Type tips and references

Different types of types

A type is a specimen selected to serve as a reference point when a taxon is first described and published. As a result, these specimens are extremely important to botanists who are attempting to determine the correct application of a name. There are several different categories of types; the most common are:

Holotype: The single specimen, from a single gathering, in a herbarium designated as the type of a taxon by the original author at the time the scientific name and description was published.

Isotype: A duplicate specimen of the holotype. *Historical tip*: the term isotype was proposed for use in 1919, so prior to that specimens might be labeled as duplicate type or cotype.

Syntype: Any specimen cited in the original description of a taxon when a holotype was not designated, or any of two or more specimens simultaneously designated in the protologue as types. Duplicates of a syntype are isosyntypes.

Lectotype: A specimen chosen by a later researcher to serve as if it were the holotype. It is chosen from among the specimens available to the original publishing author (the isotypes, syntypes and/or paratypes) of a scientific name when the holotype was either lost or destroyed, or when no holotype was designated. Lectotypes must be designated by effective publication, and there are limitations to this (Eg, unless formally printed/published in a journal, PhD dissertations do not count). Duplicates of the lectotype are isolectotypes.

Neotype: A specimen chosen by a later researcher to serve in place of a holotype when all specimens available to the original publishing author of a scientific name have been lost or destroyed. Duplicates of the neotype are isoneotypes.

Paratype: A specimen not formally designated as a type but cited along with the type collection in the original description of a taxon. Paratypes at NY are filed in the general collection.

Topotype: A specimen of a plant collected from the same locality as the holotype and usually on a different date. A topotype has no formal standing and is filed at NY in the general collection. Also called a logotype, sometimes a cotype.

Cotype: A term formerly used for syntype and sometimes for isotype and paratype or even topotype. This is an obsolete term not used by today's taxonomists, but can require careful checking to determine the intended meaning.

Curation

How each herbarium chooses to file type specimens within their collection can vary and can change as collections grow or curatorial practices change. There are different options for how to file types, whether separated out from the general collection in their own cabinet(s) or within a collection at the beginning of each genus.

We recommend filing specimens by basionym. *Quick tip*: a name with parenthetical authors can’t be a basionym.

If stored separately from the general collection, you can choose multiple ways to arrange the types. Some options are alphabetical by basionym, alphabetical by family, or in another family order (phylogenetic).

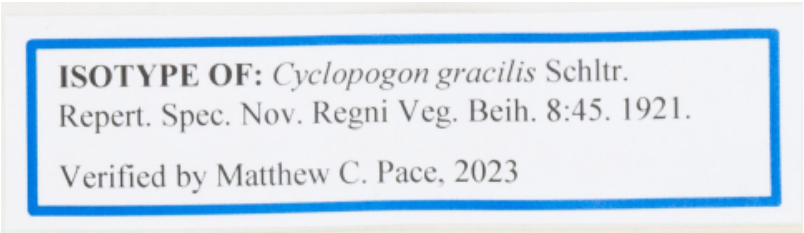
Example: NY seed plant types are arranged by basionym, in the same family (following APG4) and geographical order as the general herbarium. NY bryophyte and lichen types are arranged alphabetically by basionym, with no family structure. NY fungi and algae types are stored within their respective collections, in their own folders at the beginning of each genus. NB: One challenge to that is taxa for which we have types only or have dubious family placements.

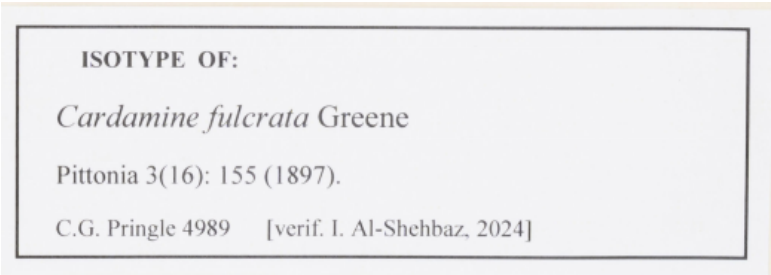
Type annotation labels

Everyone makes labels differently.

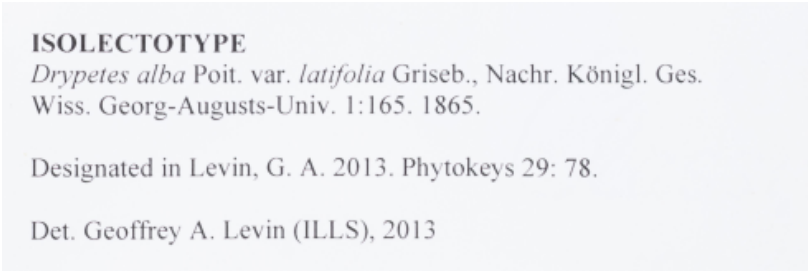
Must include: type status, scientific name, and publication citation. It's traditional to use short citations (abbreviated journal titles, citing the page number the protologue starts on and not the full range) but not required.

Should include: The person verifying the type status (with date), the collector and number or barcode number (to help match labels to sheets).





Can include: Currently accepted name (if different than basionym), lectotypification details, short summary of any issues in the determination of the type status, clarifications about the collector or locality, herbaria where other duplicates are located, full quotation of protologue if helpful, etc.



ISOLECTOTYPE
Drypetes alba Poit. var. *latifolia* Griseb., Nachr. Königl. Ges. Wiss. Georg-Augusts-Univ. 1:165. 1865.

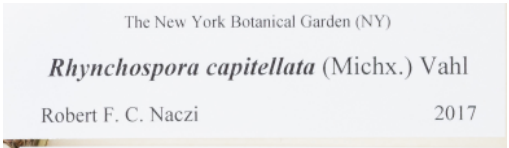
Designated in Levin, G. A. 2013. Phytokeys 29: 78.

Det. Geoffrey A. Levin (ILLS), 2013

***Dalechampia trichophila* Pax & K. Hoffm.**
Das Pflanzenreich IV. 147 XII (Heft 68): 44. 1919.

Type: "Paraguay, sandige Standorte im Flußgebiet des Capibary [sandy locations in the river basin of the Capibary] (Hassler n. 4476, 5918)."

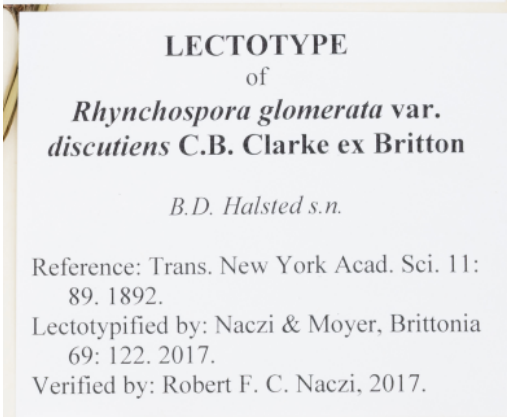
verif. A. Weiss, 2018.....NY 03376783.....syntype



The New York Botanical Garden (NY)

Rhynchospora capitellata (Michx.) Vahl

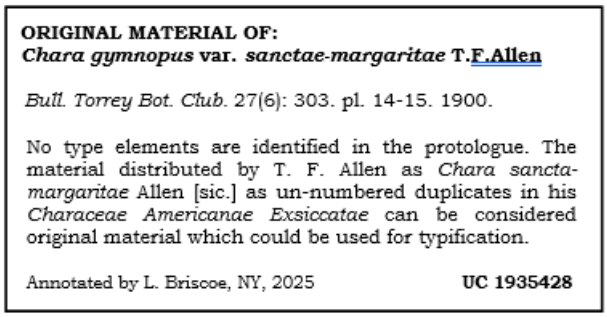
Robert F. C. Naczi 2017



LECTOTYPE
of
***Rhynchospora glomerata* var. *discutiens* C.B. Clarke ex Britton**

B.D. Halsted s.n.

