An Introduction to the Botanical Type Specimen Register

Stanwyn G. Shetler

with Mary Jane Petrini, Constance Graham Carley, M. J. Harvey, Larry E. Morse, Thomas E. Kopfler, and Collaborators
ABSTRACT

Shetler, Stanwyn G., with Mary Jane Petrini, Constance Graham Carley, M. J. Harvey, Larry E. Morse, Thomas E. Kopfler, and Collaborators. An Introduction to the Botanical Type Specimen Register. Smithsonian Contributions to Botany, number 12, 186 pages, 3 figures, frontispiece, 1973.—In the first part, the development of a computer-based system for storing and retrieving information about botanical type specimens is described from its pilot stage to its present operational stage. The concept, purpose, and scope are explained, and the operational procedures are outlined. Ways of using and contributing to this computerized register of types, both in the short-run and in the long-run, are proposed. A statistical summary of the content of the Type Register as of 30 September 1972 is given. Over 13,000 specimens representing more than 10,000 taxa have been registered. The second part consists of a Catalog of more than 1,000 specimens representing over 600 taxa of the genus Carex (Cyperaceae), which are deposited in ten major American herbaria, and the Catalog is cross-indexed five different ways: by author, publication date, collector, country, and herbarium. An introduction summarizes the preparation and editing of the Catalog. This Carex Catalog represents the first published installment of the Type Register and as such is intended to serve as an example.

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Foreword

It always has been the policy of the United States National Herbarium to make its collections as easily available as possible. We have welcomed visitors and loaned specimens on request since the founding of our herbarium. Now, in an effort to make our collections even more accessible, we have undertaken a new project to compile a computerized catalog of our type collection of approximately 65,000 specimens. Eventually, we hope to broaden this catalog, which we are calling the “Botanical Type Specimen Register,” to include the type collections of many other institutions so that it will serve as a union listing of types. Already we have enlisted the cooperation of other institutions, and the computer file presently includes records from more than a score of herbaria.

The United States National Herbarium, a worldwide collection of plants now totaling some 3 million specimens, is administered by the Smithsonian Institution’s Department of Botany, a unit of the National Museum of Natural History. The Department of Botany has played a pioneering role in the development of the Museum’s active program in data processing. The Type Register is the Museum’s first operational effort in cooperative, multi-institutional (network) data banking and, as such, is of special interest. If this approach to common data banking proves successful, it will point the way for many cooperative efforts in other branches of natural history.

Although the Type Register is still very much in its infancy, we are zealous to demonstrate its potential to the botanical community with a tangible product so that we can receive advice and counsel from the community on the basis of concrete results while the data bank is still small and susceptible to modification. This publication should prove useful in itself as a catalog of type specimens of Carex, particularly to specialists on the family Cyperaceae. The larger purpose, however, in issuing a preliminary catalog of limited scope at this time is to demonstrate the concept of the Type Register in concrete terms and thereby to solicit the collaboration of all plant systematists in molding the Register into an effective, scholarly tool for future generations of the profession.

The computer file presently registers over 13,500 type specimens, representing some 10,500 vascular plant taxa. Thus the Carex Catalog, with its 1,000 specimens and 600 taxa, is a printout of less than 10 percent of the current, rapidly growing file. Less formal and less expensive means of putting out the information will be tried with future installments, and it may become desirable or necessary at some point to begin publishing in microform. Perhaps the most common and economical mode of disseminating the accumulated information will be to provide computer printouts to individual users in response to queries for up-to-the-minute reports on specific taxonomic groups. Once the data bank is well established query service can be provided to any user for a modest fee.

We welcome your reaction to the concept of the Botanical Type Specimen Register on the basis of this sample. Only with the backing of the botanical community can we continue to get the necessary financial support to carry on the work.

Edward S. Ayensu, Chairman
Department of Botany
30 September 1972
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**A Catalog of the Genus Carex (Cyperaceae)**

Stanwyn G. Shetler (*Editor*); Mary Jane Petrini, Constance Graham Carley, M. J. Harvey, Larry E. Morse (*Assistant Editors*); Thomas E. Kopfler (*Programmer*); and Collaborators

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Head-like pistillate spike of *Carex grayi* Carey in fruiting condition, with staminate spike in background (photo by William C. Burger).
An Introduction to the Botanical Type Specimen Register

Stanwyn G. Shetler, with Mary Jane Petrini, Constance Graham Carley, M. J. Harvey, Larry E. Morse, Thomas E. Kopfler, and Collaborators

The Botanical Type Specimen Register

Stanwyn G. Shetler

Introduction

The Botanical Type Specimen Register is a computer-based system for recording information about type specimens of plant species and infraspecific taxa, which is designed to become a union registry of type holdings in the world’s herbaria. It introduces a new dimension to the management of herbarium collections. Through the use of advanced information processing methods, critical data are compiled from the herbarium and library and merged into a common, machine-searchable file from which catalogs can be printed or special queries, defined by complex selection criteria, can be answered rapidly on demand. As a result, future taxonomic investigators will be able to learn the whereabouts of type specimens of particular concern to them and obtain answers to certain basic questions without painstaking research or time-consuming travel or correspondence.

