

Nomenclatural notes on Menthinae (Mentheae — Lamiaceae) native to Brazil

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Abstract. Menthinae, one of the five subtribes of Mentheae (Lamiaceae), with ca. 735 species, is represented in Brazil by a wide range of herbs and shrubs. During an investigation of the taxonomic history of the group for the Flora e Funga do Brasil project, several nomenclatural issues with typifications in the group have been identified. This study attempts to resolve them, making suggestions of new types and re-evaluation of synonyms. Thirteen lectotypifications and one neotypification are being proposed, along with the recognition of *Thymus selloi* Spreng. ex J.A.Schmidt as a *nomen nudum*. Most of the suggested changes are due to the loss of many of Sellow's types at B during WWII, lack of specific herbaria references and collector numbers in the protologues, or to existence of designated syntypes in the referred collections. Our study is a contribution to the nomenclatural and taxonomic knowledge of Menthinae, providing a stable foundation for future study of its taxonomy, biogeography, and evolution.

Keywords: Brazilian flora, Labiatae, lectotypification, Nepetoideae, neotypification, taxonomy.

Mentheae, the largest tribe of Lamiaceae, together with tribe Ocimeae, encompasses most of the diversity of Lamiaceae in the Neotropics (Drew & Sytsma, 2012). Among the five Mentheae subtribes, Menthinae stands out as a group comprising ca. 40 genera and 735 species spread throughout the temperate, subtropical, and tropical regions of all continents, except for Antarctica, and is mostly associated with Europe, Asia, and the Americas. The species of the subtribe are frequently found in high altitude vegetation formations, occupying mostly open phytophysiognomies, such as grasslands, riverine forests, bogs, rocky montane areas, forest glades or margins and, rarely, deserts (Harley et al. 2004; Bräuchler et al. 2010).

Menthinae are usually aromatic herbs or shrubs, with ascending or divergent stamens

bearing often divaricate thecae, a symmetrical (or ± symmetrical) nectariferous disk, usually strongly 2-lipped corollas, 11- to 15-nerved calyx, and an areolate abscission scar on the nutlet (Harley et al. 2004). The group is monophyletic and well supported, as demonstrated in recent phylogenetic studies based on molecular data (Drew & Sytsma, 2012; Zhao et al. 2021). However, as shown by Drew & Sytsma (2012), Bräuchler et al. (2010), and Drew et al. (2017), several of its Neotropical genera require further investigation regarding their circumscription.

Menthinae is represented in Brazil by 42 native species in 8 genera and distributed mostly in open vegetation types, such as the *campos de altitude* (herbaceous to shrubby vegetation associated with igneous or metamorphic outcrops, composed

mainly of granites, gneisses, or nepheline syenites, that had been uplifted during the Tertiary, and starting at altitudes above 1500 m.a.s.l.), the *campos rupestres* (herbaceous to shrubby vegetation on quartzite, arenite, and ironstone soils and outcrops of the Pre-Cambrian origin, mostly at elevations above 900 m.a.s.l.), both with high levels of endemism, the *campos limpos* (grasslands at lower altitudes dominated by herbs, mainly by members of Poales, among a diversity of other herbaceous taxa, and slender shrubs), or along forest margins of the Atlantic Forest, the Cerrado and the Pampa domains (Rizzini, 1997; Vasconcelos, 2011; Antar et al. 2022).

The taxonomy of the group had been initially presented by Sprengel (1827), who did not specify herbaria or collectors for the newly described species, followed by that of Bentham (1834, 1848), who on several occasions had referred to more than one herbarium and/or collector — often without collector's numbers — for a single species, and that of Briquet (1896, 1887). Epling (1936) and Epling & Stewart (1939) made significant contributions to the advancement of taxonomic study of the group, including several lectotypifications (sometimes inadvertent — see Prado et al. 2015), and the proposal of several new taxa. Thereafter, new species or combinations have been proposed, but the taxonomy of most of the group remained largely stable (Brade, 1943; Epling, 1951; Epling & Mathias, 1957; Epling & Játiva, 1963; Irving, 1980).

With the completion of the Menthinae genera project for the online Flora e Funga do Brasil effort (Antar et al. 2022), there remained several unresolved nomenclatural issues for the native Brazilian species of *Cunila* D.Royen, *Glechon* Spreng., *Hesperozygis* Epling, *Hoehnea* Epling, and *Rhabdocaulon* (Benth.) Epling. These genera are represented in the Atlantic Forest domain, with *Hoehnea* restricted to it and the others having it as their main site of occurrence in Brazil (Epling, 1936; Epling & Stewart, 1939; Antar et al. 2022). *Cunila*, *Glechon* and mainly *Rhabdocaulon* are also represented in the Cerrado domain, while the first of those and *Hesperozygis* are found in the Pampa domain (Epling & Stewart, 1939; Antar et al. 2022).

The objective of our study is to establish correct typifications for the Menthinae species in Brazil, incorporating new nomenclatural decisions and summarizing the ones already made (Epling, 1936, 1939; Xifreda & Malo, 2004,

2006), thus establishing a stable foundation for future study of their taxonomy, biogeography, and evolution.

Material and methods

Field collecting trips have been conducted in South and Southeast Brazil since 2015. Digital images available from JSTOR Global Plants (<https://plants.jstor.org/>), JABOT (<http://rb.jbrj.gov.br/>), REFLORA (<http://reflora.jbrj.gov.br/>), and SpeciesLink (<https://specieslink.net/>) databases have been examined, as well as specimens deposited at B, BHCB, BM, BR, C, CEN, CTBS, E, F, HAL, HUEFS, IBGE, LA, G, GH, K, M, MBM, MO, NY, P, PACA, R, RB, RFA, SAMES, SP, SPF, UB, UC, US, and W herbaria (acronyms follow Thiers, [continuously updated](#)). Historic photos of type specimens from F and UC were also consulted. Our taxonomic decisions follow the rules and recommendations of the International Code of Nomenclature for algae, fungi, and plants (Turland et al. 2018).

Results and discussion

Most of the required lectotypes selections are due to the loss of Friedrich Sellow's specimens housed at B during WWII (BGBM, 2021). They had been initially designated as syntypes by George Bentham (1834, 1848), but later inadvertently lectotypified or proposed as types of new taxa by Carl C. Epling (1936), who provided for them originally absent collection numbers, as can be seen in the photos of the types in the Field Museum Negatives collection. They represent Epling's interpretations of them based on specimens with collection numbers from other herbaria, such as P, and should be treated with caution.

Possible duplicates of the specimens lost at B may be found at several herbaria in Europe and the Americas, sometimes even carrying the original label from B and thus indicating direct links to Sellow's collections analyzed by Bentham. It is worth mentioning that B still holds many type specimens for these taxa, but they represent a later transfer, likely from HAL, of the Rudolf Baschant Herbarium (Hiepmo, 1980), and as such cannot be original holotypes or lectotypes. Similar cases of problematic lectotypifications of some of the Brazilian taxa of Menthinae have been referred to by Xifreda & Mallo (2004, 2006).

Problematic cases with the designated syntypes are also common, as is the case for many species of *Rhabdocaulon*, where second step lectotypifications are required to stabilize prioritization among possible lectotypes. Details of remaining, historic, syntypes, disregarded as lectotypes by Epling's decisions (1936), are also provided. We also found rare cases of the complete lack of herbarium citations, as for example for *Hesperozygis kleinii* Epling & Játiva.

We present a nomenclatorial treatment for the following taxa of Menthinae. The conclusions reflect our nomenclatorial decisions after numerous analyses of type specimens housed in different herbaria, together with the protologues and other references, leading to the proposition of thirteen lectotypifications, one neotypification, and one *nomen nudum*:

1. ***Cunila fasciculata* Benth.**, Labiat. Gen. Spec. 363 (1834). *Hedyosmos fasciculatus* (Benth.) Kuntze, Revis. Gen. Pl. 2: 520 (1891).—Type: Brazil: [without specific locality or date], *F. Sellow s.n.* (holotype: B [destroyed]); **lectotype, here designated:** K barcode K000248135 [image!]; possible isolectotypes: B barcode B_10_0248417 [image!], HAL 3X barcode HAL0064927 [image!], barcode HAL0064928 [image!], barcode HAL0064929 [image!], UC accession 61939 [image!], UC accession 61940 [image!], S accession 08-15360 [image!], W barcode W0027334 [image!]).