Reference: Trans. New York Acad. Sci. 11: 89. 1892.
Lectotypified by: Naczi & Moyer, Brittonia 69: 122. 2017.
Verified by: Robert F. C. Naczi, 2017.

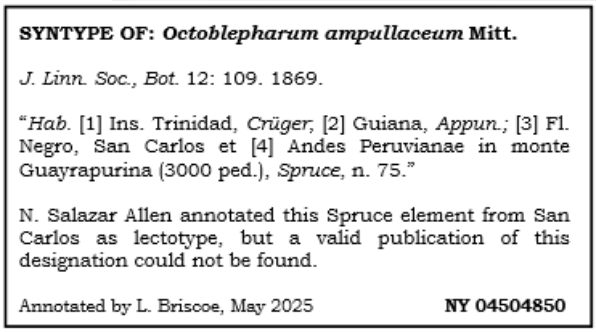


ORIGINAL MATERIAL OF:
***Chara gymnopus* var. *sanctae-margaritae* T.F.Allen**

Bull. Torrey Bot. Club. 27(6): 303. pl. 14-15. 1900.

No type elements are identified in the protologue. The material distributed by T. F. Allen as *Chara sancta-margaritae* Allen [sic.] as un-numbered duplicates in his *Characeae Americanae Exsiccatae* can be considered original material which could be used for typification.

Annotated by L. Briscoe, NY, 2025 **UC 1935428**



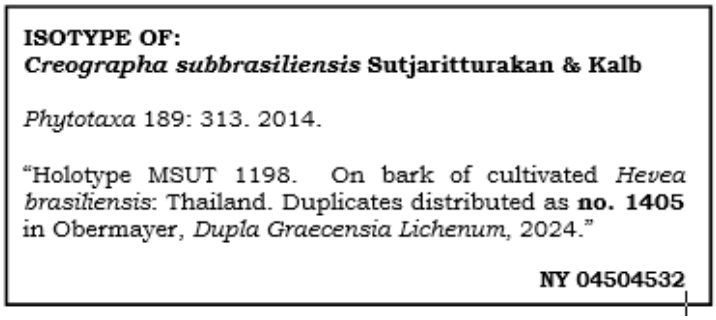
SYNTYPE OF: *Octoblepharum ampullaceum* Mitt.

J. Linn. Soc., Bot. 12: 109. 1869.

"*Hab.* [1] Ins. Trinidad, *Crüger*; [2] Guiana, *Appun.*; [3] Fl. Negro, San Carlos et [4] Andes Peruvianae in monte Guayrapurina (3000 ped.), *Spruce*, n. 75."

N. Salazar Allen annotated this Spruce element from San Carlos as lectotype, but a valid publication of this designation could not be found.

Annotated by L. Briscoe, May 2025 **NY 04504850**



ISOTYPE OF:
***Creographa subbrasiliensis* Sutjaritturakan & Kalb**

Phytotaxa 189: 313. 2014.

"Holotype MSUT 1198. On bark of cultivated *Hevea brasiliensis*: Thailand. Duplicates distributed as **no. 1405** in Obermayer, *Dupla Graecensia Lichenum*, 2024."

NY 04504532

Useful references

-International Code of Nomenclature for algae, fungi, and plants
-*The Code Decoded* by N. Turland (first edition 2013, second edition 2019): A good introduction and reference to understand the Code. Chapter 2 has a nice review of concepts and terms: (il)legitimate vs. (in)valid, homotypic vs. heterotypic synonyms, replacement names.
-International Plant Names Index (IPNI): Nomenclatural index of names of vascular plants, database of authors with standard forms/abbreviations, and database of publications with standard abbreviations.
-Tropicos: Missouri Botanical Garden's online database of names, with data on taxonomic acceptance and synonymy, types, specimens, publications, etc.
-For fungal and lichen names: IndexFungorum and MycoBank
-For algal names: AlgaeBase and Index Nominum Algarum
-HUH index of botanists: helpful for determining the correct collector(s) as it lists birth/death dates, herbaria where specimens were deposited, collecting geographies, etc.
-Taxonomic Literature II (TL-2) helpful for searching for authors to see where their types are/should be to see if it's reasonable to have them (increasingly challenging as portions of herbaria are orphaned and moved, eg. George Englemann was at MO, but the MO algae are now at UC, the lichens at NY, etc).

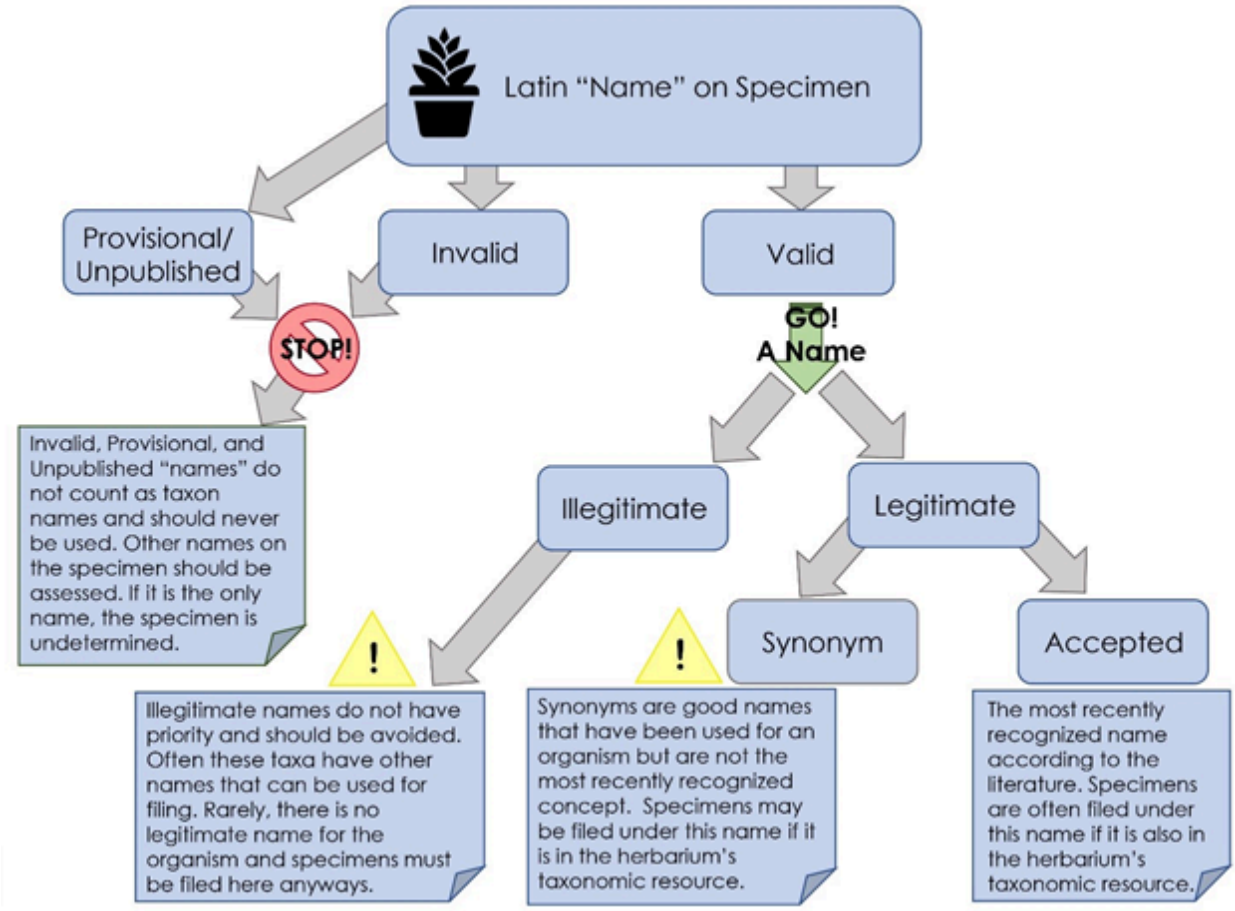
Databased types:
Useful for checking other's opinions on type status, checking collector and locality spelling in the case of hard to read handwriting, or figuring out modern place names.
-JSTOR Global Plants (Big caveat that this is not exhaustive! But good to check.)
-GBIF: Also useful for checking a species' geographical range, synonyms
-Various portals usually allow to filter search for types only (Mycoportal, Macroalgae Portal, Bryophytes and Lichens etc.)

