

LECTOTYPIFICATION OF SOME EARLY COLLECTED SPECIES OF *QUERCUS* (FAGACEAE) IN CALIFORNIA AND MEXICO

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Abstract. Lectotypes are designated for the following species of *Quercus* (Fagaceae) and associated synonymous taxa collected in Mexico, and what was later to become California, during the historic five-year Malaspina Expedition around the world: *Quercus agrifolia*, *Q. castanea*, *Q. diversifolia*, *Q. elliptica*, *Q. lobata*, *Q. lutea*, *Q. magnoliifolia* and *Q. rugosa* as well as *Q. kelloggii* and *Q. tinctoria* var. *californica* collected by early collectors in California.

Keywords: Bigelow, California, Frémont, lectotype, Mexico, Neé, Newberry, *Quercus*

Three of the common and early named species of *Quercus* L. (Fagaceae) in California, *Q. agrifolia* Neé, *Q. lobata* Neé, and *Q. kelloggii* Newb., do not have a holotype or lectotype associated with their names, although there is no doubt about their identity. Both *Q. agrifolia* and *Q. lobata* are the earliest names for species of *Quercus* collected in Mexico, and in what was later to become California, published by Luis Neé (1801). Because some of the earliest named Mexican oaks are also involved, we are also including here all names in the Neé publication that still need lectotypification.

Luis Neé was a French-born Spanish botanist who lived from the 1700s into the 1800s. Muller & McVaugh (1972) estimated that he was born about 1760 or before. Madulid (1989) reported that he died on 3 October 1807. Other sources give his dates of birth and death as 1734–1803 (<https://thebiography.us/en/nee-louis>) or 1734–1807 (<https://plants.jstor.org>). His main claim to fame was that he was a prolific collector of plant specimens who accompanied the Malaspina Expedition on a five-year scientific expedition of exploration (1789–1794) conducted by the government of Spain involving two ships, the *Atrevida* and *Descubierta*. The expedition, commanded by Alessandro Malaspina and José de Bustamante y Guerra, left Spain and explored south-eastern and western South America, western Mexico, western North America as far north as Alaska, across the Pacific to the Philippines, and south to New Zealand and Australia before returning to Spain (Madulid, 1989; David et al., 2001–2004). Although Neé made extensive botanical collections (Fernández and Alonso, 2016), the main botanical work resulting from the expedition was his publication on oaks (Neé, 1801). His name, spelled Née in the title of the publication, may have been a typographic error as he signed his name Neé, with the accent on the second ‘e.’ Most of the new species of oaks he published are Mexican, but he also described two of the common species of oaks, *Quercus agrifolia* and *Q. lobata*, in what at the time was part of Mexico but is now California. Based on the itinerary of the expedition to the west coast of Mexico and North America (Madulid, 1989:

39–40), all of the oaks were collected between March and December 1791. Another California oak, *Q. kelloggii*, was gathered by a number of early collectors during exploratory scientific expeditions in California both when California was part of Mexico and later when the United States expanded to its current continental boundaries. Several of the mid-19th century expeditions were conducted in anticipation of building railways to tie the whole country together by rail.

Neé (1801) did not cite specific specimens in his descriptions, but he did indicate where they were collected. William Trelease, who wrote the monumental and seminal work, *The American Oaks* (Trelease, 1924), never examined Neé’s collections in the herbarium of the Real Jardín Botánico in Madrid (MA), Spain, although he did have access to drawings of most of Neé’s species made for J.M.C. Lange at C, which Trelease photographed, or in the case of *Q. lobata*, redrew a leaf, and included photographs of the drawings as plates in his monograph (Trelease, 1924: pl. 65a *Q. macrophylla* Neé; pl. 72a *Q. magnoliifolia* Neé; pl. 73a *Q. lutea* Neé; pl. 101a *Q. rugosa* Neé; pl. 119a *Q. microphylla* Neé; pl. 168, fig. *Q. lobata* (leaf 1); pl. 252a *Q. splendens* Neé; pl. 301a *Q. salicifolia* Neé; pl. 358a *Q. castanea* Neé; pl. 359a *Q. elliptica* Neé; and pl. 390a *Q. acutifolia* Neé). In almost every case it is possible to determine the specimen at MA from which each drawing was made, and although Trelease used the phrase “sketch of the type” this is not effective lectotypification. It is rather surprising that Trelease did not visit MA, as he visited many of the other important herbaria in Europe just before World War I. Cornelius H. Muller, also an important oak taxonomist, did visit MA in 1950, 1958, and 1964 (Muller and McVaugh, 1972) and, as was Muller’s habit, he removed fragments (now at UCSB) from some of Neé’s specimens of *Quercus*. Several of the species of *Quercus* described by Neé, including *Q. circinata* Neé, *Q. macrophylla*, *Q. microphylla* and *Q. salicifolia*, were effectively lectotypified by Muller and McVaugh (1972). In the case of *Q. magnoliifolia*, Muller and McVaugh wrote “The type of *Q. magnoliaefolia* [sic] (sheet no. 25969) represents the species as understood