Garadoquia capitata Spreng., Syst. Veg., ed. 16 [Sprengel] 4(2, Cur. Post.): 225 (1827).—Type: Brazil, Rio Grande [do Sul]: [without specific locality or date], *F. Sellow s.n.* (holotype: HBG barcode HBG-518225 [image!]).

Thymus selloi Spreng. ex J.A.Schmidt, Fl. Bras. (Martius) 8(1): 168 (1858), *nom. nud.*

Notes.—Bentham (1834) described *Cunila fasciculata* based on a specimen *Sellow s.n.*, housed at B. Epling (1936) cited the collection number 1524 for the *Sellow* specimen at B. However, the specimens at B had not been numbered, as can be seen in the Field Museum Negatives N° 28974. Nevertheless, most of them had been seen and annotated by Bentham or Epling and confirmed as types. The specimen at B was lost during WWII, but one of *Sellow's* types that

comes from the Rudolf Baschant Herbarium is still housed at B (Hiepko, 1980).

Bentham (1834) referred to southern Brazil (“in Brasilia merid.”) as the general geographic region for the type. W0027334 is the only specimen matching that general location, that is more precisely restricted to the state of Rio Grande do Sul, part of the Brazilian South (Antar et al. 2022). There cannot be much certainty that all the specimens identified as *Sellow s.n.* are in fact duplicates. Nevertheless, a combination of Bentham's annotation, the stamp of the Herbarium Benthamianum, and the designation by Epling (1936) as an isotype at K offers enough confidence to select this material (Fig. 1) as the lectotype.

Schmidt (1858) considered *Thymus selloi* to be a synonym, reportedly in an annotation on the holotype of *Garadoquia capitata*. Since no description for that name had been made, and in accordance with Art. 38, Ex.1, Rec. 50B of the Shenzhen Code (Turland et al. 2018), it is here considered a *nomen nudum*.

2. ***Cunila galioides* Benth.**, Labiat. Gen. Spec. 363 (1834). *Hedyosmos galioides* (Benth.) Kuntze, Revis. Gen. Pl. 2: 520 (1891).—Type: Brazil: [without specific locality or date], *F. Sellow s.n.* (lectotype, designated by Epling [1936: 142]: B [destroyed]; **replacement lectotype, here designated:** K barcode K000248136 [image!]; possible isolectotypes: B barcode B_10_0311251 [image!], HAL barcode HAL0064932 [image!], K 4X barcode K000640689 [image!], barcode K000640690 [image!], barcode K000640691 [image!], barcode K000640692 [image!], M barcode M0096112 [image!], P 3X barcode P00737717 [image!], barcode P00737718 [image!], barcode P00737720 [image!], TUB barcode TUB007556 [image!], UC accession 61941 [image!], US accession 616883!, W 3X barcode W0027331 [image!], barcode W0027332 [image!], barcode W0027333 [image!]).

Cunila galioides var. *hispida* J.A.Schmidt, Fl. Bras. (Martius) 8(1): 168 (1858).—Type: Brazil: [without specific locality or date], *F. Sellow s.n.* (holotype: B [destroyed]; Brazil, Rio de Janeiro: Itatiaia, no campo, 5 Jun 1871, A.F.M. Glaziou 4893 (**neotype, here**



FIG. 1. Lectotype of *Cunila fasciculata* Benth. (F. Sellow s.n., K000248135). ©The Board of Trustees of the Royal Botanic Gardens, Kew, made openly available through Re flora Virtual Herbarium (<http://reflora.jbrj.gov.br/>). Reproduced with the consent of the Royal Botanic Gardens, Kew.

designated: P barcode P02970010 [image!];
isoneotype: R barcode R000011485 [!].

Hedeoma glaziovii Briq., *Annuaire Conserv. Jard. Bot.* Genève 2: 185 (1898). —Type: Brazil: prope Rio de Janeiro, 1876, *A.F.M. Glaziou 6651* (holotype: G accession 8423-7 [image!]; isotypes: BR barcode BR0000005113934 [image!], C 3X barcode C10012996 [image!], barcode C10012997 [image!], barcode C10012998 [image!], G accession 8423-8 [image!]; P 2X barcode P00737727 [image!], barcode P00737728 [image!]).

Notes.—Bentham (1834) described *Cunila galioides* based on a specimen *Sellow s.n.*, housed at B and on the material *A.F.C.P Saint-Hilaire s.n.*, housed at P. Epling (1936) cited the specimen housed at B as the type, an action interpreted in Prado et al. (2015) as an inadvertent lectotype selection according to the ICN (Turland et al. 2018). Epling (1936) also cited the collection number 4400 for the Sellow specimen at B. However, the specimens at B had not been originally numbered, as can be seen in the Field Museum Negative N° 28975. The only numbered collection is that of one specimen at P, but the calligraphy on its label corresponds to that of Bentham, while the original Sellow's collection at B does not have a collection number. The specimens at B, however, were lost during WWII, and are now represented solely by a photograph attached to the UC 61941 material, as confirmed by an annotation left by Epling who defined it as the type. Nevertheless, B still houses one of Sellow's types, the one coming from the Rudolf Baschant Herbarium (Hiepko, 1980).

Bentham (1834) cited southern Brazil ("in Brasilia merid.") as the general geographic reference for the type. The only specimens matching that information are K000640692 and W0027331, even though the species is widely distributed throughout the South, Southeast and parts of the Center-West of Brazil (Antar et al. 2022). There is not much certainty that all specimens identified as *Sellow s.n.* are in fact duplicates, as Sellow could have collected the species more than once. Nevertheless, taking into consideration Bentham's annotations, its origin from the Herbarium Benthamianum, and Epling's annotation stating its status as an isotype, we hereby propose the specimen from K (Fig. 2) as the replacement lectotype. The Saint-Hilaire unnumbered specimens, housed at P and marked as types, are thus recognized as the remaining syntypes.

The synonym *Cunila galioides* var. *hispidula* was proposed by Schmidt (1858) using one of Sellow's types at B, with no references to an herbarium or collection number. Later on, Epling (1936) inadvertently proposed *Sellow 4524* as the lectotype. That material was lost during WWII, leaving it without an existing type. A neotype (Fig. 3) is hereby proposed based on the quality of preserved morphology of the specimen matching the description in the protologue.

3. *Cunila incisa* Benth., *Labiata. Gen. Spec.* 361 (1834). *Hedyosmos incisus* (Benth.) Kuntze, *Revis. Gen. Pl.* 2: 520 (1891). —Type: Brazil: [without specific locality or date], *F. Sellow s.n.* (holotype: B [destroyed]; **lectotype, here designated:** K barcode K000247819 [image!]; possible isolectotypes: B barcode B_10_0248416 [image!]; G barcode G00680943 [image!], HAL barcode HAL0064935 [image!], UC accession 61953 [image!], UC accession 61955 [image!], W barcode W0027327 [image!]).

Notes.—Bentham (1834) described *Cunila incisa* based on a specimen *Sellow s.n.*, housed at B. Epling (1936) inadvertently designated the collection number 3161 as the type, which is not found among examined types except for UC 61953 in its label annotations written at a later date, presumably by the same author. The specimen at B was lost during WWII and is now represented solely by a photograph attached to the UC 61955 material, as confirmed by a note left by Epling defining it as the type. B, within the Rudolf Baschant Herbarium, still houses one of Sellow's types (Hiepko, 1980).

Bentham (1834) had southern Brazil ("in Brasilia merid.") as the general geographic reference for the type. The only available specimen that matches that information is W0027327, with a distribution restricted to the states of Santa Catarina and Rio Grande do Sul, parts of the Brazilian South (Antar et al. 2022). There is not much certainty that all specimens identified as *Sellow s.n.* are in fact duplicates, but a combination of Bentham's annotations, the stamp of the Herbarium Benthamianum, and the designation as an isotype in K by Epling (1936) gives us enough confidence to select the referred material (Fig. 4) as the lectotype.