Publications:
-Biodiversity Heritage Library (BHL): IPNI, Tropicos, and Index Fungorum will often link out to protologues hosted on BHL. Even if there is not an automatic link, many scientific publications in the public domain (generally pre 1930, as of 2025) are found on BHL.
-JSTOR: A good place to find volumes not on BHL but too old to be listed in a journal's recently published issues.
-Google Scholar: Useful for finding lectotypes or publications by a certain researcher or taxonomic group.

Challenges

Nomenclature

There is a learning curve to understanding the Code and terms used in nomenclature: (il)legitimate vs. (in)valid, homotypic vs. heterotypic synonyms, replacement names, etc.



[Figure by G. Tocci; https://spnhc.org/taxonomic-resources/#Assessing_Specimen_Names]

Handwriting

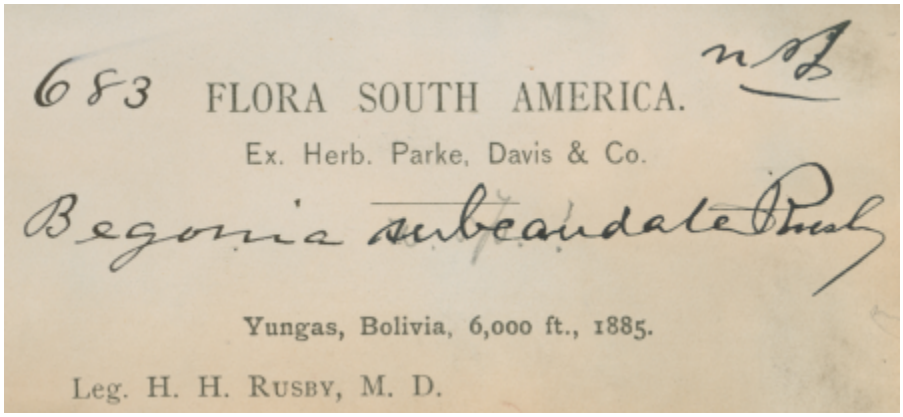
Handwriting can be a challenge for any specimen, but often necessary to decipher for potential type specimens to check localities, collectors, and dates. Here's a cursive handwriting guide that has general tips, but also NY-specific database tips (that might be less useful): https://docs.google.com/document/d/1bkhW6Jeqq42-Iwu6Mff7-Q6kS-qGsOiE-uqqSZC9mrw/edit?usp=sharing

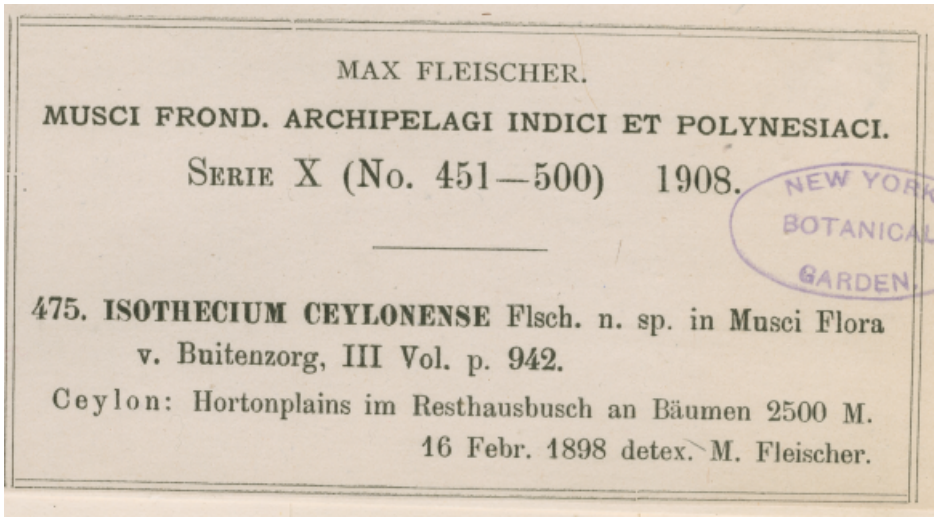
Recognizing type specimens

Dates are super important, especially in specimens without collection numbers. Duplicates must be from a single gathering, and dates must match the protologue. Also, if a specimen was collected after the date the name was published it can easily be ruled out as a type.

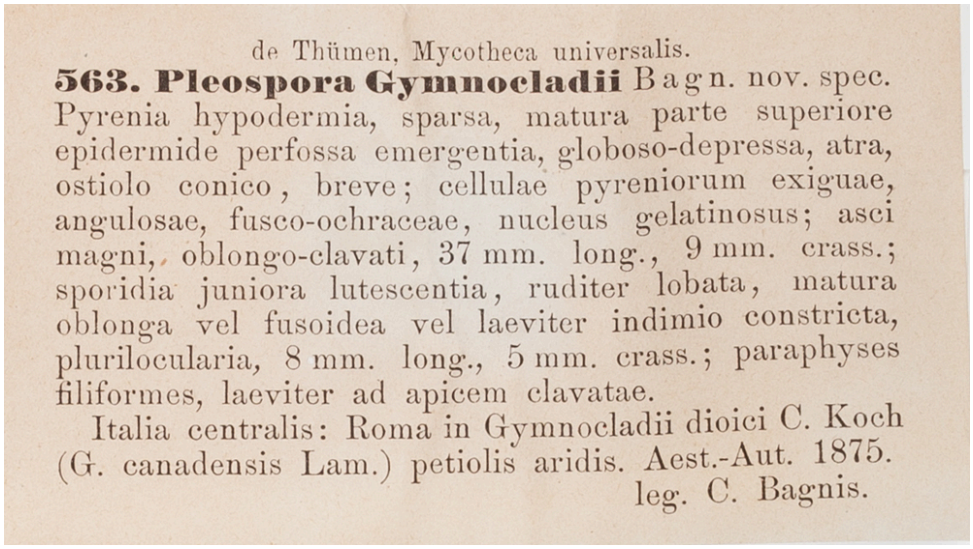
Type annotation labels were not historically used, so type specimens are often indicated on labels in a variety of ways.

n. sp. / n. var.

