarium of the University of Sevilla has been catalogued by Salgueiro González (1998), Savage's (1945) catalogue of the Linnaean herbarium at the Linnean Society of London details material in that collection, and sheets attributable to Cavanilles can be found in many other collections (see Muñoz Garmendia, 2004, for handwriting and examples of sheets in other herbaria). Cavanilles' personal herbarium, however, remains in Madrid and is kept separately from the main collection (see Garilleti, 1993, for a catalogue). It is from this herbarium that lectotypes should be chosen if at all possible. Some specimens from the Cavanilles collection have been found in the general collections at MA, so if a specimen does not appear in the historic herbarium, a search in the general collections is worthwhile.

Many monographers in *Solanum* have stated that holotypes or lectotypes for Cavanilles names were in the Madrid herbarium (MA), but without specifying a particular sheet. In some cases, only one sheet exists thus making lectotypification relatively straightforward, but in others multiple sheets in the Cavanilles herbarium and potential type material in the general herbarium at MA means that these type designations are not sufficiently precise. Some authors have assumed that all specimens bearing labels with the handwriting of Cavanilles represent duplicates of a single collection and have assumed that other sheets of a species are isotypes. Specimen collection in the 18th century did not follow the same relatively strict set of criteria that we apply today, and unless it is very clear that sheets have come from the same gathering, isotype material is unlikely to exist for most of these names. Exceptions to this can be where sheets have been collected in the field (e.g., Née material) from single collecting localities (see *Solanum phyllanthum* below).

Typifications

***Solanum betaceum* Cav.**, Anales Hist. Nat. 1: 44. 1799

Ind. loc.: "La planta se cultiva en el jardín de esta Corte... La he visto en flor y fruto en dicho jardín".

Lectotype (designated by Bohs, 1994), MA 308535; isolectotype (fragment), F.

Current accepted name: *Solanum betaceum* Cav.

A single specimen of *Solanum betaceum* exists in the Cavanilles herbarium at MA (Fig. 1 A). Bohs (1994) specified the accession number of this sheet