Stanwyn G. Shetler, Department of Botany, Smithsonian Institution, Washington, D.C. 20560; same address: Mary Jane Petrini; Constance Graham Carley (née Graham); present address: 275 Collier Rd., Atlanta, Georgia 30309); M. J. Harvey (present address: Department of Biology, Dalhousie University, Halifax, Nova Scotia); Larry E. Morse (present address: Biological Laboratories, Harvard University, Cambridge, Massachusetts 02138); Thomas E. Kopfler.

1This is No. 70 in the Flora North America Report series.

The Type Register was conceived by Mason E. Hale, who organized a pilot project in 1968 while he was chairman of the Smithsonian’s Department of Botany. This was one of several projects that Hale initiated as chairman to introduce electronic data processing (EDP) to collection management in the United States National Herbarium. (For a description of his automated system for recording specimen exchanges, see Hale and Creighton, 1970; the pilot Type Register project is described in Shetler et al., 1971.) At the outset, the author and Flora North America (FNA) personnel assisted in the development of the pilot system, and the project, though separate, has continued until the present to be associated closely with the FNA program (Shetler and Meadow, 1971). After launching the pilot effort, Hale, while continuing his involvement on an advisory level, passed the supervisory responsibility to the author, who continues to direct the work.

The project was initiated with special funds. In fiscal year 1969 and 1970, limited allocations of regular funds of the National Museum of Natural History were made through the Department of Botany, but regular budgeting did not begin until FY-71 (1 July 1970–30 June 1971) when the Museum organized a new, Museum-wide program in data processing and incorporated the Type Regis-
ter as one of the charter projects. These projects are controlled by the respective departments, but the overall program is coordinated and managed by James F. Mello, Assistant Director.

The response to the several requests for participation during the pilot phase was excellent, showing general interest among botanists and convincing Hale and others at the Smithsonian of the potential value of a type-specimen register and of the botanical community's willingness to collaborate to the fullest extent possible in creating a register along the lines conceived. From the preliminary experiments much was learned about the logistical problems and the costs and manpower requirements of network data banking. The Smithsonian necessarily is concentrating present operations on its own type collections of about 65,000 specimens. The system is designed, however, to accept data from any institution at any time, and as long as the inflow remains on a small scale, data from other institutions can be added to the central file by the present staff more or less as they are received. It is hoped that as interest in collaboration grows support commensurate to the interest will be forthcoming both for the central operation and for participating institutions.

The second part of this paper represents the first published installment of the Type Register. It is a provisional union catalog of the type specimens of the genus Carex on deposit in ten major American herbaria (see "Contributing Institutions") and a concrete example of cooperative data banking.

In FY-72, the year that ended on 30 June 1972, the Type Register project finally was put on a solid footing. Midway through this year it was possible for the first time in the four-year history of the project to staff adequately by employing three full-time persons (two assistant editors and a data conversion operator) and also to have adequate funds to process regularly. Prior to January 1970, the pilot project was carried on intermittently as funds were available by one to three part-time employees, and from January 1970 to December 1971 the project advanced on a more or less continuous, operational basis with the assistance of one, two, and occasionally three full-time persons, the number depending again on available money. During the pilot effort, the computer analysis, programming, and file processing were done on a part-time basis, as needed, by personnel of the Smithsonian Information Systems Division, and since the project has become operational this work has been performed on a similar basis by FNA personnel so as to keep the Type Register system compatible with the FNA system.

From the beginning Hale planned for the inclusion of data from an indefinite and constantly growing number of other institutions and actively sought such collaboration. In one test of the feasibility of multi-institutional input, he distributed a computer-printed set of 52 cards, representing a card catalog of the National Herbarium's complete type holdings in the genus Mimulus (Scrophulariaceae), to each of 50 large herbaria in the United States and abroad and solicited their cooperation in providing similar data from their own type collections, if any, of Mimulus. A second major test involved sending a computer-printed card catalog of the National Herbarium's complete type holdings in the family Lamiaeae (Labiateae) to the University of California, Los Angeles, where Carl Epling's extensive type collections in this family are deposited, and later to the Missouri Botanical Garden and the New York Botanical Garden. All three institutions cooperated in providing data from their own collections of types in this family. The latter two institutions continued thereafter to collaborate as much as possible on other taxonomic groups, and, apart from the Smithsonian itself, they have been the institutions with the greatest involvement in the Type Register project.