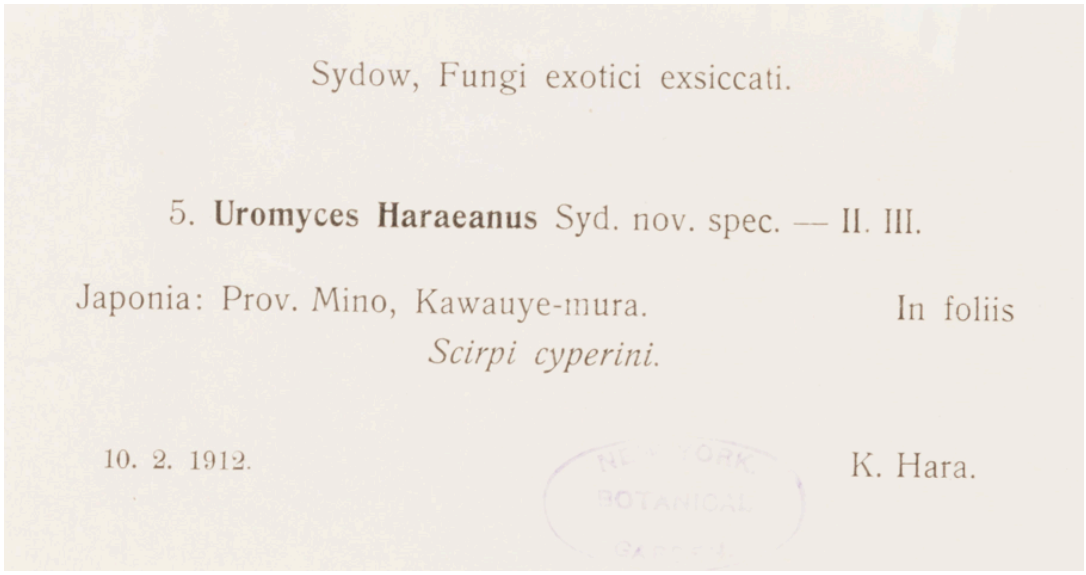




Nov. spec. with latin diagnosis



Nov. spec.



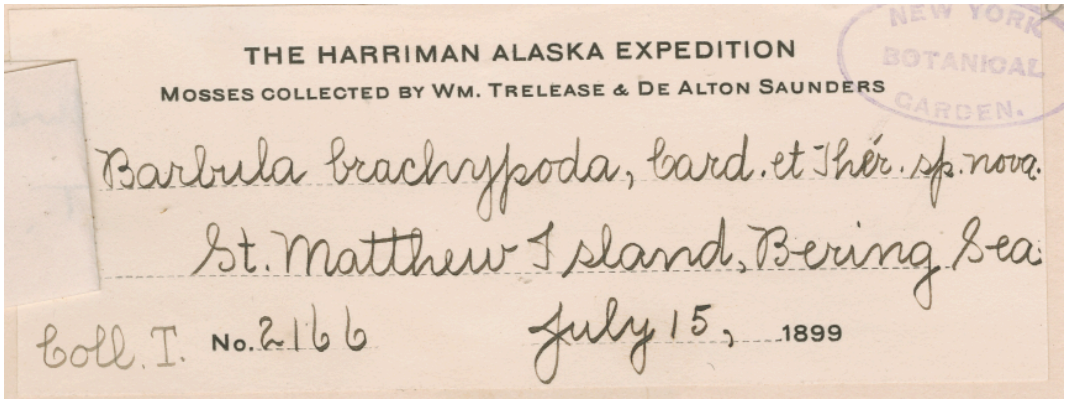
Sydow, Fungi exotici exsiccati.

5. **Uromyces Haraeanus** Syd. nov. spec. — II. III.

Japonia: Prov. Mino, Kawauye-mura. In foliis
Scirpi cyperini.

10. 2. 1912. K. Hara.

sp. nov. / var. nov.



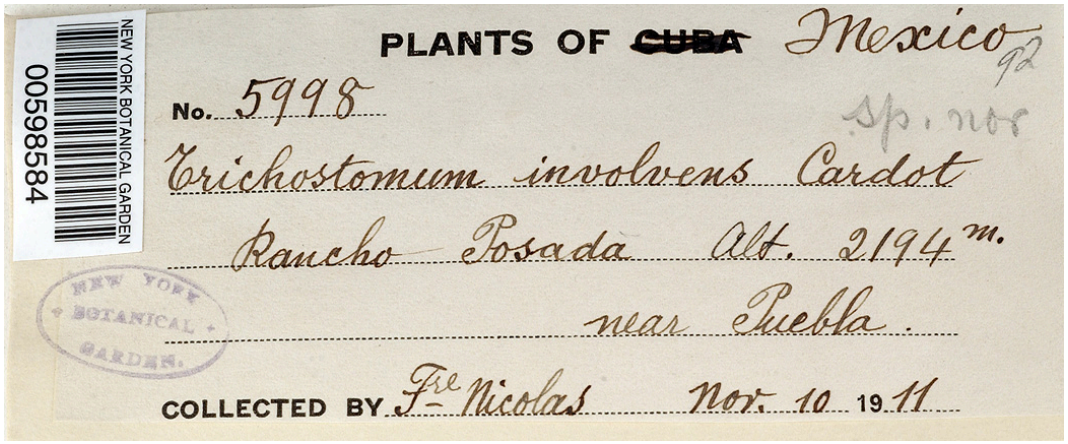
THE HARRIMAN ALASKA EXPEDITION

MOSSES COLLECTED BY WM. TRELEASE & DE ALTON SAUNDERS

Barbula brachypoda, Card. et Ther. sp. nova.

St. Matthew Island, Bering Sea.

Coll. I. No. 2166 July 15, 1899



PLANTS OF ~~CUBA~~ Mexico

No. 5998

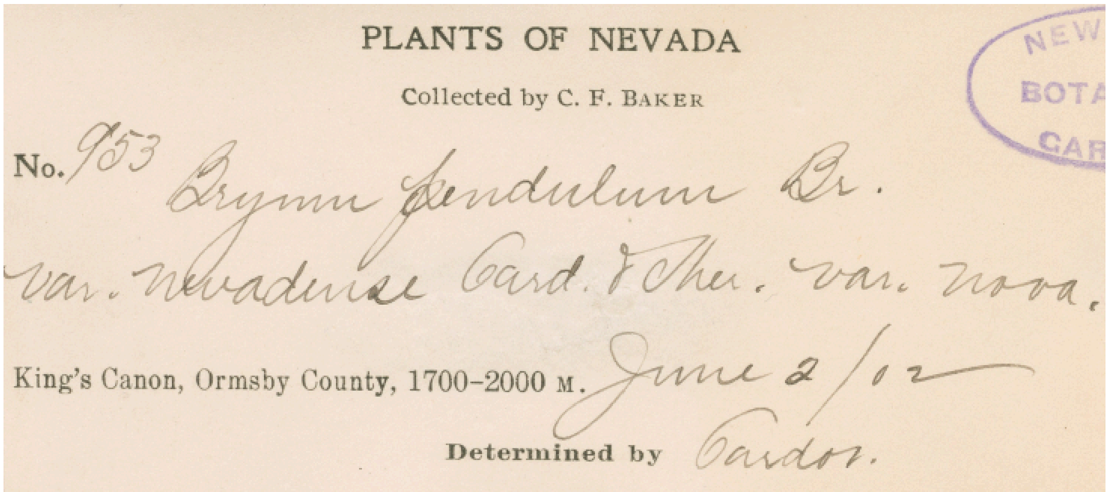
sp. nov.