We are grateful to D.E. Boufford (A/GH), L. Gautier (G), and G. Wahlert (UCSB) for their help and for the available online specimen images of specimens at G, GH, K, and US as well as on JSTOR.

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by Trelease.” The problem is that the MA sheet 25969 is not original material, as required by Article 9.4 of the current International Code of Botanical Nomenclature (Turland et al., 2018), because Neé did not consider the specimen to be *Q. magnoliifolia* but possibly a variety of *Q. nigra* L. as is evident from the determination on the label written in Neé’s hand. Dennis E. Breedlove, as part of his planned revision of Latin American oaks, studied the Neé oak types in MA in 1985 and annotated those that he proposed to designate as lectotypes, but he never published the lectotypifications before his death in 2012. In recent years, two species, *Q. acutifolia* (Nixon and Berrie, 2017) and *Q. candicans* Neé (Valencia-A. et al., 2018), have been lectotypified based on specimens that Breedlove had annotated as lectotypes. Another ten species described by Neé that Breedlove marked as lectotypes have not yet been lectotypified. All of the lectotypes and isolectotypes are listed as such in the publication of Neé’s collections by Fernández and Alonso (2016), but because they lack the phrase “designated here” as required by Article 7.11 of the current International Code of Botanical Nomenclature (Turland et al., 2018) none of the entries for those collections constitute valid lectotypification.

Of the two recently lectotypified names of Neé’s oaks, one is particularly interesting. It turns out that the Neé specimens labeled *Quercus candicans* now at MA as well as the single leaf removed from MA by Muller (now at UCSB), are actually a species of *Roldana* La Llave in the Asteraceae (Valencia-A. et al., 2018). It is rather remarkable that this misidentification had not been noticed earlier. Trelease (1924) perpetuated the misidentification because he based his understanding of the species on Neé’s descriptions and what subsequent authors, such as A. de Candolle (1864) and Liebmann (1869), had interpreted as *Q. candicans*. A. de Candolle (1864) remarked that the Neé specimens he saw at MA were strange for *Quercus* because of the sharp teeth along the edge of the lobes and the pubescence like that of *Populus alba* L. when he wrote “*Mihi videtur a Quercu aliena, propter dentes mucronatos secus margines loborum et pubescentiam modo Populi albae.*” When Muller studied the Neé specimens at MA, he did not realize that Neé’s specimens of *Q. candicans* were not an oak. Muller and McVaugh (1972) wrote; “The type consists of six detached juvenile leaves, obviously the species called *Q. candicans* by Trelease.” When Muller visited MA in 1958 he reported in his notes, now at UCSB, that the number of leaves were then only five; and when Breedlove studied the same specimens there were only four leaves remaining with at least one of the missing leaves now at UCSB. Breedlove annotated one of the two type specimens of ‘*Q. candicans*’ at MA as the lectotype and the other as the isolectotype, but he also did not recognize that the specimens were not a species of *Quercus*. The formal lectotypification was made by Valencia-A. et al. (2018), who also determined that the two specimens at MA plus the fragment at UCSB were *Roldana lineolata* (DC.) H. Rob. & Brettell. and made the combination *R. candicans* (Neé) Villasenor, S. Valencia & Coombes, which is the name that must be used for this species of *Roldana*. As pointed out by Valencia-A. et al. (2018), the Mexican oak that has