Certainly, no claim to completeness can be made for a catalog that concerns a single genus and only one percent (10/1000) of the world's public institutional herbaria (Shetler, 1969). "Usefulness" is the pragmatic criterion for compilation and publication of the Type Register, however, and usefulness is dependent on critical mass, not absolute coverage. Clearly it is unrealistic to think that the Type Register could ever achieve absolute completeness, registering all type specimens for all published taxa in all of the world's herbaria, and the Register has not been conceived on this false premise. The Register is being created on the assumption that some information is better than no information and that a catalog of ten type collections is more useful than a catalog of one type collection. Although it must be admitted that the coverage is very uneven among the ten herbaria contributing to the Carex Catalog, for example,
nevertheless this Catalog tells us more than we have ever known before about the Carex type collections of the participating institutions and provides a solid framework to which new information can be added as it becomes available from these or any other institutions.

The concept of a type register is not new. Already in the mid-1930s, A. S. Hitchcock of the Smithsonian Institution, in his capacity as chairman of the Committee on Nomenclature of the Botanical Society of America, coordinated the compilation of information on the location of type specimens. Lists of authors of new names, indicating the major group(s) of plants they described (e.g., phanerogams) and the herbaria where they deposited their types, were compiled (Hitchcock et al., 1934, 1935). Other members of the Committee in 1934 were L. R. Abrams, J. C. Arthur, A. W. Evans, J. M. Greenman, M. A. Howe, E. D. Merrill, F. W. Pennell, and C. L. Shear. “The Committee is not attempting to decide what specimens are types nor to determine the identity of types,” Hitchcock wrote in 1934; “it is attempting only to aid botanists in their search for types.” His words can only be reiterated in the present context. Other recent efforts to catalog types have been made in connection with specimen-data retrieval projects in the herbarium or museum (e.g., Beschel and Soper, 1970; Collier, 1971; Crovello, 1972).

Information processing technology has advanced far since the days of the first applications in biology, when the limitations of the computer led to some unfortunate consequences, as thoughtfully analyzed, for example, in reviews by Wood et al. (1963) and Rollins (1966) of some early applications in plant taxonomy. We make no pretense of having avoided all the pitfalls cataloged by these reviewers, but we have tried to make good use of their advice. If we have learned anything so far, we have learned that no one can design the perfect system on the first trial. Every operational system is at the same time a pilot system for an even more advanced and refined, next-generation system.

Acknowledgments.—Without the inspiration and genius of Mason E. Hale the Type Register would not exist. While chairman of the Smithsonian’s Department of Botany (1967–69), he had not only the foresight to inaugurate this computer application but also the fortitude to persist with administrative support for it when others did not always share his vision nor his optimism for its potential value. The continuing support of Richard S. Cowan, former Director, National Museum of Natural History, and of Hale’s successor as chairman, Edward S. Ayensu, have been crucial in putting the project on a stable footing. The Assistant Director, James F. Mello, and his assistant, David Bridge, deserve much credit for laying the budgetary groundwork that has brought the project to its present viable and relatively healthy state, and for facilitating its administration. From his vantage point as overseer of all EDP projects in the National Museum of Natural History, including the Type Register, Mello has provided stimulating and wise counsel, as well as constant encouragement and help.

Many curators have contributed in some way to the development of the Type Register thus far, especially in the course of the multi-institutional data-collecting experiment with Mimulus, conducted by Hale, and their cooperation is hereby gratefully acknowledged. Those curators and their assistants who participated directly in the compilation of data for the Carex Catalog are listed earlier as “Collaborators.” Among them, Hale, Irwin, Lewis, and Nicolson have taken a dedicated personal interest in the success of the Type Register from the beginning and have in effect constituted a standing advisory editorial board. In their respective institutions, they have played a role in all of the data compilation that has been done for the Register thus far, regardless of the taxonomic group. As a Smithsonian colleague, Nicolson has been a steadfast supporter of the project, showing deep interest in the work itself and sharing his time and seemingly inexhaustible nomenclatural knowledge willingly and unselfishly whenever there has been need, which often has been daily. John H. Thomas raised enthusiasm for the Type Register to a new level when, as a result of his collaboration on the Carex Catalog, he began to ask specialists borrowing from the collections he curates to compile data for the Register from type specimens loaned to them and to affix an annotation label of his own design to each, which reads, “The written information on this specimen has been abstracted for the TYPE REGISTER PROJECT by ______ on ________.”
With respect to the editorship of the Carex Catalog, Carley, who served the FNA program and the Type Register project from December 1969 to April 1971, and Petrini, who is the senior technical editor of the Type Register project, assisted Shetler with the day-to-day technical editing. Harvey and Morse assisted him with the botanical editing during the year that each spent working at the Smithsonian on the FNA program—1969–70 and 1971–72, respectively. Harvey provided botanical supervision of the data-capture operation during the initial input of Carex records from the Missouri Botanical Garden, New York Botanical Garden, and the U.S. National Herbarium. He directed the two-week, on-site input effort at the New York Botanical Garden in June 1970, which involved other genera besides Carex. Cynthia N. Ostroff of the Index Nominum Genericorum project assisted part-time at the Smithsonian in the technical editing of the Carex data from Harvard University. Marilyn Andraeson helped with the data compilation at the Missouri Botanical Garden, while similar assistance was rendered by Zella Ellshoff, Robert Helliwig, and Gail Johnson at the New York Botanical Garden.