Trichostomum involvens Cardot

Rancho Posada Alt. 2194 m.

near Puebla.

COLLECTED BY Fr. Nicolas Nov. 10 1911


PLANTS OF NEVADA

Collected by C. F. BAKER

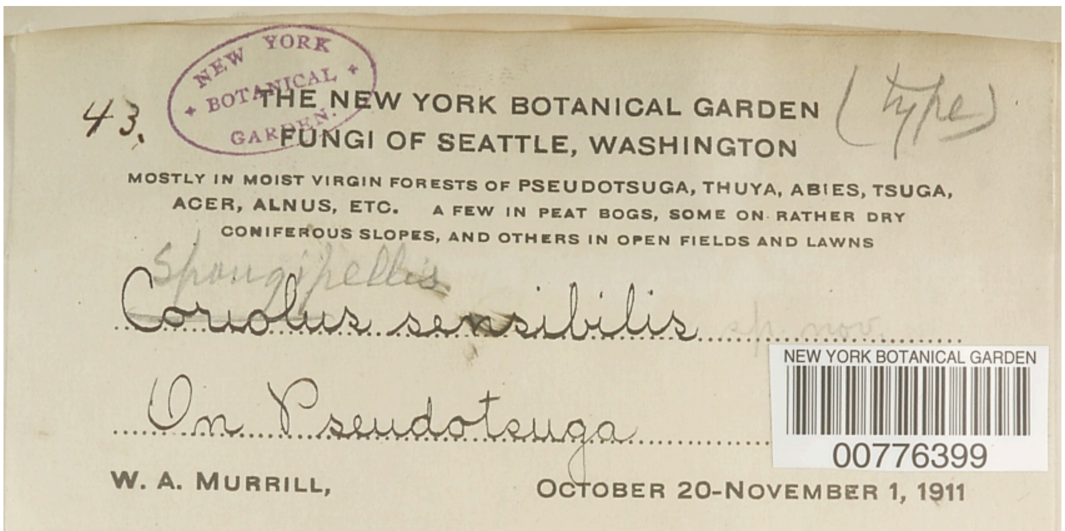
No. 953 Bryum pendulum Br.

var. nevadense Card. & Ther. var. nova.

King's Canon, Ormsby County, 1700–2000 M. June 2/02

Determined by Cardot.

type / typus


43. THE NEW YORK BOTANICAL GARDEN (type)

FUNGI OF SEATTLE, WASHINGTON

MOSTLY IN MOIST VIRGIN FORESTS OF PSEUDOTSUGA, THUYA, ABIES, TSUGA, ACER, ALNUS, ETC. A FEW IN PEAT BOGS, SOME ON RATHER DRY CONIFEROUS SLOPES, AND OTHERS IN OPEN FIELDS AND LAWNS

Spongipellis

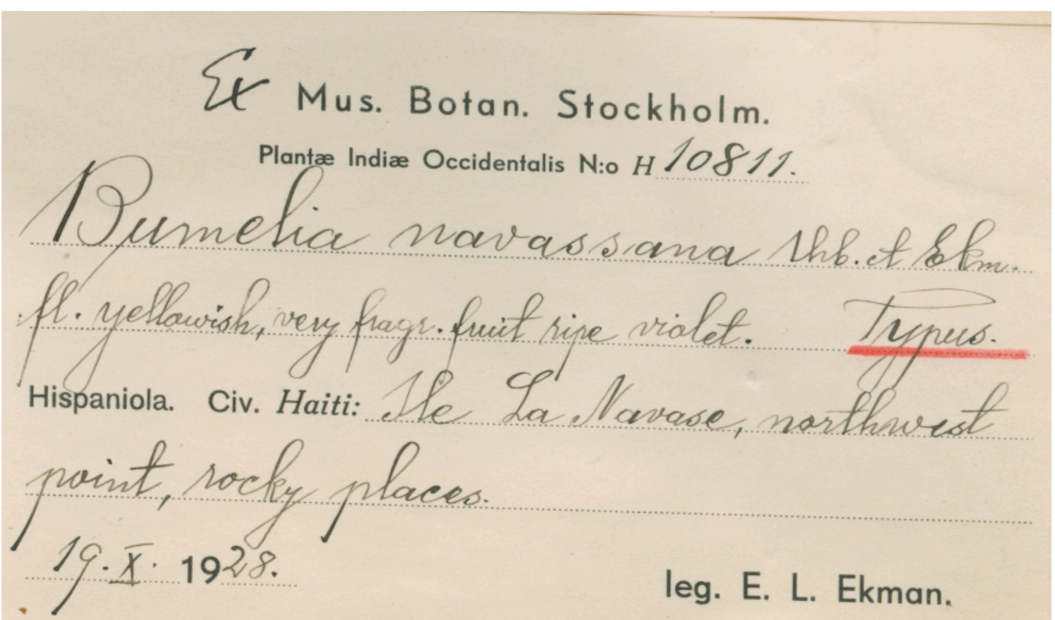
Coriolus sensibilis sp. nov.

On Pseudotsuga

NEW YORK BOTANICAL GARDEN

00776399

W. A. MURRILL, OCTOBER 20-NOVEMBER 1, 1911


Ex Mus. Botan. Stockholm.

Plantæ Indiæ Occidentalis N:o H 10811.

Bumelia navassana Urb. et Ekm.

fl. yellowish, very fragr. fruit ripe violet. Typus.

Hispaniola. Civ. Haiti: Ile La Navase, northwest point, rocky places.

19·X·1928.

leg. E. L. Ekman.

5-19-36-5000 (7A-7992) #25710

New York State College of Agriculture at Cornell University

DEPARTMENT OF PLANT PATHOLOGY

Typhula umbrina sp. nov.
On leaves of rhizomatous iris
Central Exp. Sta. Farm
Ottawa, Canada

Type

Collected by F. L. Drayton

Determined by R. Remsberg Date 4-16-36

Neltuma neomexicana B. & R.

From
THE UNITED STATES NATIONAL HERBARIUM. Type
INTERNATIONAL BOUNDARY COMMISSION, UNITED STATES AND MEXICO.