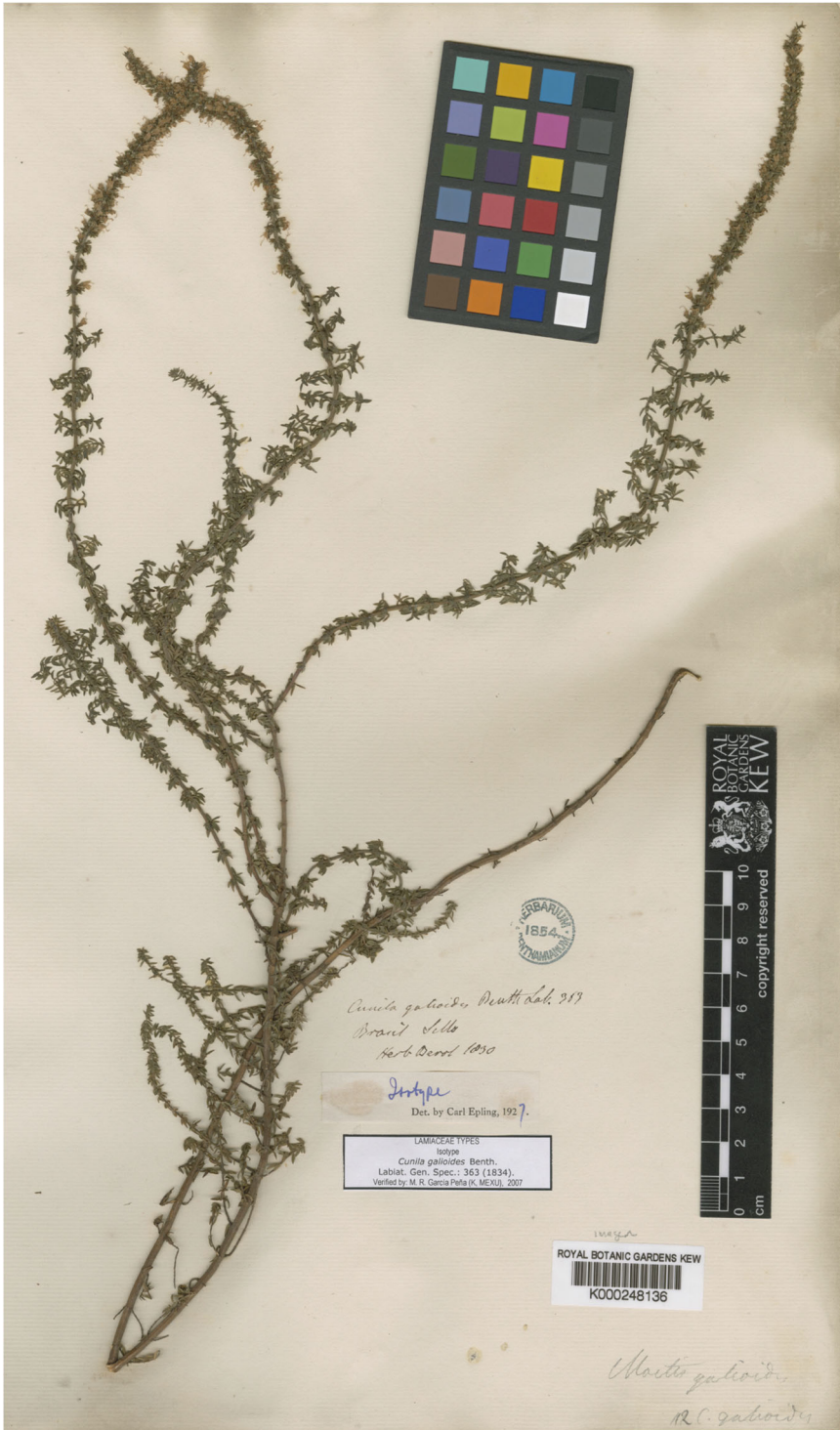


FIG. 2. Replacement lectotype of *Cunila galioides* Benth. (*F. Sellow s.n.*, K000248136). ©The Board of Trustees of the Royal Botanic Gardens, Kew, made openly available through Reflora Virtual Herbarium (<http://reflora.jbrj.gov.br/>). Reproduced with the consent of the Royal Botanic Gardens, Kew.



FIG. 3. Neotype of *Cunila galioides* var. *hispida* J.A.Schmidt (A.F.M. Glaziou 4893, P02970010). ©MNHN — Muséum national d'Histoire naturelle, made openly available through SpeciesLink (<https://specieslink.net/>). Reproduced with the consent of the MNHN — Muséum national d'Histoire naturelle.

4. *Cunila menthoides* Benth., Labiat. Gen. Spec. 363 (1834).—Type: Brazil: [without specific locality or date], *F. Sellow s.n.* (holotype: B [destroyed]; **lectotype, here designated:** K barcode K000248137 [image!]; possible isolectotypes: K barcode K000640693 [image!], G barcode G00681160 [image!], HAL barcode

HAL0104706 [image!], UC accession 61960 [image!], UC accession 61961 [image!]).

Notes.—Bentham (1834) described *Cunila menthoides* based on a specimen *Sellow s.n.*, housed at B. Epling (1936) inadvertently designated the number 3990 as the type, which is presently found only in UC 61960 in the

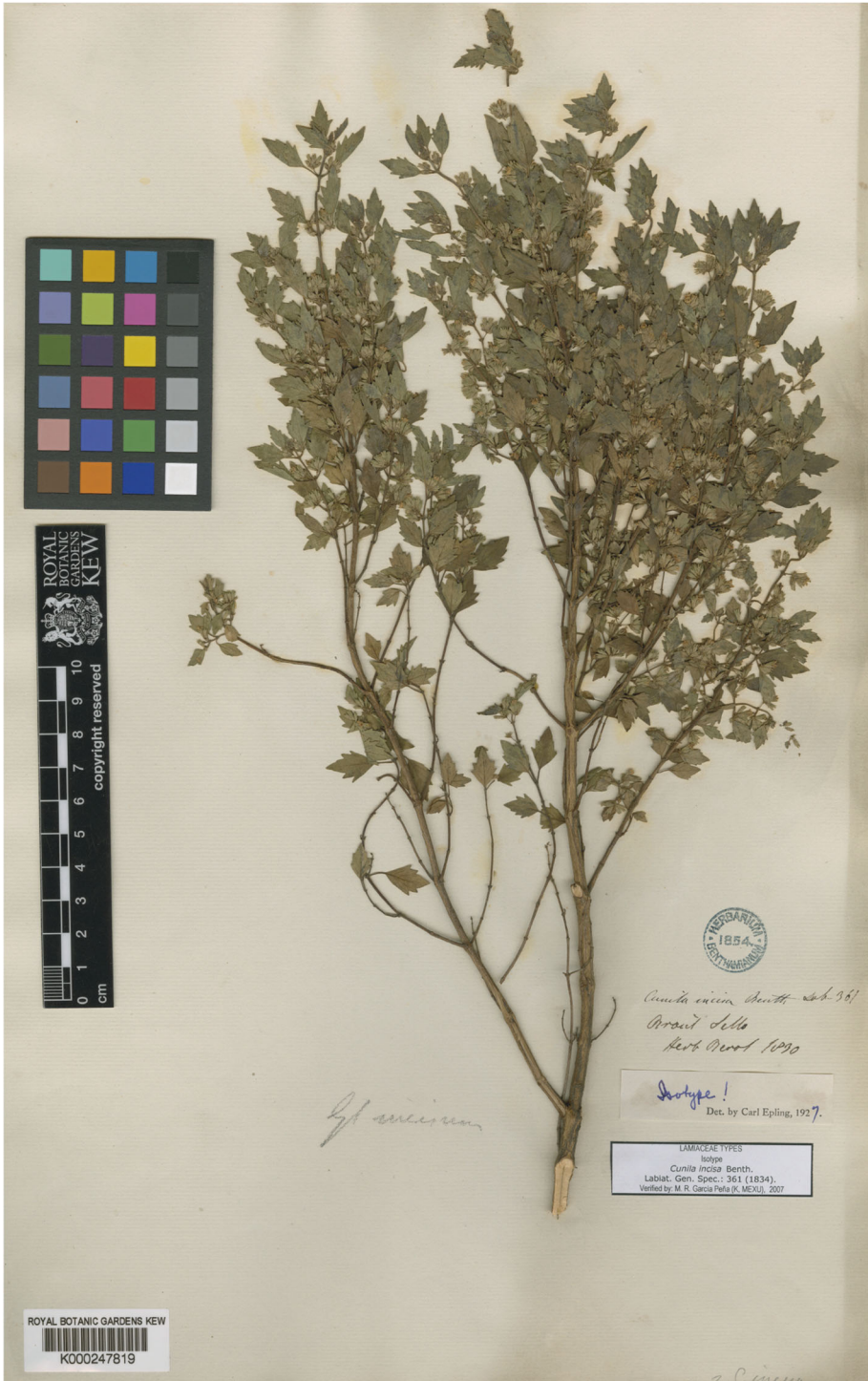


FIG. 4. Lectotype of *Cumula incisa* Benth. (*F. Sellow s.n.*, K000247819). ©The Board of Trustees of the Royal Botanic Gardens, Kew, made openly available through ReFlora Virtual Herbarium (<http://reflora.jbrj.gov.br/>). Reproduced with the consent of the Royal Botanic Gardens, Kew.