At least part of the Carex Catalog was examined in near final form by Frederick J. Hermann of the U.S. Forest Service Herbarium at Fort Collins, Colorado, and Tetsuo Koyama of the New York Botanical Garden, specialists on Carex and the family Cyperaceae, respectively. Although both provided helpful comments, they should not be held responsible in any way for the final Catalog, because neither was able to devote the enormous amount of time that would have been required to check the file authoritatively. This responsibility rests with the editors and collaborators.

Several specialists at the New York Botanical Garden have provided data to the Type Register for groups other than Carex: Caroline Allen (Lauraceae: a few records of selected taxa), Patricia Kern Holmgren (Brassicaceae: Draba, Thlaspi), Tetsuo Koyama (Cyperaceae: a few records of selected taxa), John T. Mickel (Schizaeaceae: Anemia subgenus Coptophyllum and segregate genera), and Ghillean T. Prance (Chrysobalanaceae, Di-chapetalaceae). (See also "Statistical Summary of Type Register Contents"). Holmgren has been the one chiefly responsible for coordination at the working level of the New York Botanical Garden's collaboration in the Type Register project. Mildred E. Mathias, Director, Botanical Gardens-Herbarium, supervised the compilation of data on types of the family Lamiaceae at the University of California, Los Angeles, early in the project. Bruce MacBryde assisted in the compilation of the data for this family and for the genus Mimulus at the Missouri Botanical Garden. Other botanists who deserve mention for playing a part in the project at the Smithsonian are Amy Jean Gilmartin, Monterey Peninsular College, Monterey, California, and Miloslav Kovanda, Czechoslovak Academy of Sciences, Prague, who spent the years 1969–70 and 1970–71, respectively, with the FNA program.

The FNA Editorial Committee (John H. Beaman, Walter H. Lewis, John McNeill, John T. Mickel, Peter H. Raven, Stanwyn G. Shetler, Roy L. Taylor, John H. Thomas) has taken a deep interest in the Type Register project from the outset and provided financial and material support through the FNA program, as well as invaluable advice and encouragement. A report on progress has been given at every meeting of the Committee since the Register was organized, and much time has been devoted to evaluation of the present and future development of the Register.

The pilot processing system was designed by Reginald Creighton, Manager of Information Storage and Indexing, and programmed by Willard Handley, both of the Smithsonian's Information Systems Division. Creighton worked closely with Hale to develop the pilot system, which served the original purposes well, and the Type Register would not exist if it had not been for Creighton's pioneering insight and dedication. When the project became more closely associated with the FNA systems effort, Harriet R. Meadow, Systems Development Manager of FNA, designed the present operational system in its general outlines. Kopfer has been responsible for the detailed design and

**Figure 1.**—Stages in the preparation of records for the Type Register: a, Constance Carley checks nomenclatural data in the Gray Herbarium Card Index; b, Mary Jane Petrini enters corrections into the computer via a remote typewriter terminal connected by telephone (photos a and b by Walter G. Peter III); c, type specimens of the genus Viola (Violaceae) are examined and discussed with respect to the problems of recording them in the Type Register by (left to right) M. J. Harvey, John T. Mickel, and Harriet R. Meadow in the herbarium at the New York Botanical Garden (photo by New York Botanical Garden).
programming and for the maintenance and querying of the machine files. Morse wrote the COBOL program for concatenating the data into the paragraph form used in the Carex Catalog. Meadow's analysis and design resolved some basic unforeseen problems that arose after using the pilot system for a time, and her efforts resulted in the operational system that continues to serve very well. She has played a crucial role in the success of the project and continues to provide advice and guidance on matters of systems development. Several botanists who also have experience with computer applications have provided valuable advice from time to time: Theodore J. Crovello, University of Notre Dame; David J. Rogers, University of Colorado; and James H. Soper, National Museum of Natural Sciences, Ottawa.