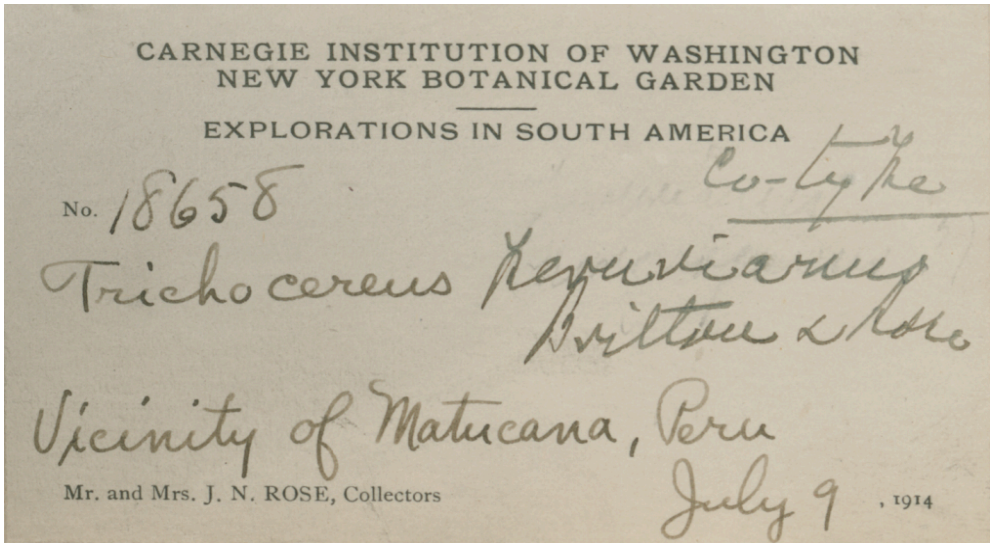
No. 2325

=Prosopis ~~glandulosa Torr.~~

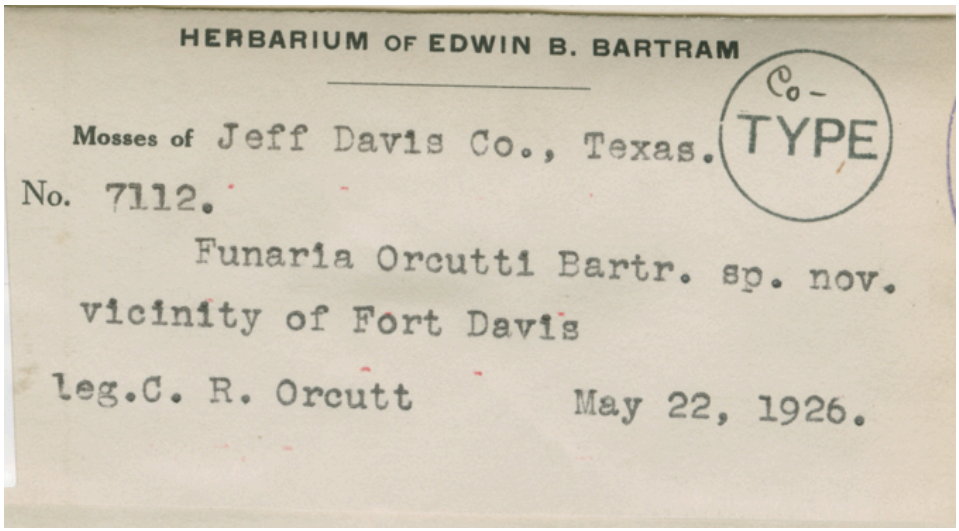
Dog Springs, Dog Mts. New Mexico

EDGAR A. MEARNS, Collector. Sept. 16, 1893.

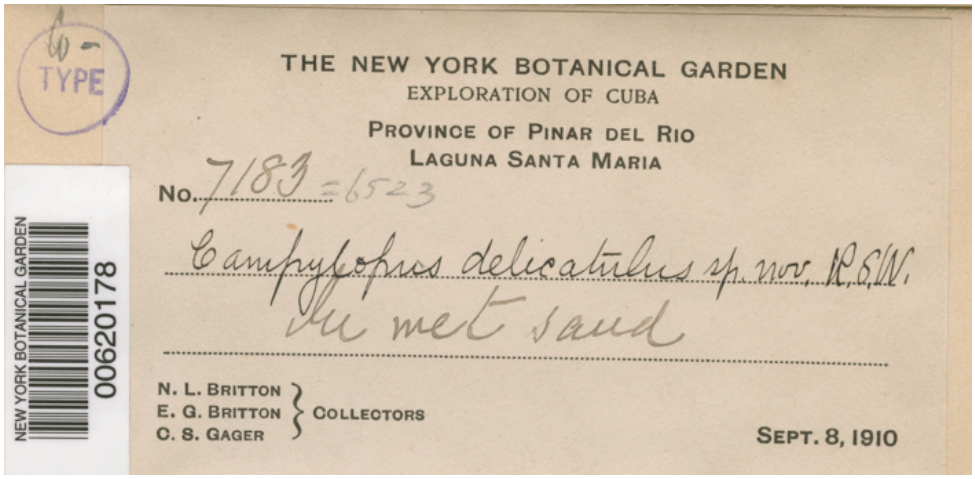
cotype



(in this case, an isotype, since label matches protologue, Rose & Rose no. 18658, July 9, 1914)

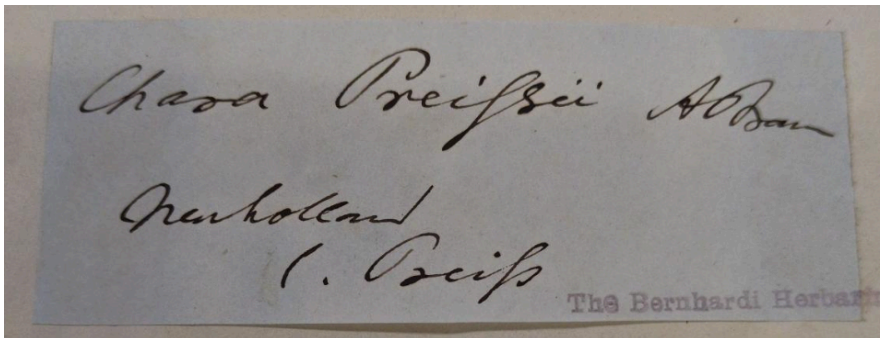


(another isotype, label matches protologue, C.R. Orcutt no. 7112, May 22, 1926)



(in this case, not any kind of type. Type is E.G. Britton no. 6523, so we see that this was compared with the type, and is marked sp. nov., but was not listed in the publication even as an additional specimen seen or paratype by R.S. Williams)

If you have an author's herbarium, and are familiar with their handwriting or practices, you may be able to spot potential types by clues such as an eponymous epithet collected by the person the taxon is named after. For example, this *Chara preissii* A.Braun, collected by Preiss, in Braun's handwriting, ended up being a type, after matching information found inside the packet to the protologue.



Occasionally authors used *mihi* instead of writing their own name as the authority, in this case Carl Müller for *Aongstroemia euphoroclada* Müll.Hal. It's important to check the bibliographic references for these, to make sure the names were in fact published.

Author name abbreviations

The author names given in publications and on annotation labels aren't always formatted to ensure attribution to the correct person. My source for author abbreviations is IPNI, which incorporated all the information from *Authors of Plant Names* (Brummitt & Powell, 1992).

Example 1:
I received a type for *Chalybea boliviensis* whose author string in the protologue/annotation label is given as:

Taxonomonic Treatment

Chalybea boliviensis *Michelang., Fuentes, & Penneys,* ***sp. nov.*** *TYPE: Bolivia: La Paz, Franz Tamayo, Parque Nacional Madidi, Keara, Tocoaque III-Chuncani chaqui*, 14°37'39"*S*, 68°57'30"*W*, 2,550 *m*, 14 *Nov* 2007 (*bud*), *A. Araujo-Murakami, F. Canqui, N. Chapi, Rene Canaza & Rene Pari 3755* (*holotype*: *LPB* [!]; *isotypes*: *K, accession H*2017/00685 [!], *MA* [*n.v.*], *MO, accession* 6478541 [!], *NY, barcode* 4239391[!], *USZ* [*n.v.*] *Figs*. 1, 2 *and* 3.