annotations written at a later date on its label, presumably by the same author, and in a photograph of the material attached to UC 61961. No other specimen has a collector's number, although most of them are marked as seen by Bentham or Epling. That specimen at B, however, was lost during WWII. No other available duplicates have collectors' numbers.

Bentham (1834) cited southern Brazil ("in Brasilia merid.") as the general geographic reference for the type. The only specimen matching that information is HAL0104706, more precisely that of the states of Santa Catarina and Rio Grande do Sul (Antar et al. 2022). The specimens at G and HAL, though representative of the species, are identified as *Cunila pulegioides* Benth., a name that was never published—highlighted by Dr. Christian Bräuchler in a note on the second specimen—and that should not be confused with *Cunila pulegioides* L., the basionym of *Hedeoma pulegioides* (L.) Pers.

There is no certainty that all specimens identified as *Sellow s.n.* are in fact duplicates, but a combination of Bentham's annotations, the stamp of the Herbarium Benthamianum, its designation as an isotype in K by Epling (1936), and an Epling's note treating it as an isotype should be enough to confidently select the referred material (Fig. 5) as the lectotype.

5. *Glechon discolor* Epling, Repert. Spec. Nov. Regni Veg. Beih. 85: 145 (1936).—Type: Brasilia [Brazil]: [without specific locality or date], *F. Sellow 4210* (holotype: B [destroyed]; **lectotype, here designated:** UC accession 55173 [image!]; isoelectotypes: K 2X barcode K000485443 [image!], barcode K000485444 [image!]).

Notes.—Epling (1936) described *Glechon discolor* based on the specimen *Sellow 4210*, housed at B. The specimen at B, however, was lost during WWII. There is no certainty that the specimens at K identified as *Sellow s.n.* are in fact duplicates but, considering Epling's annotations on them and his decision to treat them as isotypes at K, they are here treated as such. Taking into consideration the herbarium where Epling was working (Stafleu & Cowan, 1976), and the designation of an isotype at LA, later transferred to UC, we treat the material chosen by Epling (Fig. 6) as the most adequate option for the lectotype.

It is noteworthy to mention that even though the province of São Paulo was defined by Epling (1936) in the protologue as the area of occurrence for the type, no collections matching that information have been found. The only geographic reference more specific than the country ("in Brasilia merid.", southern Brazil) was found in a note written by Bentham on the sheet of the K000485444 specimen. This geographic term is fairly general and does include São Paulo, but that state is not part of the known distribution of the species, restricted to the states of Santa Catarina and Rio Grande do Sul (Epling & Stewart, 1939; Antar et al. 2022).

6. *Hesperozygis kleinii* Epling & Játiva, Brittonia 15: 369 (1963).—Type: Brazil, Santa Catarina: Bom Jardim [da Serra], São Joaquim, Serra do Oratório, Aparados da Serra, 18 Set 1958, *R. Reitz & R.M. Klein 7172* (**lectotype, here designated:** UC accession 49799 [image!]; isoelectotypes: HBR accession 54909 [image!], RFA accession 30375 [!]).

Notes.—When describing *Hesperozygis kleinii* based on *Reitz & Klein 7172*, Epling & Játiva (1963) did not define where the type materials were housed. Upon investigation, three specimens were uncovered. Among those, we consider the specimen at UC (Fig. 7), previously housed at LA, the most suitable candidate for lectotypification, since it was housed at LA where Epling was mainly working (Stafleu & Cowan 1976) and therefore likely the main specimen on which the description of the new species was based.

7. *Hesperozygis nitida* (Benth.) Epling, Repert. Spec. Nov. Regni Veg. Beih. 85: 133 (1936). *Hedeoma nitida* Benth., Nat. Pflanzenfam. [Engler & Prantl] iv. III A. 295 ≡ *Keithia nitida* Benth. Prodr. [A. P. de Candolle] 12: 247. 1848.—Type: Brazil, Rio de Janeiro, in Serra dos Órgãos, 1841, *G. Gardner 5835* (lectotype, designated by Epling [1936: 133]: K; **second step lectotype, here designated:** K barcode K000485461 [image!]; isoelectotypes: K barcode K000485460 [image!]; UC accession 1943458 [image!]).

Notes.—Bentham (1848) described *Keithia nitida* without defining an herbarium for the