Technical help in editing and capturing data has been given by the following persons, listed in the order in which they were hired, some as employees of FNA and others as employees of the Type Register project: John Bolduc, Nancy Howard, Barbara Bryant, Grace Rickard, Edna Montford, Mary Beth Moore, Barbara Halter, Gudrun Christenson, and Rita Abessinio. Julia E. Taylor and Liliosa Mangosing Evangelista have been cheerfully indispensable in discharging the myriad clerical and administrative tasks without which a project of this nature could never succeed.

In addition to receiving regular budgetary support on an increasing scale from the Smithsonian Institution, the Type Register project has been funded in part by the National Science Foundation through grants made to the American Institute of Biological Sciences (GB-8441, GN-812, GB-26173) and to the Smithsonian Institution (GB-31715 and contract C-720) for the FNA program, the Smithsonian Research Foundation (grants Sg0621054, Sg0621054/C1 and Sg0621054/C2), and the Smithsonian Office of Systematics.

**Concept and Purpose of Type Register**

Perhaps 200 million specimens are on deposit in the more than one thousand public herbaria in the world, and scattered among these vast collections may be as many as 4 million type specimens (Shetler, 1969; Shetler et al., 1971). North American herbaria alone probably contain more than a half-million types. Likewise the original publications describing new plant taxa and establishing their types are myriad and scattered through the world's literature. The taxonomist who wishes to make a scholarly study of a group of species, including an investigation of their typification, faces the formidable task of locating the relevant original descriptions and type specimens. Fortunately for him, two standard indices, *Index Kewensis* (Rouleau, 1970; Meikle, 1971) and the *Gray Herbarium* (Card) Index (Shaw, 1971), and various standard library catalogs and union listings are readily available to guide him to the pertinent literature. No similar indices exist, however, to guide the taxonomist to the pertinent type specimens. To find types he first must search the original literature case by case for indications or clues and then, through travel or correspondence, continue his search in herbaria among the specimens themselves. Even with the original descriptions in hand the specialist often faces great difficulties in trying to determine where the types are deposited. The modern literature still shows an astonishing lack of standardization in the way types are designated and their herbarium deposition indicated.

What the taxonomist needs, therefore, is a *finder's guide* to the type holdings of at least the world's major herbaria. This guide should be indexed primarily by taxon but also cross-indexed several ways, and it should include citations of the original publications and basic collection data as provided by the specimen label and/or published description. Such an index ultimately would incorporate and enhance the functions of *Index Kewensis* and the *Gray Herbarium Index*. This type of registry could become effective at once for newly published taxa if taxonomists would agree to require registration of all new taxa and type depositions at the time of publication as a condition for effective publication. Furthermore, the registry, if computerized, would be the logical central repository for specialists' annotations on typification, especially with respect to lectotypification and neotypification. Plant taxonomy desperately needs an effective central place and straightforward procedure for registering lectotypes, neotypes, and specialists' conclusions about other kinds of types.

The Botanical Type Specimen Register, as conceived, therefore, is to serve primarily as a finder's guide for locating type specimens. The secondary function, however, is to serve as a guide to the
original descriptions of the registered taxa and to provide collection data for the registered specimens. The specimen information necessarily is organized by taxonomic name. Thus the file is not purely a specimen register; the data are organized so as to constitute a three-level hierarchy: taxon, collection, specimen. A full entry (record) in the Register is, therefore, a synthesis of data from the herbarium and the library which cannot be completed without examining the original specimen and the original publication, as well as other specimens and publications as necessary. A record can be initiated with data from either the herbarium or the library and supplemented later by data from the other. To a degree this happens naturally as other institutions contribute to the initial record, but in any event years may elapse before all records of a given taxonomic group can be brought to relative completeness.

The development of the Type Register ultimately involves three stages: registration, verification, and validation.

The immediate objective is to initiate the computerized working file without getting bogged down in time-consuming researches to resolve challenges of the validity of the data. Such scholarly research is the province of specialists who may need years to resolve particularly difficult nomenclatural and typification questions, and the preparation of the kind of index envisaged here could never be accomplished if all questions had to be answered first and the compiled data had to be “perfect.” In the first stage, therefore, the primary goal is to record or register the facts more or less at face value as they are given by the available primary and/or secondary sources. Research and editing are kept to a minimum except where obvious discrepancies can be resolved without extensive investigation. The editing is restricted largely to formatting the data according to the technical standards of the processing system, and to standardizing the use of names, titles, and terms in key fields.