One of the authors on the paper for *Chalybea boliviensis* is Alfredo F. Fuentes, but "Fuentes" pulls up a different person in our database. According to IPNI, "Fuentes" is Maturana Francisco Fuentes (1876-1934). Alfredo F. Fuentes in IPNI is listed as "A.Fuentes".

Example 2:
I received a paratype of a newly described fungus *Hydnum persicinum* Lacey, M.E. Sm., Swenie & T.M. Baroni.

But per IPNI, Lacey is already taken by a paleobotanist Lacey, William Springthorpe (1917-). And Lance Lacey, the mycologist, is already in IPNI as L.Lacey.

Hydnum persicinum Lacey, M.E. Sm., Swenie & T.J. Baroni, sp. nov., Fig. 3A, B.

MycoBank No: 855747.

GenBank: PP414172 (ITS); PP419908 (*TEF-1*).

Etymology: Latin for peach, in this case peach colored basidiomata.

Diagnosis: Distinctive in ***Hydnum*** subgenus ***Rufescentia*** by the small-to-medium-sized basidiomata with peach or creamy-peach colors, globose or subglobose basidiospores, 8 × 7 µm, and occurring under ***Quercus*** and ***Coccoloba***. ***H. persicinum*** is similar in many features to the temperate ***H. mulsicolor*** but differing by the non-eccentric stipe, lack of a dense mat of mycelium at the stipe base, and differing by ITS and *TEF-1* sequences.

Type: **Belize**, Cayo District, Mountain Pine Ridge, Douglas Da Silva Forestry Station area, near British Military camp, in swampy wooded area, on soil under ***Quercus*** and ***Coccoloba***, 460 m asl, 16.968592–88.994338, 13 January 2002, Lance Lacey 44LL (Isotype: CORT014893; Holotype :BZ-841 BRH).

Lacey, Lance (fl. 2020)

Standard Form
L.Lacey

IPNI Life Sciences Identifier (LSID)
urn:lsid:ipni.org:authors:20085344-1

Area of Interest
Mycology

Two sheets

Example 1: The protologue for *Elaphrium trinitense* Rose lists the type as being Britton, Britton & Brown 2739 but does not indicate which herbarium the type is deposited at. NY has two sheets of Britton et al. 2739 (NY 01210603, 01210604). They are duplicates that both have labels written in N.L. Britton's handwriting, but neither sheet indicates a type status. So, our two sheets should be considered syntypes and a lectotype could be designated. I was able to find that a lectotype was designated in 2016.

"Elaphrium trinitensis Rose, Bull. Torrey Bot. Club 48: 333. 1922. Type: Trinidad and Tobago: western end of Monos Island, 4 Apr 1921 (fl, fr), Britton, Britton & Brown 2739 (lectotype, here designated: NY 01210604; isolectotypes: K, NY 01210603, US)."

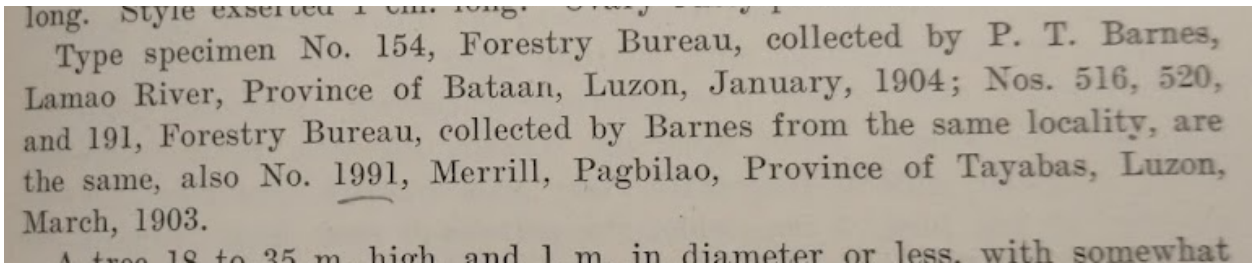
Example 2: Smith and Schubert (1944) cited a sheet of H.H. Rusby 683 in the New York Botanical Garden herbarium as the type in their protologue of *Begonia subcaudata* Rusby ex L.B.Sm. & B.G.Schub. NY has two sheets of this collection, so these would normally be treated as syntypes. However, one sheet was stamped in the upper right corner that it was incorporated into NY in 1948, after the publication date, and therefore would not have been seen by the authors. The holotype can then be determined to be the sheet that was deposited at NY at the time and annotated by Smith and Schubert.

Begonia subcaudata Rusby ex L.B.Sm. & B.G.Schub., Revista Univ. (Cuzco) 33(87): 81 (1944). Type: Bolivia, Yungas, 6000 ft, 1885, *H.H. Rusby 683* (holotype NY [NY00118650], isotype NY [03091042]).

Older publications

These are often formatted quite differently from modern standards and the Code had different rules at different times to govern publications (and did not even accept the type method until the twentieth century!).

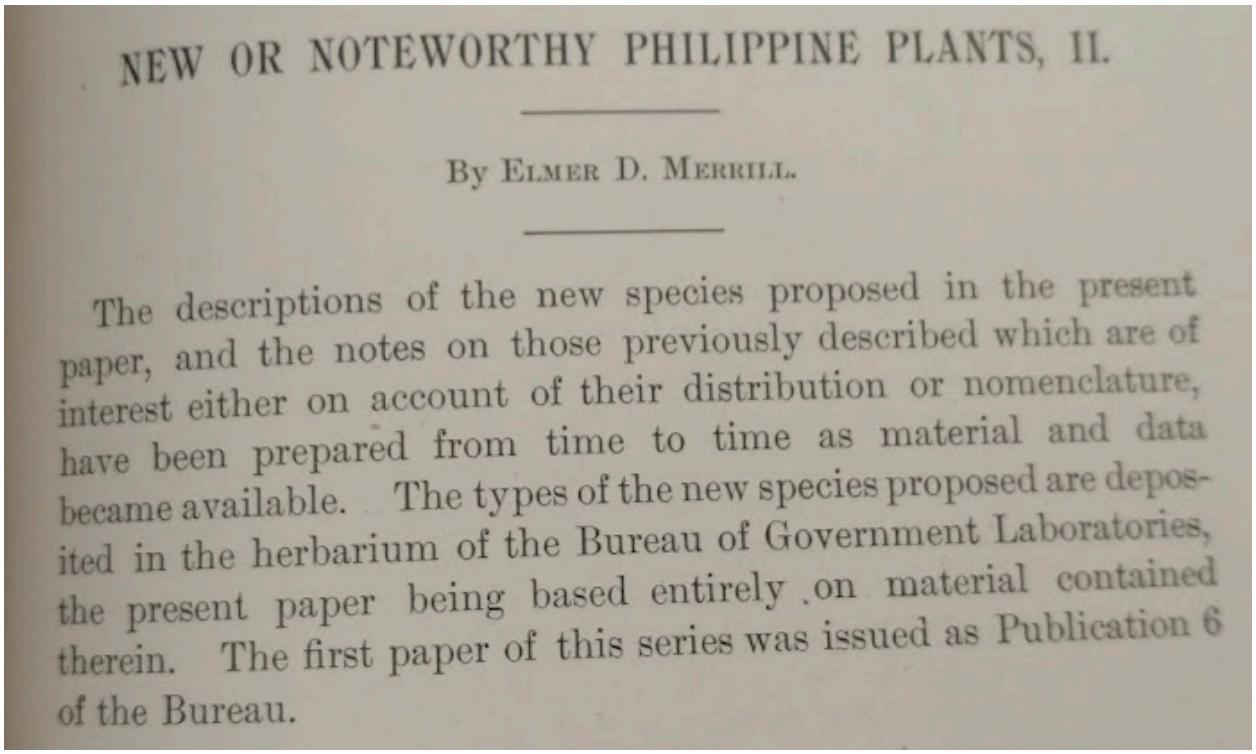
Example 1:
I received several sheets of *Palaquium tenuipetiolatum* Merr. annotated as syntypes. The protologue reads:


long. Style exserted 1 cm. long; [illegible]