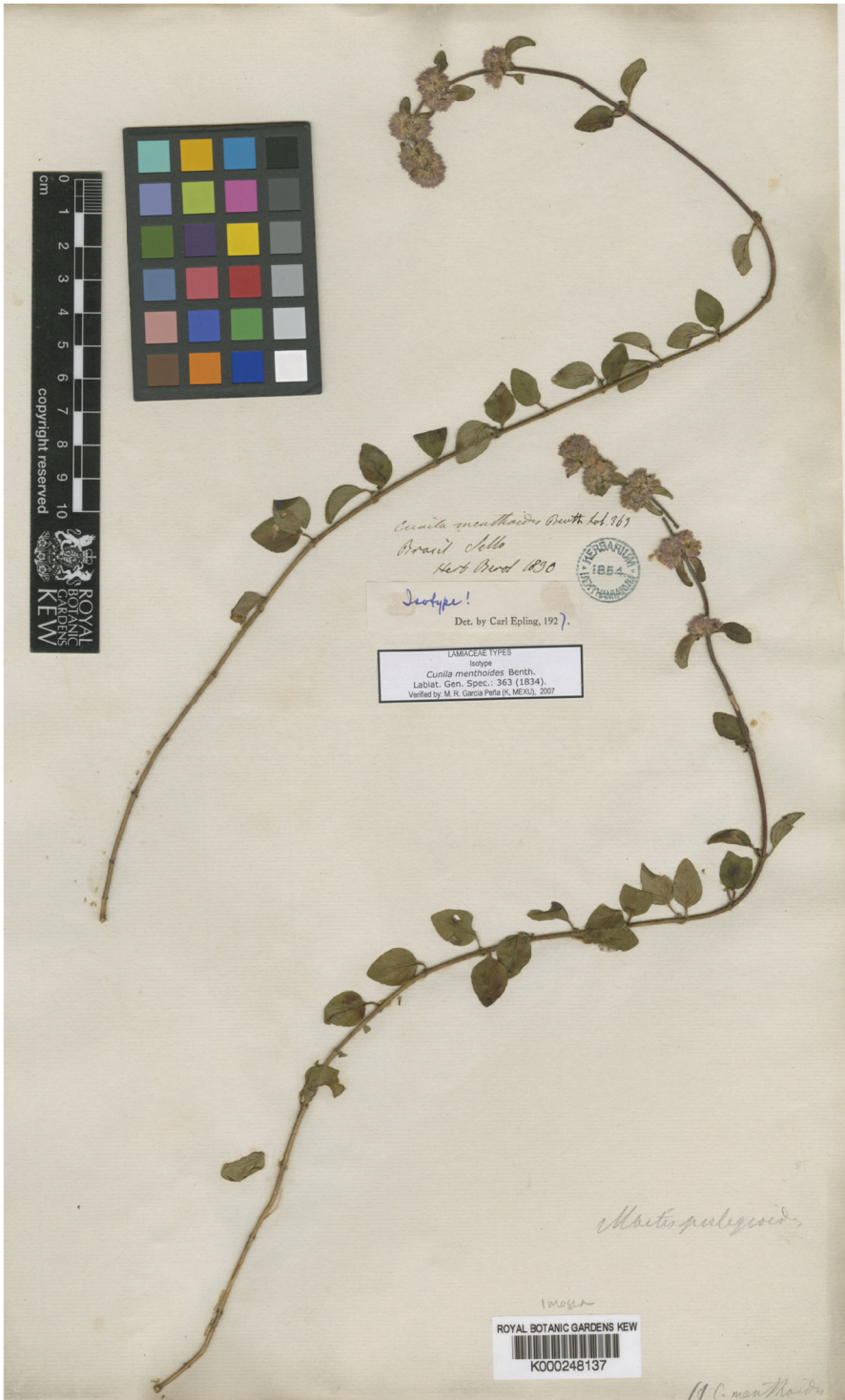


FIG. 5. Lectotype of *Cumula menthoides* Benth. (*F. Sellow s.n.*, K000640693). ©The Board of Trustees of the Royal Botanic Gardens, Kew, made openly available through ReFlora Virtual Herbarium (<http://reflora.jbrj.gov.br/>). Reproduced with the consent of the Royal Botanic Gardens, Kew.

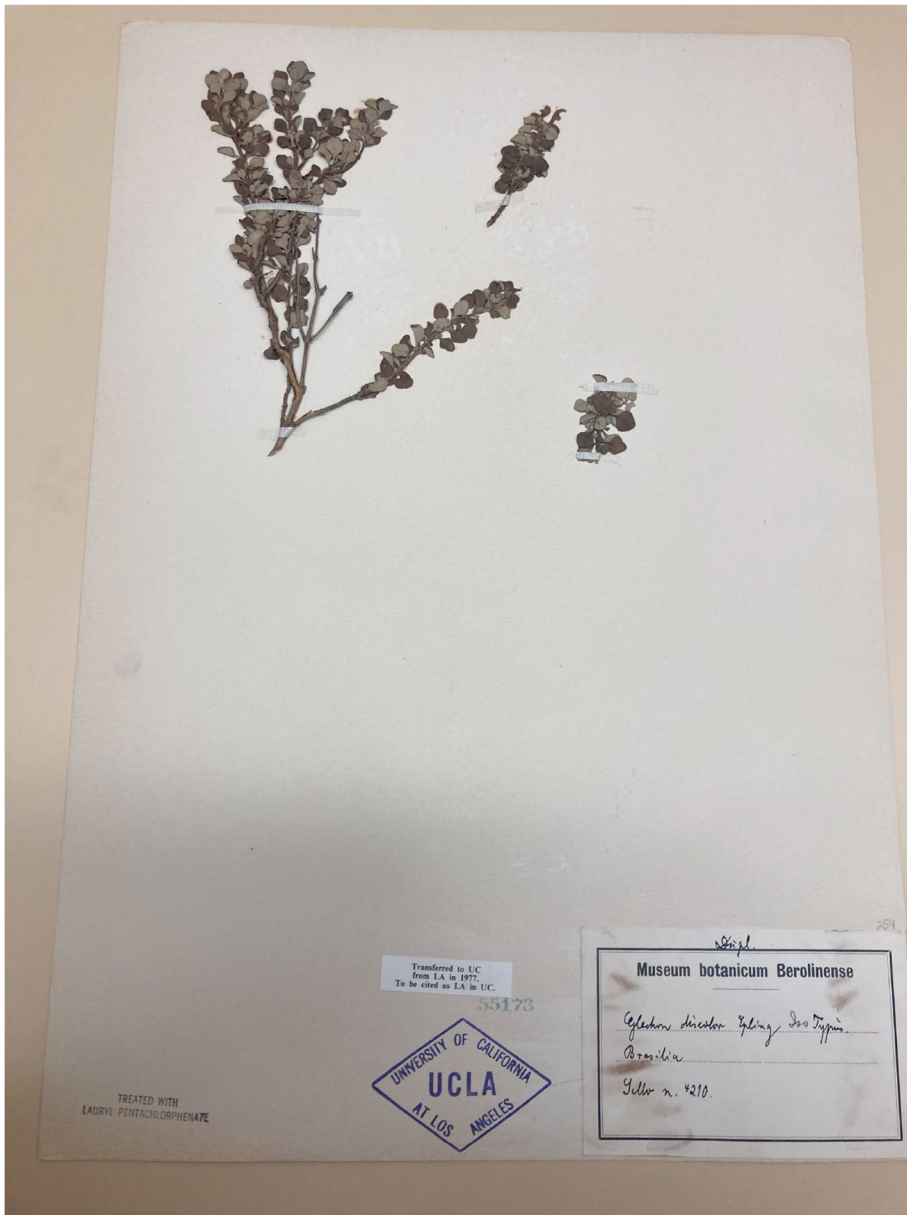


FIG. 6. Lectotype of *Glechon discolor* Epling (*F. Sellow* 4210, UC accession 55173). Photo taken by Dr. Paul Fine, curator of Neotropical Flora at UC. Reproduced with the consent of University and Jepson Herbaria, Berkeley.

specimen, which led to a lectotypification by Epling (1936), who designated the type specimen as housed in K, and an isotype in LA (later transferred to UC). The appointed collection for the type, however, holds two specimens, which brought the necessity for a second step lectotypification.

Although Epling stated on its label that the specimen K000485460 should be recognized as the lectotype, it presents the contradictory information that it was collected in Minas Gerais state on a printed note, which is not in agreement with the species protologue. Furthermore, the only specimen clearly mentioning Serra dos Órgãos Mountains is



FIG. 7. Lectotype of *Hesperozygis kleinii* Epling & Játiva (*R. Reitz & R.M. Klein 7172*, UC accession 49799). Photo taken by Dr. Paul Fine, curator of Neotropical Flora at UC. Reproduced with the consent of the University and Jepson Herbaria, Berkeley.

UC1943458, but the note concerning that location was written later, as confirmed by its distinct calligraphy. Finally, the specimen K000485461, suggested as an isotype on a note made by Epling, has its location appointed as “Brazil” with a handwritten note stating “Near summit (...)” followed by words which are almost illegible, but were

interpreted, as seen in the UC1943458 isotype, as “(...) Organ Mts.”, the same locality presented in the protologue. Therefore, we hereby choose the last K specimen (Fig. 8) as the second step lectotype due to the collection where it is housed, the notes left by Bentham, and its available geographical information.



FIG. 8. Second step lectotype of *Hesperozygis nitida* (Benth.) Epling (G. Gardner 5835; K000485461). ©The Board of Trustees of the Royal Botanic Gardens, Kew, made openly available through Reflora Virtual Herbarium (<http://reflora.jbrj.gov.br/>). Reproduced with the consent of the Royal Botanic Gardens, Kew.



FIG. 9. Lectotype of *Hesperozygis ringens* (Benth.) Epling. (F. Sellow s.n., K000485458). ©The Board of Trustees of the Royal Botanic Gardens, Kew, made openly available through ReFlora Virtual Herbarium (<http://reflora.jbrj.gov.br/>). Reproduced with the consent of the Royal Botanic Gardens, Kew.