The second stage is to verify all data by firsthand examination of the pertinent specimens and original publications. When the data are compiled in the first place from the original sources expressly for the Type Register, verification is accomplished in the process of preparing the data for registration, and the two steps merge into a single operation. When a secondary source such as an existing card file or published index is used, however, there is a need to verify the information subsequently by checking the specimens and original descriptions. Two examples will illustrate. (1) Index Kewensis and the Gray Herbarium Index constitute indispensable secondary sources of references to original publications, but the original publications themselves must be examined in order to verify both the existence of the descriptions and the accuracy of the citations. (2) Present-day revisions and monographs customarily indicate where the key type specimens are deposited, but this information is not considered verified, for purposes of the Register, until the specimens have been seen in the process of compiling the data for the Register, because the data must be verified in the context of the specific requirements of the Register. This is a critical point.

It should be emphasized here that a taxonomic revision or monograph, no matter how carefully and authoritatively executed, constitutes a secondary source of information for all taxa treated except those being described to science for the first time. In fact, as synthetic works, these treatises often present only the barest details on type specimens, especially for previously described but even for newly described taxa, and the author’s own nomenclatural interpretations frequently are not clearly distinguished from the original data. It is not unusual, for example, to discover in the process of verifying a record in the Type Register that the author of a revision or monograph, in identifying what he believed to be the holotype, unwittingly designated a lectotype or even a neotype by strict application of the international rules of botanical nomenclature. Therefore, except as a reference to the original sources, for which it is of course invaluable, the monographic treatise has proved to be a disappointing starting point for compiling the Type Register; it seldom provides all necessary data and often presents summaries of the original facts which are telegraphic to the point of being imprecise or even inaccurate. On the other hand, the monographic treatise is indispensable in the third or validation stage, because it deals in a systematic way with the typification of the taxa covered and establishes authoritative precedents that must be considered in the interpretation of the information in the Type Register. Furthermore, short of having all the original references and specimens in
hand, the monograph, which brings together all the data for a taxonomic group into one place, is by far the best single source of data for the given group.

Verification is not a simple procedure that can be accomplished once for all time but an involved, virtually never-ending process, which seems to expand in direct proportion to the number of specimens and publications examined. Comparison of the original description with data from one or more specimens rarely can be made without uncovering at least minor discrepancies that must be reconciled. As types from additional herbaria are registered it often becomes necessary to reexamine the original publication and secondary references again and again to resolve new discrepancies, and such discrepancies frequently multiply faster than they can be resolved as publication after publication is consulted. Gazetteers, atlases, biographies and biographical dictionaries, personal fieldnotes and letters, and even new correspondence with current specialists, in addition to the obvious taxonomic treatises and reference works, may be employed eventually in the course of trying to verify the data of an entry in the Register.

Apart from the facts themselves is the matter of interpretation and judgment. The compilation of any highly condensed, formatted, and standardized file of data such as the Type Register is bound to involve much interpretation of fact and judgment of what to include and what to exclude. The computer imposes the additional problem of judging how best to format and standardize the data for search and retrieval. As new data are provided or brought to light, there is a constant need to reevaluate prior interpretations and judgments, and this in turn may require reexamination of previously consulted literature and specimens. The problem is one not only of accuracy and completeness within a given record but also of consistency among records. How the geographic information is standardized in the record for Taxon A, for example, has a direct bearing on how the geographic information is standardized for Taxon B, and decisions made for the first case without knowledge of special problems to be faced in the second case may have to be reevaluated and changed when the two records are considered together. In short, there is no a priori way to set standards for all time.

The long-term goal of the third and ultimate stage in the development of the Type Register is to validate the data according to the rules of the International Code of Botanical Nomenclature (ICBN; Stafleu et al., 1972) and thereby to establish the Register as a wholly reliable, authoritative index of types of plant species and infraspecific taxa. Validation involves typification, specifically the designation of kind or status of type, and such matters as rank, priority, synonymy and homonymy, authorship, and orthography. Up to a point, the records can be validated by any botanist or technical person skilled in the strict application of the provisions of the ICBN, because many of the problems are purely technical or legal. Indeed, experience with the Type Register has proved that a trained technical editor frequently makes decisions more consistent with the ICBN than the specialist, at least insofar as the objectives of the Register are concerned. Such technical validation, while it greatly increases the reliability of the data, nevertheless is without the force of authority that can be gained only through the sanction of the taxonomic authorities themselves. As in all taxonomic research, many of the questions that arise regarding typification have no absolute answer but require good judgment by an experienced specialist on the basis of all available evidence, and no amount of technical expertise could suffice. This type of authoritative validation is needed in the long run if the Type Register is ever to take its place as an indispensable and thoroughly accepted tool of plant systematists, and it is hoped that the specialists will cooperate in validating the information in the Register as it becomes available group by group in preliminary form. In the short run, however, the most that can be achieved is some degree of technical validation. The important point to stress here is the dynamic state of the file which can be updated at any time to accord with current knowledge and understanding.