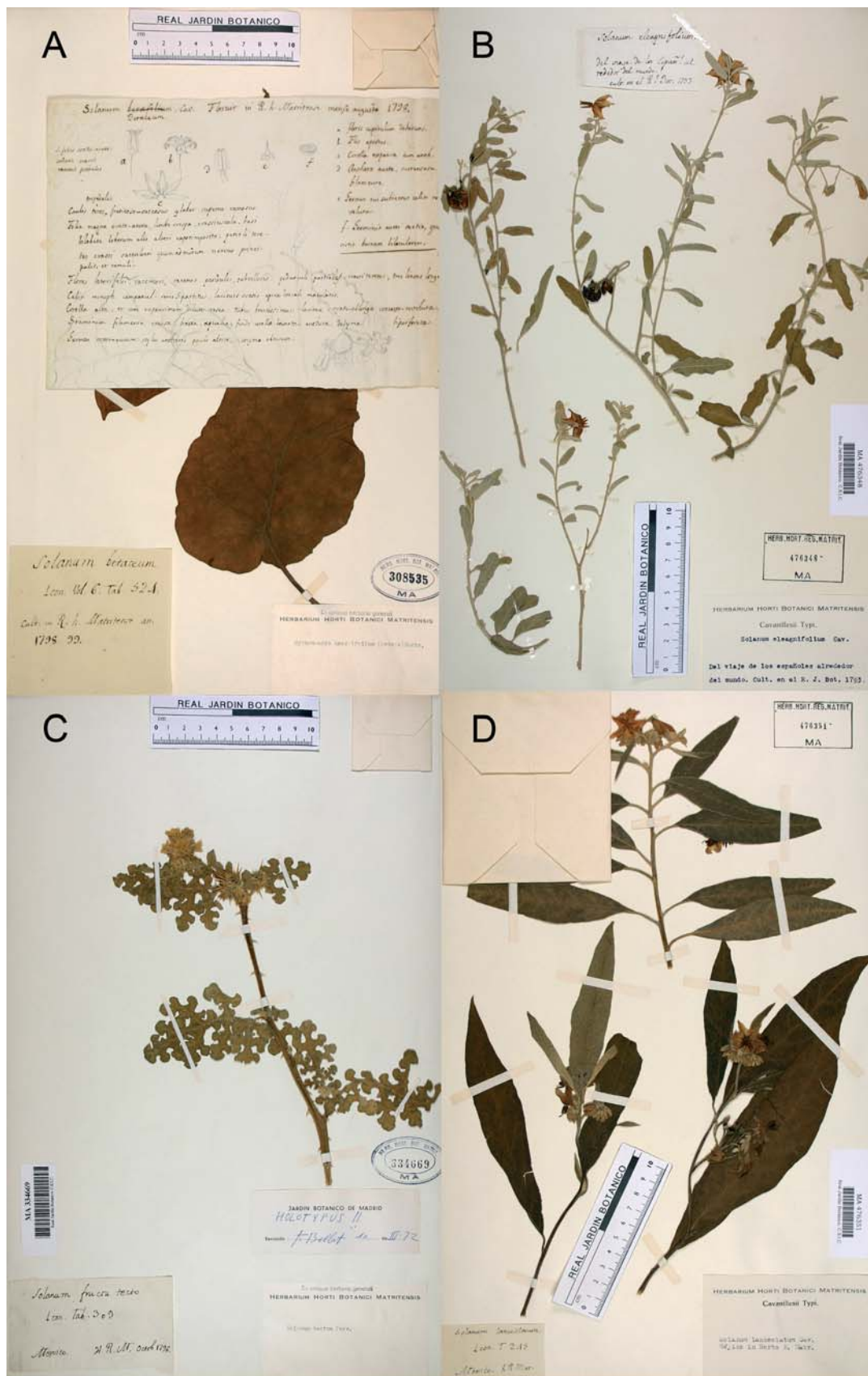


Fig. 1. **A**, lectotype of *Solanum betaceum* Cav. (MA 308535); **B**, lectotype of *Solanum elaeagnifolium* Cav. (MA 476348-2); **C**, lectotype of *Solanum fructo-tecto* Cav. (MA 334669); **D**, lectotype of *Solanum lanceolatum* Cav. (MA 476351).

(MA308535) and thus effectively lectotypified the name. She suggested that isoelectotypes of *Solanum betaceum* could be found at F (a fragment of the sheet in Madrid probably taken by J.F. Macbride) and at C and G. Only the fragment at F can be considered an isoelectotype, as one of the sheets at C is dated 1801 and the other (and that at G) is probably a duplicate of a gathering later than that of the lectotype.

Solanum elaeagnifolium Cav., Icon. 3(1): 22, tab. 243. 1795

Ind. loc.: "Habitat in America calidiore. Floret a Iulio usque Octob. ad in Regio horto Matritensi".

Lectotype (designated here), MA 476348-2; isoelectotype, MA 476348-1.

Current accepted name: *Solanum elaeagnifolium* Cav.

The two sheets of *Solanum elaeagnifolium* in the Cavanilles herbarium appear to be from the same gathering, as the stems are extremely similar morphologically, with identical spines and leaf shapes, both of which vary considerably in this species. I have selected as the lectotype the sheet bearing a label, in Cavanilles' hand, dated prior to the publication of the name (see Fig. 1 B). The isoelectotype has only a printed label (see Garilleti, 1993). The material was said by Cavanilles to come from plants cultivated from seeds collected by Luis Née in Coquimbo, Chile.

Solanum fructo-tecto Cav., Icon. 4(1): 5, tab. 309. 1797. As "fructu-tecto".

Ind. loc.: "Habitat in Imperio Mexicano. Culta en R. H. M. ex seminibus inde missis, floruitque autumn 1796, et periit".