been called *Q. candicans*, now must go by the next oldest available name, *Q. calophylla* Schldl. & Cham. Although there is no doubt that the extant Neé collections of ‘*Q. candicans*’ at MA and the leaf at UCSB are *R. candicans*, it is quite possible that the original specimens collected by Neé were in fact an oak and that there was a mix-up of specimens at some point. The reason for this uncertainty is that in Neé’s description as translated into English (Neé 1805) states that it was “A middle-sized tree with a straight trunk, and branches forming a compact head.” The *Roldana* to which the extant five leaves belong is a shrub about 2–3 m tall. At BM and G there are specimens of an oak labelled *Q. candicans* that were sold by Pavón in the 1820s (Muller and McVaugh, 1972) that could possibly be the actual specimens collected and described by Neé, but it is likely impossible to prove that they are part of the original material of Neé’s *Q. candicans*. Of the remaining ten species of *Quercus* described by Neé that Breedlove marked as lectotypes or isolectotypes eight are still recognized species including species from both Mexico and California.

The story of how *Quercus kelloggii* was named is a bit complicated and involves a number of early collectors in California. What was ultimately named *Q. kelloggii* appears in the part of Bentham’s *Plantae Hartwegianae* that covers Hartweg’s collections from California between 1846 and 1847 (Bentham 1849: 294–342). According to Stafleu and Cowan (1976: 176) the whole publication was published between about January 1849 and March 1857. Within the section covering the California collections, the entries have two numbering systems. The first is a sequential taxonomic number assigned by Bentham followed by a number in parenthesis from Hartweg’s journal as published in *The Journal of the Horticultural Society of London* between 1846 and 1848. The *Quercus* entry in question appears on page 337 in Bentham’s *Plantae Hartwegianae* treatment as “1966 (139). *QUERCUS rubra*, Linn. (*vide* Liebmann).” The locality is given as “*In planitiebus circa Sonoma*” which translates as “In lowlands around Sonoma.” Hartweg’s (1847: 190) journal gives more information; “The face of country about Sonoma and San Miguel is perfectly level towards the bay, and capable of great agricultural improvements. Several species of oaks (*Quercus*, Nos. 139, 140, and 141) thrive well in the fine black vegetable mould [*sic*], and are disposed in large irregular clumps, giving the country the appearance of an immense park, enlivened by numerous herds of elks and antelopes.” Collection number 139 was later named *Q. kelloggii*, number 140 is *Q. douglasii* Hook. & Arn., and number 141 is *Q. lobata*. Although Sonoma is the present day locality of the town of Sonoma, San Miguel was the name of Rancho San Miguel in present day Sonoma County that no longer exists. From Hartweg’s journal those collections would have been made in mid-September of 1846 although the date 1848, which has to be incorrect, appears on the label of some specimens of this collection. Liebmann’s determination of *Q. rubra* was evidently the reason that Bentham did not publish *Hartweg 1966* (139) as a new species, although he had already named the specimen in the Bentham Herbarium (K000832289)

as “*Quercus sonomensis* Benth.” The determination by Liebmann was not on the Hartweg collection but rather on a Frémont collection (number 500) dated 1846 in the Hooker Herbarium at K (K000832288); this specimen has the typical Liebmann determination slip in his hand. Apparently, Liebmann did not study any of the collections in the Bentham Herbarium, which is evident from the fact that only specimens in the Hooker Herbarium were cited in his major work on Mexican oaks (Liebmann, 1854). Because it was not until 1854 that the Bentham Herbarium was given to Kew, it is likely that Liebmann, who did not date his determination slips, had examined only the Hooker Herbarium and at a date before 1853. The Bentham Herbarium also had a duplicate of *Frémont 500* which is now at NY (NY00253629) and is discussed further below. Bentham would have known that the Hartweg and Frémont collections were the same species, and clearly the reference by Bentham of *Q. rubra* “fide Liebmann” is in reference to Frémont 500 seen by Liebmann in the Hooker Herbarium at Kew. The publication date of page 337 in Bentham’s *Plantae Hartwegianae* is probably mid-February 1857 (Staffleu and Cowan, 1976: 176) which indicates that Torrey, who was working on the same species of oaks, but with other specimens, would have been unaware of Bentham’s writing until sometime after that date.