Like verification, validation is a continuous process that never really ends, because the light of new information often requires important reevaluations and appropriate changing of the computer file. At the same time, a basic threshold can be achieved. A record is considered verified at least on an initial basis once the original description and all registered specimens have been seen in person by someone compiling and editing data expressly for the T
Register. Likewise a record is considered validated at least initially once the designation of types has been worked out in accordance with the ICBN expressly within the framework of Type Register specifications and format. These thresholds must be attained before the second and third stages of development can be said to have been achieved on a minimal basis. Authoritative validation as described above, on the other hand, will require the input of many specialists in the years to come and is a very long-term proposition.

The three stages of development may be summarized as follows:

Stage 1. Registration.—Creation of the initial file, which involves basic standardization of citation and geographical fields.

Stage 2. Verification.—Editing file against primary sources in the light of the accumulated data.

Stage 3. Validation.—Shaping the Register as an authoritative tool on typification, fully in accordance with the ICBN, by getting input from specialists and by incorporating information on lectotypification and neotypification, as well as other critical annotations.

In practice, registration, verification, and validation certainly are not sharply delimited phases and often merge into each other as a single process. Once the original description and specimens are in hand one attempts to accomplish as much of the entire three-stage process as possible. Verification and validation, in particular, tend to overlap; it is in fact impossible to accomplish the one without to a degree accomplishing the other. From the point of view of the daily operation, however, registration, verification, and validation represent distinct working stages in the creation of the computer database, involving different procedures and personnel. Editorially, each stage results in a more refined, reliable, and authoritative database. In the first stage, the data can be compiled and registered entirely from secondary sources, if necessary, although this is not recommended, but neither verification nor validation can be accomplished without consulting the original sources. Regarding the operational distinction between verification and validation, it should be realized that a technical person may be quite competent to verify the accuracy of the data but not to validate the type designations even with the original sources in hand. Ordinarily, technical editors are responsible for verification, and only when professional botanists or other specialists skilled in the application of the ICBN perform this function is it possible to perform the validation function at the same time.

The present computer file of some 13,000 specimen entries, constituting the entire Type Register, is a registry of largely unverified and unvalidated records of apparent or presumptive types, and for the next several years, at least, effort will continue to be concentrated on the rapid compilation and input of similar preliminary data from many other taxonomic groups and institutions, starting with the Smithsonian's own type collection. The strategy is to register the greatest number of taxa and specimens in the shortest possible time so as to achieve quickly a critical mass of data for producing catalogs and answering queries. Clearly the usefulness of such a database will be directly proportional to its taxonomic and institutional comprehensiveness. Unless efforts to verify and validate the data are kept to an essential minimum as new records are being processed, there is little chance that a comprehensive data base can be created in the foreseeable future. The manpower and resources simply are not available at present for the massive searches in the herbarium and library that would be required to bring every new record to the Stage 2 or Stage 3 level of refinement as it is being entered into the file. To a large extent, therefore, the Stage 1 Type Register will have to be verified and validated through use, through feedback from the specialists who discover its shortcomings in the course of their research.

Under no circumstances is the Type Register being used or is it intended to be used as a place to designate lectotypes and neotypes and thereby to set nomenclatural precedents. If the Register is ever to be used in this manner, which as indicated earlier may prove desirable eventually, the taxonomic fraternity will have to make a conscious decision to do so.

When the scope of the task is considered, it is not surprising that no one has attempted to compile a union catalog of type specimens before now. The task can be cut down to size, however, because relatively few of the world's public herbaria are large enough to have a significant concentration of type specimens. Only about a score of the world's herbaria, for example, contain over two million specimens each, and a published index, including...
literature citations, to any one of these collections would be enormously useful in itself. Each new institution to be added to such a base would enhance the catalog greatly and move it one step closer to the goal of a worldwide union registry.

The U.S. National Herbarium is one of the score of major herbaria with more than two million specimens, and its type collection of 65,000 or more specimens certainly constitutes a significant initial data base. Furthermore, not only is this type collection separate from the main herbarium and easily accessible, but it also has an associated file of cards on which are recorded pertinent data from the original publication (see “Source of Data”). Without this large, ready-made card file and without computer technology, which permits the creation of a union register on a much more flexible and dynamic basis than would otherwise be possible, the Type Register doubtless would never have been conceived or started. The Botanical Type Specimen Register is in the first instance, therefore, an index (catalog, register) of the U.S. National Herbarium’s own type collections. The thousands of man-hours that have gone into the creation and maintenance of the National Herbarium’s type collection and card file have paid off, of course, to the many who through the years have used the type herbarium on the Smithsonian premises. By computerizing this information the Smithsonian’s Department of Botany now makes it possible for taxonomists at large to benefit from the accumulated data and enormous manpower investment.