Lectotype (designated here), MA 334669.

Current accepted name: *Solanum fructo-tecto* Cav.

Garilleti (1993) indicated no material of this species was present in LINN or MA. A sheet of *Solanum fructo-tecto* has subsequently come to light in the general herbarium bearing a label in Cavanilles' hand with a date (1796) prior to the publication of the name (Fig. 1 C). The locality coincides with the protologue ("R. H. M."). Whalen (1979) indicated that the "holotype" of *Solanum fructo-tecto* was at MA, but he cited no specific sheet and this may have been an assumption based on the original description. In any case, a lectotype must be indicated, as no holotype sheet was designated by Cavanilles.

Solanum lanceolatum Cav., Icon. 3(1): 23, tab. 243. 1795

Ind. loc.: "Habitat in Imperio Mexicano, unde in Regium hortum introductum".

Lectotype (designated here), MA 476351.

Current accepted name: *Solanum lanceolatum* Cav.

Of the 5 sheets of *Solanum lanceolatum* in the Cavanilles herbarium only MA 476351 has label information indicating it was cultivated in the Real Jardín Botánico in 1793 (see Fig. 1 D), thus linking it to the protologue. The plate number from the *Icones* (T. 245) also appears on the label in Cavanilles' hand (Garilleti, 1993). The other four sheets (MA 476349, MA 476350, MA 476352, MA 476353) have various labels, none of which correspond to the protologue. None of these can thus be considered isoelectotype material (see also Garilleti, 1993).

Solanum lentum Cav., Icon. 4(1): 4, tab. 308. 1797

Ind. loc.: "Habitat en Imperio Mexicano. Floruit in Regio Horto Matriensi mense Septembri et Octobri anni 1794".

Lectotype (designated here), MA 476355.

Current accepted name: *Lycianthes lenta* (Cav.) Bitter.

Of the three specimens of *Lycianthes lenta* in the Cavanilles herbarium, only one has a collection date prior to publication of the name (Fig. 2 A). The other two sheets (MA 476354, MA 476356) either have no date or are dated 1800. Although the lectotype collection date differs from that of the protologue, it is prior to the publication of the name, and matches the month of the protologue.

Solanum parviflorum Cav., Icon. 3(1): 19, tab. 236. 1795

Ind. loc.: "Habitat in Insula S. Dominici. Floret Septembr. et Octob. Vidi vivum in Regio horto Parisiense anno 1786".

Lectotype (designated here), MA 206020.

Current accepted name: *Solanum polyacanthon* Lam.

Garilleti (1993) indicated that no material was located in either LINN or MA, but the sheet here designated as the lectotype was found amongst the general collections in 2007 (Fig. 2 B). The label is in Cavanilles' hand and coincides with the protologue, indicating that the specimen was cultivated in Paris ("R.h.P.") and was from what is today the Dominican Republic ("Habitat Insula S. Dominici"). The specimen is morphologically similar to type material of *Solanum polyacanthon* (described in 1794) in the Lamarck herbarium at P and may be from the same living collections cultivated in Paris.