Type specimen No. 154, Forestry Bureau, collected by P. T. Barnes, Lamao River, Province of Bataan, Luzon, January, 1904; Nos. 516, 520, and 191, Forestry Bureau, collected by Barnes from the same locality, are the same, also No. 1991, Merrill, Pagbilao, Province of Tayabas, Luzon, March, 1903.

A tree 18 to 35 m. high and 1 m. in diameter or less, with somewhat

Merrill states the type is Forestry Bureau No. 154, and the other specimens can be interpreted as paratypes. In the text here he does not cite a herbarium, however if you check the paper's introduction he states that types for all new species are deposited in the herbarium of the Bureau of Government Laboratories (PNH).



NEW OR NOTEWORTHY PHILIPPINE PLANTS, II.

By Elmer D. Merrill.

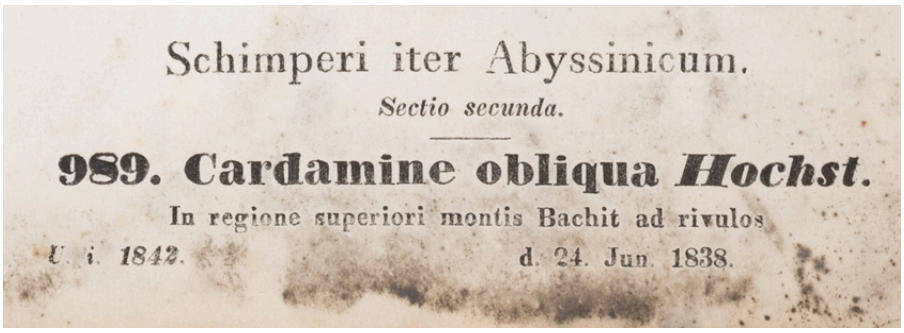
The descriptions of the new species proposed in the present paper, and the notes on those previously described which are of interest either on account of their distribution or nomenclature, have been prepared from time to time as material and data became available. The types of the new species proposed are deposited in the herbarium of the Bureau of Government Laboratories, the present paper being based entirely on material contained therein. The first paper of this series was issued as Publication 6 of the Bureau.

So NY's sheet of Forestry Bureau No. 154 would be an isotype for this name, but unfortunately PNH was destroyed during World War II, so the holotype is no longer there. However, a lectotype was designated in 1960 by P. van Royen.

Palaquium tenuipetiolatum Merr., Publ. Bur. Sci. Gov. Lab. 17: 45. 1904. Type: Philippines, Lamao River, Province of Bataan, Luzon, January 1904, P. T. Barnes Forestry Bureau No. 154, holotype: PNH†. Lectotype designated by P. van Royen, Blumea 10(2): 530 (1960): "Barnes 154 in NY" (lectotype: NY [NY 05070732]; isolectotype: SING).

Example 2:

While digitizing collections made in Africa for the recent TCN project, interns found many collections that were distributed in the mid nineteenth century as sets out of Europe under various titles, including many un-labeled types. This collection of *Cardamine obliqua* Hoch. ex A.Rich. was collected in Ethiopia ("Abyssinia") by W.G. Schimper, 24 Jun 1838, and distributed as no. 989 in the second set of *Schimperi iter Abyssinicum* in 1842.



Schimperi iter Abyssinicum.

Sectio secunda.

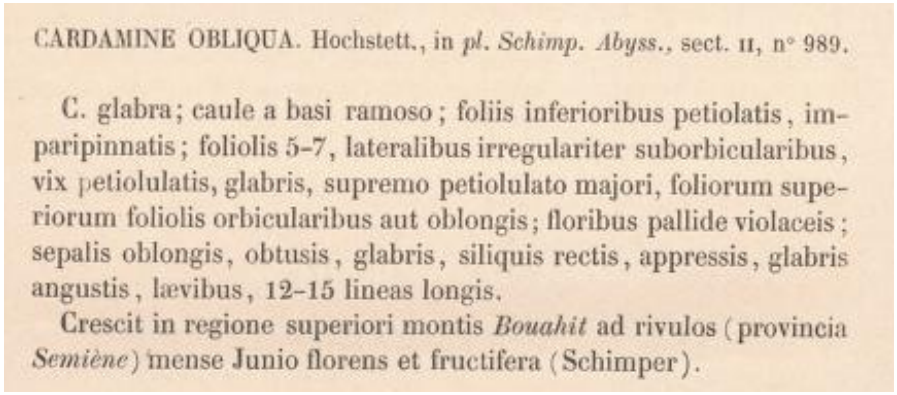
989. Cardamine obliqua *Hochst.*

In regione superiori montis Bachit ad rivulos

U. i. 1842. d. 24. Jun. 1838.

At that point it was distributed as a *nomen nudum* - a naked name without a proper description having been published. In 1847 this was rectified by the publication of *Tentamen florae*

Abyssinicae by Achille Richard, which cites the material distributed as no. 989, with the additional information “in regione superiori montis Bouahit [on label as Bachit] ad rivulos (provincia Semiene) mense Junio florens et fructifera (Schimper).”



CARDAMINE OBLIQUA. Hochstett., in *pl. Schimp. Abyss.*, sect. II, n° 989.

C. glabra; caule a basi ramoso; foliis inferioribus petiolatis, imparipinnatis; foliolis 5-7, lateralibus irregulariter suborbicularibus, vix petiolulatis, glabris, supremo petiolulato majori, foliorum superiorum foliolis orbicularibus aut oblongis; floribus pallide violaceis; sepalis oblongis, obtusis, glabris, siliquis rectis, appressis, glabris angustis, lævibus, 12-15 lineas longis.

Crescit in regione superiori montis *Bouahit* ad rivulos (provincia *Semiène*) mense Junio florens et fructifera (Schimper).

It is unclear how many duplicates exist of this set, but there are digitized specimens of no. 989 identified as types of *Cardamine obliqua* in JSTOR Global Plants from 13 herbaria (B, BR, HAL, K, KW, M, MICH, P, S, STU, TUB, UBT, and US) in addition to this newly identified type at NY (and quite possibly other institutions where it may still be general collection).

Hochstetter’s personal herbarium is at TUB, but they have not identified a collection there as a holotype or lectotype. Most of the duplicates are identified in Global Plants as “isotypes” although technically isotypes must be a duplicate of a holotype. Philosophically, there are enough of these collections to call into question whether they were truly all a single gathering. Some taxonomists would consider all the material distributed as no. 989 as original material, or alternately as syntypes, from which a lectotype could be selected.