At the same time that Bentham was completing *Plantae Hartwegianae*, Torrey was working on the *Report on the botany of the expedition* published in volume 5 number 4 of *Reports of explorations and surveys: to ascertain the most practicable and economical route for a railroad from the Mississippi River to the Pacific Ocean, made under the direction of the Secretary of War* which is abbreviated in its different volumes as *Pacif. Railr. Rep.* (Torrey, 1857). This particular volume and number covered the route near the thirty-fifth parallel, explored under the command of A.W. Whipple in 1853 and 1854 and was published between August and September of 1857 (Staffleu and Cowan, 1986: 407) although Torrey dated his introduction to the botanical section as January 12, 1857. The botanical collections of the expedition were made by J. M. Bigelow. In the introduction to the botanical part the volume Torrey wrote that “The greater part of the botanical collections made by Bigelow, in the Pacific Railroad Survey, under the charge of Captain Whipple, were submitted to me for examination in accordance with the instructions of the War Department.” When Torrey named *Quercus tinctoria* W. Bartram var. *californica* Torr., he not only had the Bigelow collection (NY01470684 collected in “Napa Valley” in 1854), but also four additional earlier collections that were in the Torrey Herbarium, now at NY. Those specimens included examples of the same oak collected during “Frémont’s Expedition to California, 1845–47” from the Sacramento Valley (NY00253624 collected 8 Apr 1845 from “Sacramento bottom, above Coro Creek”; NY00253628 collected 14 Jun but without a year from “Near N. Branch of the American Fork”...[illegible due to label damage] and likely better stated as near the branch of the North Fork American River). Two additional sheets of this entity that appear to be duplicates of a collection made by

C.C. Parry in 1850 (NY00253625 and NY00253626) were collected in the “Mountains east of San Diego” as part of the Southern California and Mexican Boundary Survey under the direction of W. H. Emory). It is clear that Torrey relied on the collection localities of all five of those specimens when he wrote that this variety occurs in the “Hillsides, Napa Valley. This is a common tree in California. It occurs throughout the valley of the Sacramento, and as far south as San Diego” (Torrey, 1857: 138). Torrey used the collection localities of all of those specimens when he noted the distribution in the protologue. In the first sentence Torrey was referring to the Bigelow collection and in the second and third sentences he was referring to the Frémont and Parry collections. Because he did not cite specific collections all five of those sheets, including the Bigelow collection which we are here designating as the lectotype, are original material as defined by Article 9.4 of the current International Code of Botanical Nomenclature (Turland et al., 2018). It is also important to note that Torrey wrote, and in his hand, “*Quercus tinctoria* var. *californica*” on the label of all five specimens. Torrey thought that *Q. tinctoria* var. *californica* might actually be a distinct species and wrote “We have not been able to point out characters sufficient to distinguish it specifically from *Q. tinctoria* of the Atlantic States, and yet it is probably a distinct species.”

The NY00253628 specimen, original material of *Quercus tinctoria* var. *californica*, is an important collection to delve into in more depth. The specimen label has only the day and month but not the year except for the printed label indicating that it was part of “Frémont’s Expedition to California, 1845–7.” It is possible to make inferences based on additional information from several Frémont collections at GH, K, and NY. A specimen of *Frémont 500* at NY dated 1846 (NY00253629) with duplicates at the other two herbaria as GH00344994 and GH00343026 at Harvard and K000832288 at Kew (ex Hooker Herbarium, which is the specimen mentioned earlier). There is no precise collection locality on the four specimens except that they are from California. However, *Frémont 511* (NY00186315), which is the type collection of *Philadelphus fremontii* Rydb. (Hydrangeaceae), was collected on 14 Jun 1846 along the “North branch of the American River.” This is the same day and month as well as the same locality as the NY00253628 specimen of *Q. tinctoria* var. *californica* and supplies the year of 1846 to this specimen as well as linking the four collections of *Frémont 500* to the NY specimens thus making them all original material. It is clear that NY00253628, NY00253629, GH00344994, GH00343026, and K000832288 are all part of the same collection made on 14 Jun 1846 of which the first one is original material seen by Torrey. All of these specimens are also morphologically and phenologically identical.

The NY00253629 specimen was sent to NY from K (Bentham Herbarium) and was most likely received at NY at a later date as it does not have the name *Quercus tinctoria* var. *californica* in Torrey’s hand as do the other original material. On the labels, “Torrey 1850,” in Bentham’s hand, is the date Bentham received the specimens from Torrey.