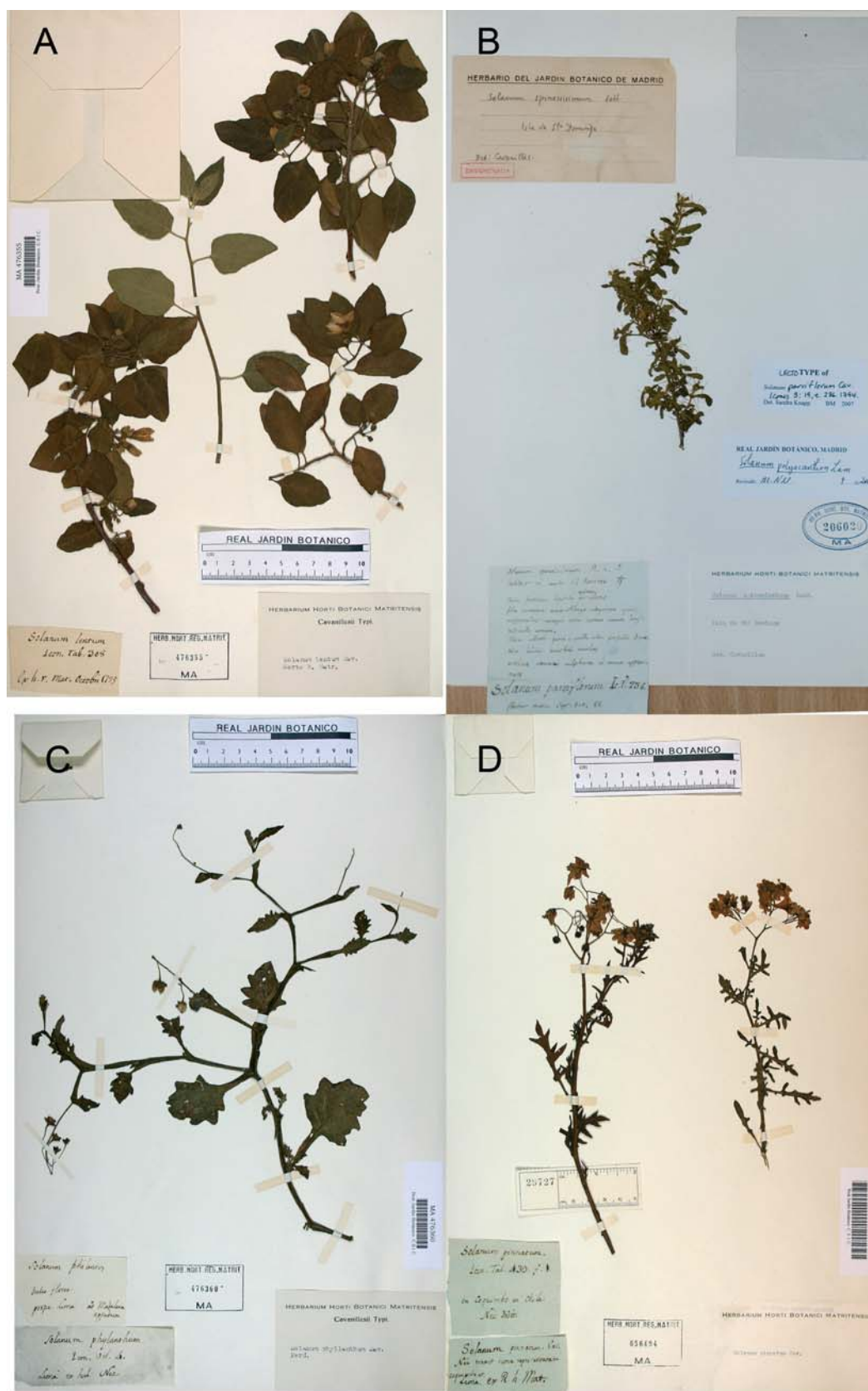


Fig. 2. **A**, lectotype of *Solanum lentum* Cav. (= *Lycianthes lenta* (Cav.) Bitter) (MA 476355); **B**, lectotype of *Solanum parviflorum* Cav. (= *Solanum polyacanthum* Lam.) (MA 206020); **C**, lectotype of *Solanum phyllanthum* Cav. (= *Solanum montanum* L.) (MA 476360); **D**, lectotype of *Solanum pinnatum* Cav. (MA 656494, left-hand fragment).

Solanum phyllanthum Cav., Icon. 4(1): 35, tab. 359 fig. 1. 1797

Ind. loc.: “Habitat in agris cultis prope oppidum *la Magdalena* deuca dissitum a Lima, Floretque Iunio et Iulio. Vidi siccum in laudato herbario”.