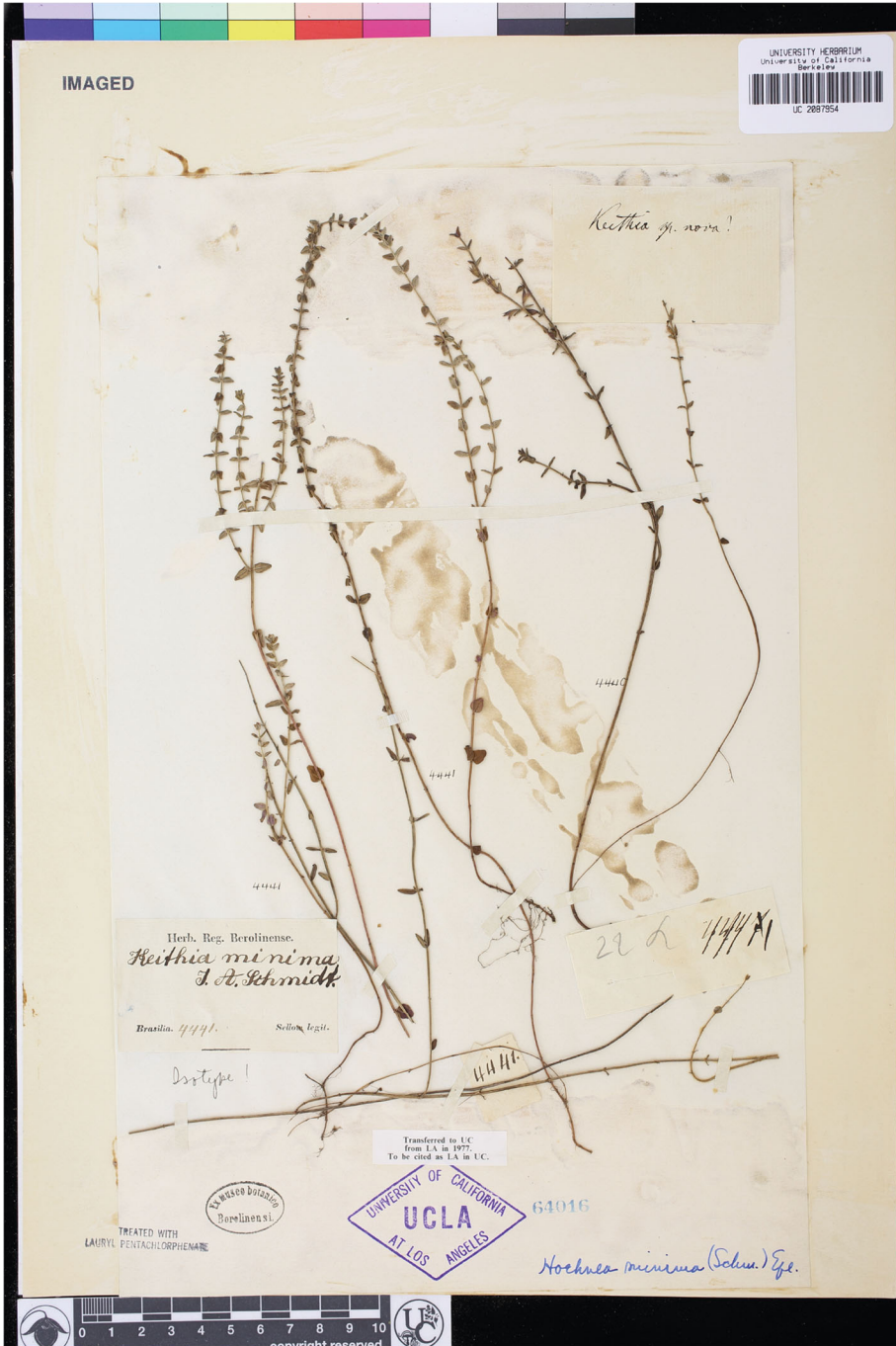


FIG. 10. Replacement lectotype of *Hoehnea minima* (J.A.Schmidt) Epling. (F. Sellow 4441, UC accession 64016). Photo digitalized by Dr. Paul Fine, curator of Neotropical Flora at UC. Reproduced with the consent of the University and Jepson Herbaria, Berkeley.

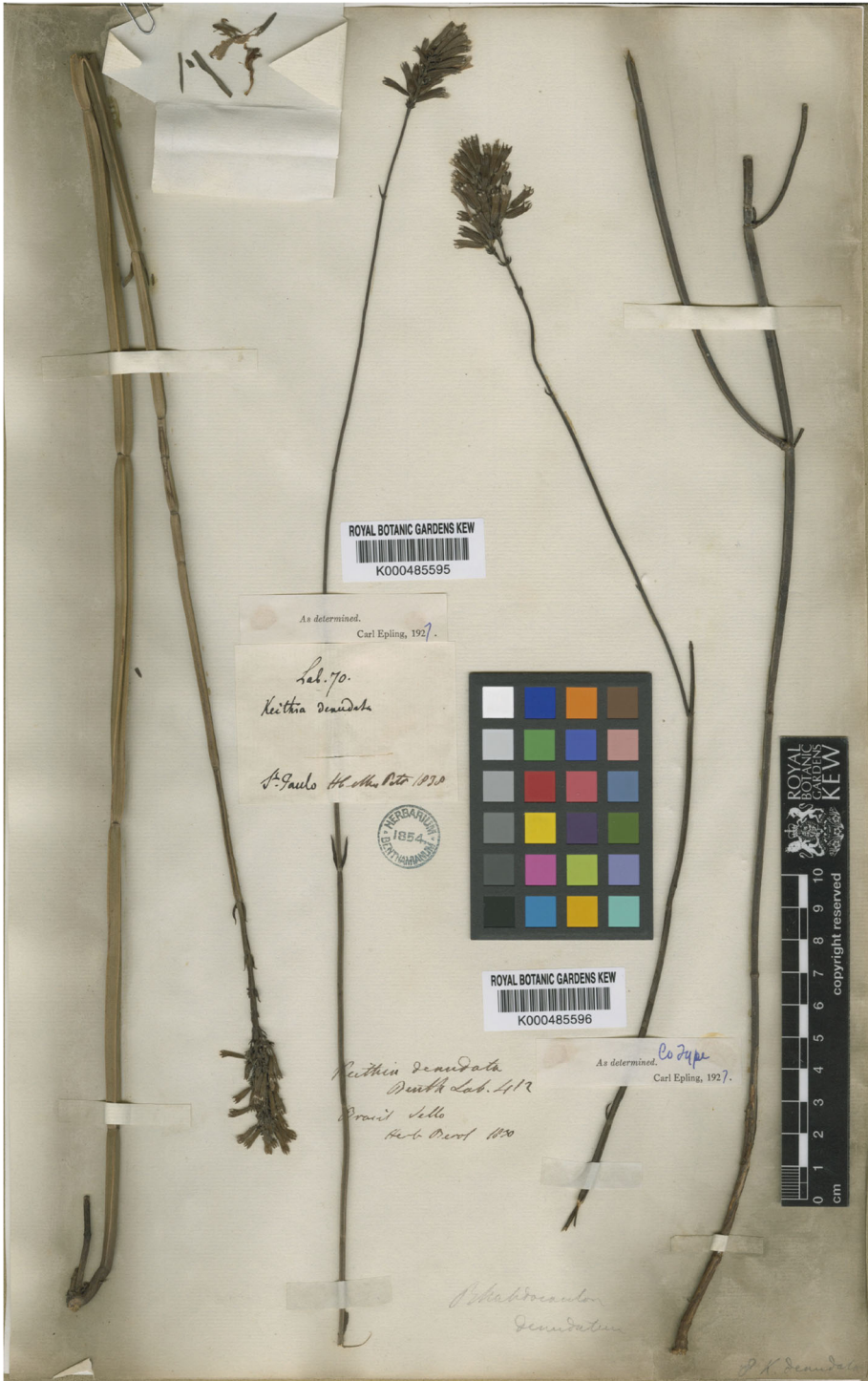


FIG. 11. Replacement lectotype of *Rhabdocaulon denudatum* (Benth.) Epling. (F. Sellow s.n., K000485596). ©The Board of Trustees of the Royal Botanic Gardens, made openly available through Reflora Virtual Herbarium (<http://reflora.jbrj.gov.br/>). Reproduced with the consent of the Royal Botanic Gardens, Kew.



FIG. 12. Second step lectotype of *Rhabdocaulon gracile* (Benth.) Epling (A.F.C.P. Saint-Hilaire C2 1572, P00714595). ©MNHN — Muséum national d'Histoire naturelle, made openly available through SpeciesLink (<https://specieslink.net/>). Reproduced with the consent of the MNHN — Muséum national d'Histoire naturelle.