This is evident from the letter Bentham sent to Torrey on 25 May 1850 in which Bentham thanked Torrey for “your most valuable parcels containing to my great delight an excellent set of Col. Frémont’s California plants” (<https://www.biodiversitylibrary.org/item/220607#page/21/mode/1up>). Also on the label, and with a different pen there are the words “sp. nov” which may have been added by Bentham at the time he was working on the same species collected by Hartweg, which is discussed above. At some point this specimen was sent back to NY from K as it has the *Herbarium Benthamianum* date stamp of 1854, which all K specimens from the Bentham Herbarium had at the time the Bentham Herbarium was given to Kew.

A year after Torrey published *Quercus tinctoria* var. *californica*, J. S. Newberry published the main part of the botanical report in another of the *Pacif. Rail. Rep.* series (Newberry, 1859: 28–29, 89, Fig. 6). In this publication, Newberry published *Quercus kelloggii* and cited *Q. tinctoria* var. *californica* as a synonym. He indicated that he considered it to be neither *Q. tinctoria* nor *Q. coccinea* Münchh., although it was similar to both. Newberry raised Torrey’s variety to the rank of species and gave it a new specific epithet to honor Albert Kellogg, who was the first resident California botanist, one of the founding members of the California Academy of Sciences, and its first Curator of Botany. Like Torrey, Newberry did not cite specimens, but he writes “This oak is found in different parts of California, but, apparently, does not extend northward beyond the Oregon line. I have specimens collected both south and north of San Francisco, in the coast mountains, and we found it occurring in considerable numbers between Fort Reading and Lassen’s butte, on the western slope of the Sierra Nevada in northern California.” We now know that the species extends into Oregon and into northern Baja California, Mexico. Most of Newberry’s collections are at US (Staffeu and Cowan, 1981: 733), but there are no Newberry collections of *Q. kelloggii* at US or NY. In any event, because we consider *Q. kelloggii* to be a new name for *Q. tinctoria* var. *californica*, the lectotype of *Q. tinctoria* var. *californica* must also be the lectotype for *Q. kelloggii*. In 1859, a year after the publication of *Q. kelloggii*, J. G. Cooper (1859: 261) published the combination *Q. californica* (Torr.) J. G. Cooper, an illegitimate name because Cooper cited the older name of *Q. kelloggii* in synonymy. Bentham’s herbarium name of “*Q. sonomensis* Benth.” was published five years later by A. de Candolle (1864: 62) who wrote “*Q. sonomensis* (Benth, fide Kotschy in h. Boiss.),” apparently unaware that the species had already been published as *Q. kelloggii*. The holotype of *Q. sonomensis* (Benth.) A.DC. although perhaps originally in the G-BOIS herbarium, is now in the G-DC herbarium. The following is the synonymy and lectotypification of the taxa discussed in this article.

Quercus agrifolia Neé, *Anales Ci. Nat.* 3: 271 (1801). TYPE: U.S.A. California: 1791, J. Robredo & M. Esquerria s.n. (Lectotype [designated here]: MA25959 [as image]; Isolectotypes: UCSB000038 [fragment of lectotype, MA25959], MA232908 [as image], UCSB000039 [fragment of MA232908]).

The collection locality on the MA labels is between Monterey and Nootka, without exact locality. Because *Q. agrifolia* does not occur north of California, the collections were most likely made when the ships stopped at Monterey, California, between September 13 and 25 of 1791 (David et al., 2001–2004). The type collection from California has been attributed to Neé because he described the species, but he actually never collected oaks in California. According to Madulid (1989), the botanist Thaddeus Haenke (1761–1816) joined the expedition in Valparaíso, Chile, after having missed the first part of the expedition by not arriving in Cadiz in time for the departure from Spain. It was Haenke who traveled with the two ships north from Acapulco to the west coast of North America during 1791 while Neé collected in Mexico where he gathered the specimens of *Quercus* that he later described from there. Neé rejoined the ships on their return to Acapulco before their voyage across the Pacific in December 1791. Neé actually attributes the collections to Robredo and Esquerria where he writes (in translation of his original publication) “I cannot give the height of this species, of which I have only seen branches collected at Monterey and Nootka, by the marine officer, Don Joseph Robredo, and Don Manuel Esquerria, paymaster of the corvette *Atrevida*” (Neé 1805).