Lectotype (designated here), MA 476360; isolectotypes, MA 476357, MA 476358, MA 476359.

Current accepted name: *Solanum montanum* L.

Cavanilles refers in the protologue to the collections made by Luis Née on the expedition to circumnavigate the globe directed by Alejandro Malaspina (see Muñoz Garmendia, 1992) at the locality La Magdalena (today a part of central Lima) in coastal Peru. In the Cavanilles herbarium there are four sheets attributable to Née, only one of which has a label in Cavanilles’ hand (MA 476360; Fig. 2 C). The others have labels indicating provenance from La Magdalena in the hand of José Demetrio Rodríguez, who worked with Cavanilles when he was director of the Jardín Botánico. Although several of these state “Née dedit 1801”, these are likely to be duplicates of the lectotype, as they appear to be from the same gathering. These sheets are here treated as isolectotypes of *Solanum phyllanthum*. A watercolour by José Guío y Sánchez, one of the expedition artists, held at the Real Jardín Botánico of Madrid (reproduced in Higuera, 1989: plate 105 and García Guillén, 2001: 131) is labelled in Née’s hand “Magdalena, Junio 1790” and is certainly from the same populations as the lectotype specimens. The watercolours appear to have been prepared from living plants, and do not exactly match any of the herbarium specimens.

Solanum pinnatum Cav., Icon. 5(1): 23, tab. 439 fig. 1. 1799

Ind. loc.: “Habitat prope Coquimbo in Chile. Floret Aprili. Vidi siccum in memorato herbario”.

Lectotype (designated here), MA 656494 (left-hand specimen).

Current accepted name: *Solanum pinnatum* Cav.

The single sheet of *Solanum pinnatum* in the Cavanilles herbarium (Fig. 2 D) is composed of two morphologically different fragments from two different localities (one from Coquimbo in Chile, and the other cultivated in Madrid from seeds from Lima). The labels on the sheet (see Fig. 2 D) do not indicate to which fragment they belong; both are affixed in the lower left hand corner. The left-hand specimen matches material of *Solanum pinnatum* collected in Coquimbo, while the right-hand fragment is more similar to material from the Lima area (J. Bennett,

pers. comm.), and is likely to be that cultivated in Madrid rather than that collected by Née. The left-hand fragment on the sheet is therefore selected as the lectotype, while the right-hand fragment is not type material. A watercolour by José Guío y Sánchez, one of the expedition artists, held at the Real Jardín Botánico of Madrid (reproduced in Higuera, 1989: plate 36) is labelled in Née’s hand “Coquimbo” and is probably from the same populations as the lectotype specimens, although the rounded lobe margins are slightly different from those of the lectotype specimen.

Solanum pomiferum Cav., Descr. 1: 112. 1802

Ind. loc.: “Florece por Agosto y Septiembre y se cultiva en el Jardín del Rey”.

Lectotype (designated here), MA 308485.

Current accepted name: *Solanum lycopersicum* L.

A single sheet in the Cavanilles herbarium is labelled “*Solanum pomiferum*/ R. h. M.” in Cavanilles’ hand (Fig. 3 A). Although the sheet lacks a collection date, it matches the description and protologue and is the only possibility for a lectotype. This specimen is also the lectotype for the superfluous name *Lycopersicon pyriforme* Dunal (which cited *Solanum pomiferum* in synonymy) and all combinations based on that epithet (Peralta & al., 2008).

Solanum pygmaeum Cav., Icon. 5(1): 23, tab. 439 fig. 2. 1799

Ind. loc.: “Habitat in planicie vulgo *Pampas de Buenos Ayres*, haud longe a Ballesteros. Floret Septiembre. Vidi siccum in laudato herbario”.

Lectotype (designated here), MA 476361.

Current accepted name: *Solanum pygmaeum* Cav.