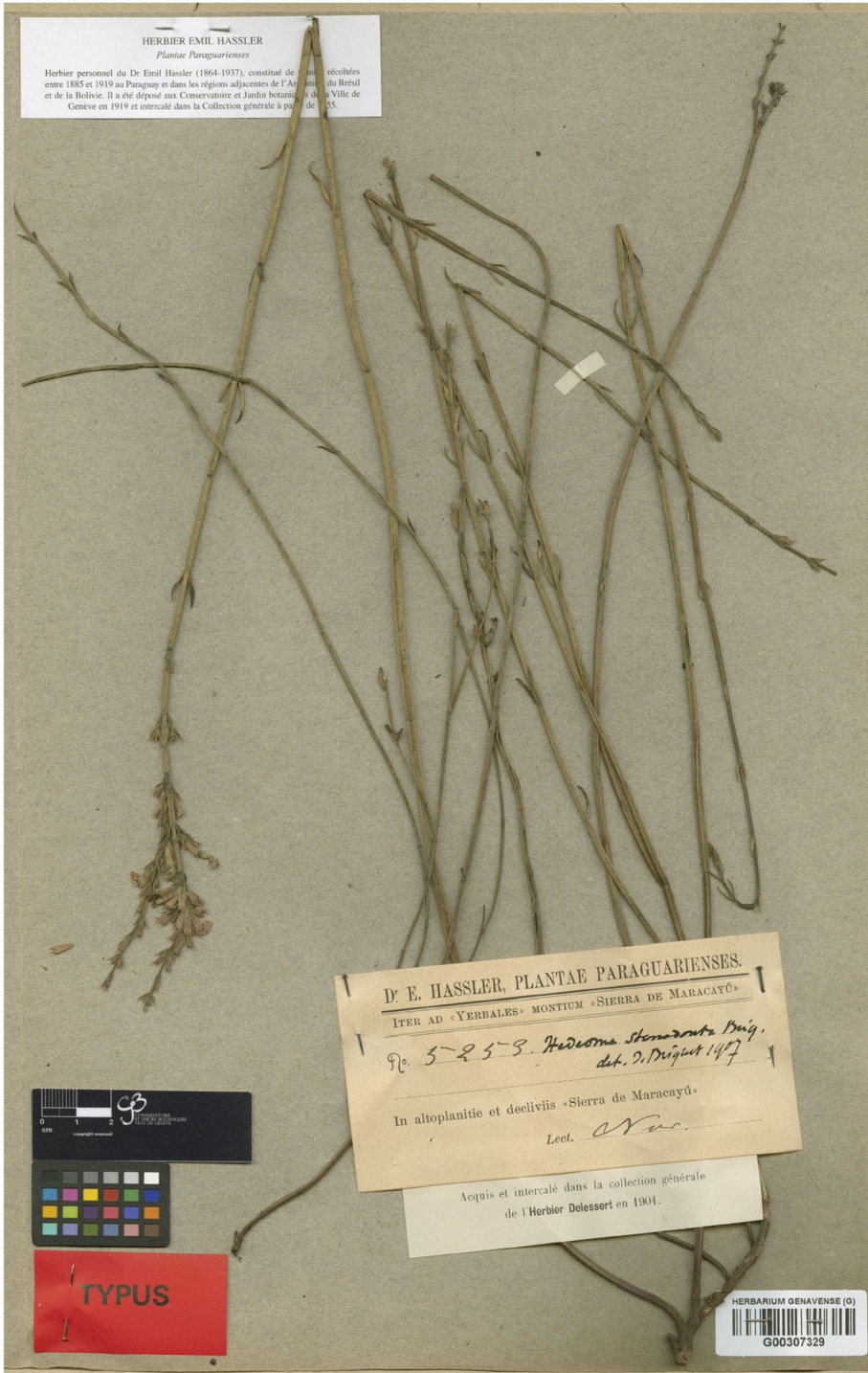


FIG. 13. Lectotype of *Rhabdocaulon stenodontum* (Briq.) Epling (*E. Hassler* 5253, G00307329). Openly available on the Catalogue des herbiers de Genève (CHG) (<http://www.ville-ge.ch/musinfo/bd/cjb/chg/>). Reproduced with the consent of the Conservatoire et Jardin botaniques de Genève.



FIG. 14. Replacement lectotype of *Rhabdocaulon strictum* (Benth.) Epling. (*F. Sellow s.n.*, K000485589). ©The Board of Trustees of the Royal Botanic Gardens, Kew, made openly available through Reflora Virtual Herbarium (<http://reflora.jbrj.gov.br/>). Reproduced with the consent of the Royal Botanic Gardens, Kew.

8. *Hesperozygis ringens* (Benth.) Epling, Repert. Spec. Nov. Regni Veg. Beih. 85: 134 (1936). *Glechon ringens* Benth., Labiat. Gen. Spec. 409. 1834.—Type: Brazil: [without specific locality or date], *F. Sellow s.n.* (holotype: B [destroyed]; **lectotype, here designated:** K barcode K000485458 [image!]; possible isolectotypes: B barcode B_10_0004117 [image!], BR barcode BR0000006913878 [image!], G barcode G00437837 [image!], HAL barcode HAL0114389 [barcode!], K barcode K000485459 [image!], UC accession 70231 [image!], W 2X barcode W0027343 [image!], barcode W0031664 [image!]).

Notes.—Bentham (1834) described *Glechon ringens* based on a specimen *Sellow s.n.*, housed at B. Later, Epling (1936) proposed a new combination *Hesperozygis ringens* for the new genus *Hesperozygis*, and inadvertently designated the collection number 3305 as its type, which can only be seen in the photograph of the duplicate described by him as the type and attached to UC 70231 and at a later date annotated in Epling's notes attached to the selected lectotype. No other specimen, including the one at B seen in the Field Museum Negative N° 28968, displays a collector's number, although most of them are marked as seen by Bentham or Epling. The types at B have been lost during WWII, even though B still houses one of the Sellow's type, that from the Rudolf Baschant Herbarium (Hiepko, 1980).

Bentham (1834) designated "in Brasilia merid." as the general geographic reference for the type. No similar information was found among the examined specimens, even though the species is restricted to the state of Rio Grande do Sul in the extreme South of Brazil (Antar et al. 2022). There is no certainty that all specimens identified as *Sellow s.n.* are in fact duplicates, but a combination of Bentham's annotations, the stamp of the Herbarium Benthamianum, the designation of an isotype at K by Epling (1936) and his note on the material treating it as an isotype should be sufficient to confidently select the referred material (Fig. 9) as the lectotype.

9. *Hoehnea minima* (J.A.Schmidt) Epling, Repert. Spec. Nov. Regni Veg. Beih. 115: 9 (1939). *Keithia minima* J.A.Schmidt, Fl. Bras. (Martius) 8(1): 173. 1858.—Type: Brasilia [Brazil]: [without specific locality or date], *F. Sellow 4441* (lectotype, designated by Epling [1936: 132]: B [destroyed]; **replacement lectotype, here designated:** UC accession 64016 [image!]).

Notes.—Schmidt (1858) described *Keithia minima* using a specimen *Sellow s.n.*, housed at B. Epling (1936) assigned to it the collection number 4441, what is here understood as an inadvertent lectotypification. Later on, Epling & Stewart (1939) proposed *Hoehnea minima*, based on Epling's new genus *Hoehnea*. The lectotype at B was lost during WWII and is only preserved as a negative photograph in the UC 64015 material. The replacement lectotype (Fig. 10), marked as an isotype in Epling's annotation, represents a complete specimen adequate for detailed morphological observation, and therefore most suitable to be treated as such.

10. *Rhabdocaulon denudatum* (Benth.) Epling, Repert. Spec. Nov. Regni Veg. Beih. 85: 136 (1936). *Hedeoma denudata* (Benth.) Briq., Nat. Pflanzenfam. [Engler & Prantl] iv. III A. 295 (1887). *Keithia denudata* Benth., Labiat. Gen. Spec. 412. 1834.—Type: Brazil: [without a specific locality or date], *F. Sellow s.n.* (lectotype, designated by Epling [1936: 136]: B [destroyed]; **replacement lectotype, here designated:** K barcode K000485596 [image!]; possible isolectotypes: E 2X barcode E00208046 [image!], barcode E00208047 [image!], HAL barcode HAL0114392 [image!], G barcode G00435270 [image!], K barcode K000485595 [image!]).