Quercus castanea Neé, *Anales Ci. Nat.* 3: 276 (1801). TYPE: MEXICO: Hidalgo, 1791, L. Neé s.n. (Lectotype [designated here]: MA25950 [as image]; Isolectotypes: UCSB000189 [fragment of lectotype, p.p. as to larger leaf], MA210518 [as image]).

Quercus diversifolia Neé, *Anales Ci. Nat.* 3: 270 (1801). TYPE: MEXICO: Guerrero, 1791, L. Neé s.n. (Lectotype [designated here]: MA26468 [as image]; Isolectotype: UCSB000576 [fragment of lectotype, MA26468]).

Quercus elliptica Neé, *Anales Ci. Nat.* 3: 278 (1801). TYPE: MEXICO: Hidalgo, 1791, L. Neé s.n. (Lectotype [designated here]: MA25956 [as image]; Isolectotypes: UCSB000210 [fragment of lectotype, MA25956], MA232907 [as image], UCSB000211 [fragment of MA232907]).

Quercus kelloggii Newb., *Pacif. Railr. Rep.* 6(3): chapter 2, 28, 89, fig. 6 (1858). TYPE: U.S.A., California, Napa Valley. J. M. Bigelow s.n., 1854 (Lectotype [designated here]: NY01470684 [as image]; isolectotype: GH00106400 [as image]).

Heterotypic synonyms: *Quercus californica* (Torrey) J.G. Cooper, *Smithson. Rep.* 1858: 261. (1859). *Nom. illeg.*

Quercus sonomensis Benth. ex A.DC., *Prodr.* 60(2.1): 62 (1864). TYPE: U.S.A. California: in lowlands around Sonoma, September 1846, T. Hartweg 1966 (139), (Holotype: G00719751 [as image]; Isotypes: GH00343027 [as image], K000832289 [as image], NY00248768 [as image], P06852561 [as image]).

Quercus tinctoria W. Bartram var. *californica* Torr., *Pacif. Railr. Rep.* 4(5): 138. (1857). TYPE: U.S.A. California: Napa Valley, 1854, J. M. Bigelow s.n. (Lectotype [designated here]: NY01470684 [as

image]; isolectotype GH00106400 [as image]). Original Material: U.S.A. California: near the branch of the North Fork American River, 14 June 1846, *J. C. Frémont 500* (NY00253628 [as *s.n.* 14 June] [as image], GH00344994 [as 500 1846] [as image], GH00343026 [as no collector name 500, 1846] [as image], NY00253629 [as 500, 1846] [as image], K000832288 [as 500, 1846] [as image]); U.S.A. California: mountains east of San Diego, 1850, *C. C. Parry s.n.* {NY00253625 [as image], NY00253626 [as image]}; U.S.A. California: Sacramento bottom, above Coro Creek, 8 April 1846, *J. C. Frémont s.n.* {NY00253624 [as image]}).

Quercus lobata Neé, *Anales Ci. Nat.* 3: 277 (1801). TYPE: U.S.A. California: 1791, *J. Robredo & M. Esquerria s.n.*, (Lectotype [designated here]: MA26477 [as image]; Isolectotypes: UCSB000239 [fragment of lectotype, MA26477], MA26478 [as image], UCSB000240 [fragment of MA26478]).

The type locality on the specimen label is between Monterey and Nootka to the north of San Blas but with no exact locality. As explained under *Q. agrifolia* the type locality is most likely from the vicinity of Monterey, California.

Quercus magnoliifolia Neé, *Anales Ci. Nat.* 3: 268 (1801). TYPE: MEXICO. Guerrero: 1791, *L. Neé s.n.* (Lectotype [designated here]: MA233387 [as image]; Isolectotype: MA233386 [as image]).

Quercus lutea Neé, *Anales Ci. Nat.* 3: 269 (1801). TYPE: MEXICO. Guerrero: 1791, *L. Neé s.n.* (Lectotype [designated here]: MA233384 [as image]; Isolectotype: MA233385 [as image]).

Quercus rugosa Neé, *Anales Ci. Nat.* 3: 275 (1801). TYPE: MEXICO. Guerrero: 1791, *L. Neé s.n.* (Lectotype [designated here]: MA26471 [as image]; Isolectotypes: UCSB000413 [fragment of lectotype, MA26471], MA232926 [as image], UCSB000412 [fragment of MA232926]).

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