The single sheet of *Solanum pygmaeum* in the Cavanilles herbarium (Fig. 3 B) is a collection made by Luis Née in Argentina and bears three labels, two of which are in Cavanilles’ hand (see Garilleti, 1993). Esquina Ballesteros, the type locality, is in the province of Córdoba on the eastern slope of the Andes at low (ca. 100 m) elevation, and was visited by Née on 15-16 April 1794. The general locality “Pampas de Buenos Aires” was used by Née for all his collections made on the voyage on foot between February-May 1794 from Mendoza in the high Andes to Buenos Aires and Montevideo on the Atlantic coast of South America (Muñoz Garmendia, 1992). This locality must thus be viewed with caution and not interpreted as the area of Buenos Aires itself.

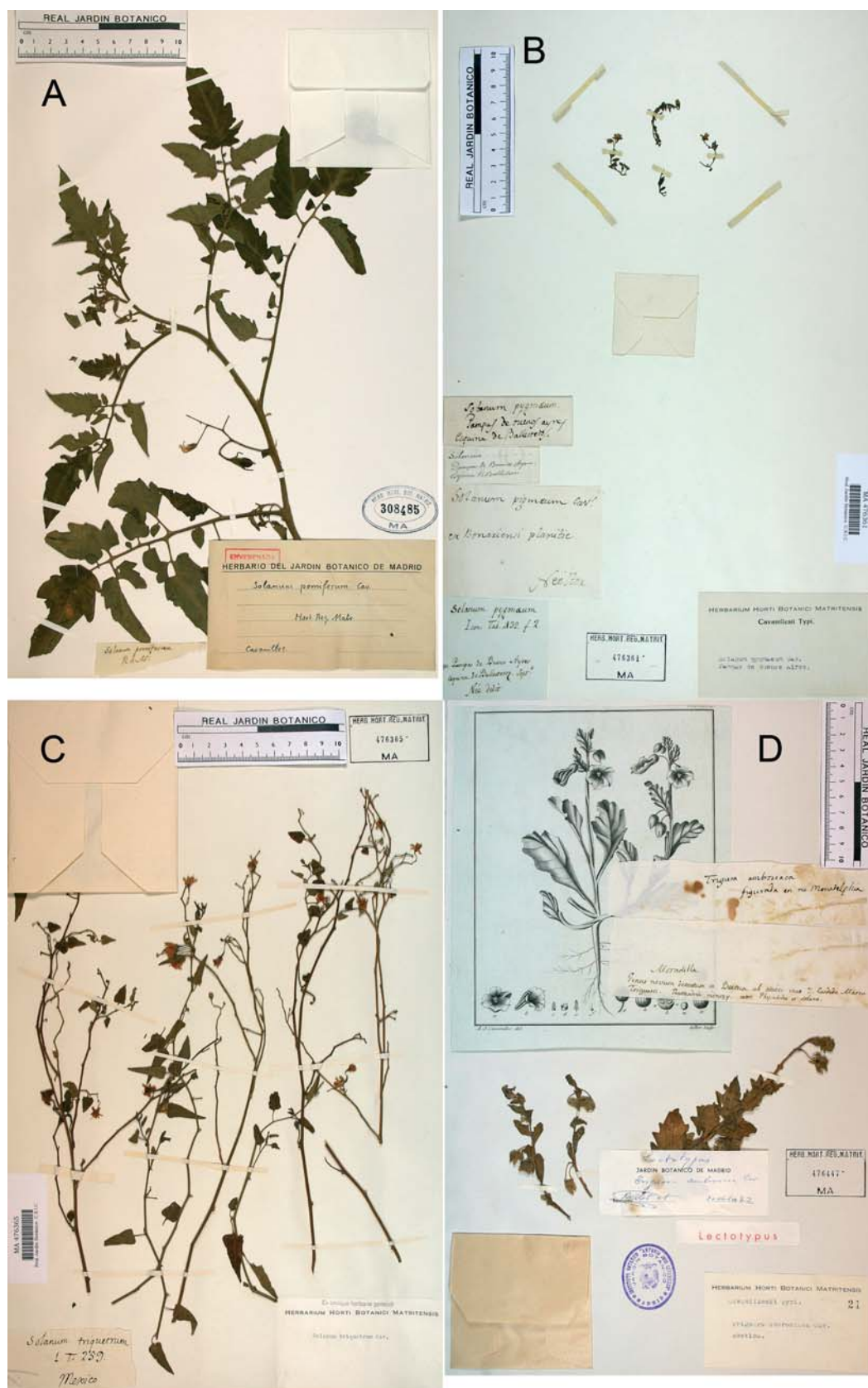


Fig. 3. **A**, lectotype of *Solanum pomiferum* Cav. (= *Solanum lycopersicum* L.) (MA 308485); **B**, lectotype of *Solanum pygmaeum* Cav. (MA 476381); **C**, lectotype of *Solanum triquetrum* Cav. (MA 476365); **D**, lectotype of *Triguera ambrosiaca* Cav. (= *Solanum herculeum* Bohs) (MA 476447).

Solanum triquetrum Cav., Icon. 3(1): 30, tab. 259. 1795

Ind. loc.: “Habitat en Nova-Hispania. Colitur en Regio horto Matritense, ubi floruit mense Septembri”.
Lectotype (designated here), MA 476365.

Current accepted name: *Solanum triquetrum* Cav.

Three sheets of *Solanum triquetrum* were found in the Cavanilles herbarium. Of these, only MA 476365 (Fig. 3 C) indicated provenance (Mexico) matching the protologue; this sheet also bears a label linking it to the plate in the *Icones* (“I. T. 259”) in Cavanilles’ hand. The other sheets were either collected later than the publication of the name (MA 476362) or have only a label indicating their cultivation in Madrid (MA 476364). Many stems of *Solanum triquetrum* are mounted on each of these sheets.

Triguera ambrosiaca Cav., Diss. 2, App.: II, tab. A. 1786

Ind. loc.: “Habitat loco supra citado”; “habitat in argillaceis Carmonae, Hispalis, Cordubae, et per tota fere inferiorem Baeticam; ubi eas reperit D. de Trigueros”.

Lectotype (designated here), MA 476447.

Current accepted name: *Solanum herculeum* Bohs.