Notes.—Bentham (1834) described *Keithia denudata* based on a specimen *Sellow s.n.*, housed at B, and specimens *A.F.C.P. Saint-Hilaire s.n.*, housed at P and M. Epling (1936) later on proposed the name *Rhabdocaulon denudatum*, following the recombination of

significant parts of *Keithia* Spreng. into the new genus *Rhabdocolon*, and inadvertently lectotypified the specimens by citing the *Sellow s.n.* specimen at B as the type. The specimen at B, however, was lost during WWII and can be seen only in a photograph of a specimen in the Field Museum Negative N° 28957, without, however, certainty that it represents the specimen selected by Epling.

Though Bentham (1834) described the occurrence of the species in southern Brazil (“in Brasilia merid.”), and Epling (1936) cited Minas Gerais as the province of its occurrence, such geographic references have not been found among the analyzed specimens. Other geographic references, found on the label of the HAL0114392, were “Brasil aequin.” (Which may be interpreted as a reference to Minas Gerais), and, in a note to the K000485595 isolectotype, St. Paulo, part of southern Brazil. Both latter regions are in fact parts of the actual distribution for the species (Antar et al. 2022).

A combination of Bentham’s annotations, the stamp of the Herbarium Benthamianum, the designation of an isotype at K by Epling (1936), and his note treating it as a “cotype” — or, rather, an isotype — makes the designated specimen (Fig. 11) the most suitable replacement as the lectotype. It is also worth mentioning that both materials at K are part of the same sheet, though with different barcodes and associated notes.

11. *Rhabdocolon gracile* (Benth.) Epling,

Repert. Spec. Nov. Regni Veg. Beih. 85: 136 (1936). *Hedeoma gracilis* (Benth.) Briq. Nat. Pflanzenfam. [Engler & Prantl] iv. III A. 295. 1887. *Keithia gracilis* Benth., Labiat. Gen. Spec. 412. 1834.—Type: Brazil: São Paulo, Campos près Carapatos dans les Campos Geraes, 1816–1821, A.F.C.P. *Saint-Hilaire C2 1572* (first step lectotype, designated by Epling [1936: 136]: P; **second step lectotype, here designated:** P barcode P00714595 [image!]; isolectotype: P barcode P00714596 [image!]).

Notes.—Bentham (1834) described *Keithia gracilis* based on the specimen A.F.C.P. *Saint-*

Hilaire s.n., housed in P. Later on, Epling (1936) proposed the name *Rhabdocolon gracile* based on his recombination of a significant part of *Keithia* Spreng. into his new genus *Rhabdocolon* and made an inadvertent lectotypification by assigning the collection number 1572 to the cited type specimen.

Upon investigation, we found that there are in fact two specimens with the same collector’s number in the collection, which necessitates a second-step lectotypification. Considering prioritizing between the two specimens, we decided on the one (Fig. 12) with the higher quality of preserved morphology and more closely matching the description. A third specimen, from Saint-Hilaire’s collection and numbered C2-2791-10, is designated as a syntype. Considering the decisions made, this last specimen should be recognized as a remaining syntype.

12. *Rhabdocolon stenodontum* (Briq.) Epling,

Repert. Spec. Nov. Regni Veg. Beih. 85: 136 (1936). *Hedeoma stenodonta* Briq., Bull. Herb. Boissier Ser. II. vii. 612. 1907.—Type: Paraguay, Ypejhú: Sierra de Maracayú, Nov. 1885–1902, E. Hassler 5253 (**lectotype, here designated:** G barcode G00307329 [image!]; isolectotypes: B [destroyed], F barcode F0BN017707 [image!], G barcode G00307330 [image!], GH GH00001191 [image!], K K000485594 [image!], NY NY00000578 [image!], P 4X barcode P00714584 [image!], barcode P00714585 [image!], barcode P00753762 [image!], barcode P00753763 [image!], S accession 04-2713 [image!], UC accession 944369 [image!]).

Notes.—Briquet (1907) described *Hedeoma stenodonta* based on the gathering numbered 5253 in his work discussing Hassler’s collection. Epling (1936) later on proposed the combination *Rhabdocolon stenodontum* based on the new genus *Rhabdocolon*. Searching for the type specimens, we found that two of these specimens are housed at G, where the Delessert collection had been transferred (Stafleu & Cowan 1976), and thus requiring

lectotypification. Considering Briquet's determination on the specimen label, and the fact that it had a priority of 23 years in the transfer from the Delessert collection to G, we hereby designate one of the available specimens (Fig. 13) — effectively syntypes — as the lectotype. It is noteworthy to mention that, although the details of locality and collection date are not completely available for these specimens, they can be confirmed in Briquet (1907).

13. *Rhabdocalyon strictum* (Benth.) Epling. Repert. Spec. Nov. Regni Veg. Beih. 85: 137 (1936). *Cunila stricta* Benth., Labiat. Gen. Spec. 362. 1834. *Hedyosmos strictus* Kuntze, Revis. Gen. Pl. 2: 520 (1891).—Type: Brazil: [without specific locality or date], *F. Sellow s.n.* (lectotype, designated by Epling [1936: 137]: B [destroyed]; **replacement lectotype, here designated:** K barcode K000485589 [image!]; possible isolectotypes: G barcode G00681158 [image!], HAL barcode HAL0064945 [image!], UC accession 1943464 [image!], W barcode W0013599 [image!]).

Notes.—Bentham (1834) described *Cunila stricta* using a specimen *Sellow s.n.*, housed at B, and the material *A.F.C.P. Saint-Hilaire*, housed in the collector's collection. Later on, Epling (1936) proposed the name *Rhabdocalyon strictum* as a combination in the newly created genus *Rhabdocalyon*, and made an inadvertent lectotypification by designating the Sellow material as the type. The material at B, however, was lost during WWII.

Bentham (1834) used “in Brasilia merid.” as a general geographic reference for the type. The only specimen in accordance with such reference is W0013599, even though the species is only found in the states of Santa Catarina and Rio Grande do Sul, parts of the Brazilian South (Antar et al. 2022). A combination of Bentham's annotations, the stamp of the Herbarium Benthamianum, and the designation as an isotype at K by Epling (1936) gives us enough confidence to select the referred material (Fig. 14) as the replacement lectotype. The specimens at P and US and marked as types are part of Saint-Hilaire's collection and should be recognized as remaining syntypes.

Acknowledgments

The authors are grateful to the personnel of several herbaria who provided inestimable help under extremely difficult conditions of the COVID-19 pandemic, making this work possible. Especially among others, Dr. Paul Fine, curator of Neotropical Flora at UC; Dr. Robert Vogt, Senior Curator at B; Dr. Freud Stauffer, Head Curator of Phanerogams, and his assistant secretary, Laurence Loze, at G; María del Rosário García-Peña, responsible for the Program of Loaning and Scanning of type specimens at MEXU; Dr. Nilber Gonçalves da Silva, and the technician Renata Santos, at R; Dr. Rosana Lopes and the technician Carla G. Manão, at RFA; Dr. Sylvia Orli, IT and Digitization Manager at US; and James C. Solomon, Curator Emeritus at MO. This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior — Brasil (CAPES) — Finance Code 001. The first author would like to thank CNPq and CAPES for the financial support throughout his research projects. GMA thanks CAPES, ASPT, the Bentham Moxon Trust, IdeaWild, and the Smithsonian Institution for financial support. MT thanks Alexander von Humboldt Foundation (proc. BRA/1139098), FAPERJ (procs. E26/203.269/2016 and E-26/202.708/2019—JCNE), and CNPq (proc. 470349/2013-1—Universal, proc. 306758/2019-9—Pq2).

Funding

This work was supported by the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) through grants awarded to ABO (grant# 132032/2020-1) and MT (grant# 306758/2019-9); Fundação de Amparo a Pesquisa do Rio de Janeiro (grant# E-26/202.708/2019) awarded to MT; Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) — Finance Code 001 awarded to GMA; The American Society of Plant Taxonomists through a Graduate Student Research Grant for GMA; and Idea Wild grant awarded to GMA.

Declarations

Conflicts of interests/Competing interests

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial

interest in the subject matter or materials discussed in this manuscript.

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