The genus *Triguera* was named in honour of the Spanish botanist Cándido María Trigueros, who sent a detailed description, seeds and specimens to Cavanilles while he was in Paris (González Bueno, 2002). Cavanilles had named another genus *Triguera* in 1785 [Cavanilles, 1785; now recognised as *Hibiscus lobatus* (Murray) Kuntze], but realised the plant had been already named *Solandra* by Murray earlier that year. Cavanilles’ second use of the name *Triguera* in 1786 has been conserved (see McNeill & al., 2006, Appendix III: 409).

The descriptions of *Triguera ambrosiaca* and *Triguera inodora* appear as a supplement or appendix to the *Secunda dissertatio botanica* (Cavanilles, 1786). TL2 (Stafleu, 1977) states that the pages with *Triguera* are to be found after the plates, but in the BM copy of the *Secunda dissertatio botanica* (Cavanilles, 1786) the plates are bound after the additional pages with the description of *Triguera*. The description is not paginated sequentially with the rest of the work, but instead with Roman numerals (I-III) in the manner of an Appendix. The pages with *Triguera* are still part of the original 1786 work. The assessment of the text of the *Secunda dissertatio botanica* at the end of the main body of the text suggests that in the original draft submitted to the Académie Française for publication fault was found with the description of *Triguera* – “Cette Description, que nous n’avons pu vérifier,

est un peu incomplète, en ce que l’attache de quelques parties n’y est pas assez spécifiée. Nous invitons l’Auteur à réparer cette légère omission, et nous pensons d’ailleurs que cette seconde Dissertation, qui contient, comme la première, une suite des plantes nouvelles ajoutées aux anciennes déjà connues, mérite également d’être approuvée par l’Académie et imprimée sous son privilège. Le Louvre, ce premier mars 1786, Signé Fougereux de Bondaroy, A.L. de Jussieu, et le Ch. de Lamarck” (Cavanilles, 1786: 106). The comments by Fougereux de Bondaroy, de Jussieu and Lamarck are the equivalent of a review of Cavanilles’ paper, and the published version has taken into account their comments.

Three specimens of *Solanum herculeum* are to be found in the Cavanilles herbarium. Garilleti (1993) indicated that only two of these could be considered type material, as the third (MA 476446) was collected after the date of publication. The other two sheets (MA 476445, MA 476447 – the lectotype) are both annotated in Cavanilles’ hand, but that chosen as a lectotype has reference to Trigueros (“Moradilla/ Genus novum detectum in Baetica ab amici meo D. Candido Maria Trigueros. Pentrandria monogy. inter Physalis et Solana”) and the plate from the original publication attached (see Fig. 3 D). Hansen & Hansen (1973) indicated the “holotype” of *Triguera ambrosiaca* was at “MA”, but without a specific indication of sheet. The three sheets in the Cavanilles herbarium are variously annotated “holotype” (unattributable label on MA 476445), “lectotype” (unattributable label on MA 476446) and “lectotype” (annotation by F. Bellot on MA 476447). None of these sheets can be a holotype, and the selected lectotype is the same as that annotated by Bellot in 1972. Hansen & Hansen (1973) also indicated that “isotypes” of *Triguera ambrosiaca* were present in Paris in P-LA and P-Juss. Bohs & Olmstead (2001) repeated the holotype and isotype citations of Hansen & Hansen (1973) without further specification. I did not find a specimen of *Solanum herculeum* in P-LA. In any case, even if the Paris specimens were sent by Cavanilles (Hansen & Hansen, 1973), if they were sent after his return to Spain they post-date the protologue and cannot be type material.

Triguera inodora Cav., Diss 2, App.: III. 1786

Ind. loc.: “Habitat et florum cum praecedente. Vernacule Moradilla blanquezina, Trig.”; “*Triguera ambrosiaca*, habitat in argillaceis Carmonae, Hispalis, Cordubae, et per tota fere inferiorem Baeticam”.

Lectotype not known.

Current accepted name: *incertae sedis*; doubtful species.

Garilleti (1993) indicated that no specimen corresponding to *Triguera inodora* could be found at MA or LINN. The protologue indicates that the plant is similar to *Solanum herculeum* (*Triguera ambrosiaca* of Cavanilles), but has a different common name, "moradilla blanquezina", also provided by Dr. Trigueros. No sheets have been found at MA with the common name 'moradilla blanquezina', but the lectotype of *Triguera ambrosiaca* has the common name 'moradilla' said to have been provided by Trigueros. The description of *Triguera inodora* indicates that it has entire, glabrous leaves, glabrous calyces, and a corolla with a shorter tube, white or yellowish throat and entire, emarginate lobes (Cavanilles, 1786). Many plants of *Solanum herculeum* do indeed have paler (usually more greenish) flowers, but the combination of characters in Cavanilles' description does not match any specimen of this taxon (*Triguera* is monospecific if recognised at the generic level). I have seen mixed collections of *Solanum herculeum* and various species of *Convolvulus*, with which the flowers are quite similar. It is possible that *Triguera inodora* is a species of *Convolvulus* from southern Spain, such as *Convolvulus tricolor* L., which has flowers with a white throat and glabrous leaves. It is not clear that Cavanilles had a specimen of this species; his description is taken verbatim from a letter sent to him by Trigueros in October 1785 (reproduced in Aguilar Piñal & Valdés Castellón, 1998). This name must remain of uncertain status (*incertae sedis*) in the absence of any clear reference to original material.

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