Scope of Register

The Register is designed to handle taxa typified by specimens, namely, taxa of the rank of species or below, and it encompasses all infraspecific taxonomic levels recognized by the ICBN. In the future, modifications in design may be desirable if not essential to accommodate cases in which the type is not a specimen but a description or a figure. For the present, however, the object is to register specimens, and for this reason data collection usually begins with the specimens and proceeds to the literature rather than the other way around. There are good reasons for arguing on the one hand that registration should proceed from the specimen to the taxon and on the other hand that the process should be reversed, proceeding from the taxon to the specimen. No doubt this publication will stimulate debate on these alternatives; meanwhile, it should be made clear that primarily the first approach is being taken.

With one exception, only the original names of newly described taxa, i.e., taxa being described to science for the first time, are included. The one exception is a wholly new name for a previously described taxon necessitated because all other possible names and combinations would violate the international rules. New combinations involving previously published epithets are excluded rigorously insofar as they are known to be combinations; in such cases, only the basionym is entered into the Register. In one sense, therefore, the Type Register is a basionym file. This approach has been taken because it is the only feasible way in the foreseeable future to create a stable file with fixed points of reference. Eventually, viewed in the longest terms, it will be necessary to link the Type Register to a much vaster name list that shows all possible synonymy connections among basionyms and combinations and thus makes it possible to trace the nomenclatural history of a particular species, for example, from modern usage back to original usage. This is far too much to expect of the Type Register in itself, however, and for this reason the design of the Register allows for no synonymy except for orthographic variants. If a taxon originally was published under a generic or specific name with a spelling that later was corrected, then the original spelling is indicated in a special field, while the accepted spelling is shown in the main taxon field; for example, many species have been published in the genus *Penstemon* under the spelling “*Pentstemon*,” and this spelling is indicated in the orthographic synonym field, as necessary. Without this approach, the same genus would alphabetize in different parts of the file (e.g., *Aploppappus* vs. *Haploappus*).

Only validly published names are included, but the names need not be legitimate, as defined by the *ICBN* (see also McVaugh et al., 1968).

Taxonomically and geographically, the Register is limited only by the availability of data and operational resources. The present machine file includes only vascular plants and primarily flowering plants, but it could be expanded at any time to include cryptogamic groups if the data and the
resources to input the data, especially personnel, were available. The geographic scope already is worldwide because the initial source of most records, the U.S. National Herbarium's type collection, is worldwide in scope although particularly strong in New World areas. The input is further biased geographically at present by the fact that the other herbaria which have cooperated thus far on the Register also are North American institutions with principally New World collections (except Arnold Arboretum).

Inclusion of type photographs has been suggested several times, but so far this has not been done because they present special problems requiring careful study before the system can be modified to accommodate them. Whereas type specimens are unique and, even in the case of isotypes and syntypes, are distributed to a relatively limited set of herbaria among the total, type photographs are not unique, and in theory every herbarium can have a photograph of any type. The Register soon could be overloaded with references to photographs, and no purpose would be served. While there is a clear need, especially on the part of floristic workers who may be able to satisfy their requirements with photographs and thus avoid a massive borrowing of type specimens, for a central index of negatives on deposit at major centers from which type photographs could then be purchased, this problem calls for separate attention.

To an extent, the same reasoning applies to type fragments because many institutions potentially can have fragments of the same specimen. A type fragment has no standing in the ICBN unless it can be interpreted as a formal type of some kind (e.g., isotype), and most fragments cannot be dignified by such interpretation. In the modern era when travel and communication are easy, making the remotest corners of the earth accessible, the informational value of the type fragment in one's own herbarium has diminished greatly because the type specimen itself can be borrowed or examined by personal visit. Thus only in the case of types that have been destroyed or of types that for political or other reasons are still inaccessible can importance be attached to a register of information on the whereabouts of type fragments. In other words, the taxonomist wants to know, "Where can I find a type specimen?" not "Where can I find a type fragment?" The latter question will interest him only if all efforts to see a type specimen fail or prove impractical. For these reasons, type fragments have been registered sparingly in the present file and only when the circumstances seem to warrant doing so.

Lectotypes and neotypes present a special problem that cannot be handled properly with the current system design. The system allows for only a single bibliographic citation, namely, the citation of the original publication where the taxon was first described and the name proposed. In cases of lectotypification or neotypification, however, it is necessary to cite also the second, later reference where the lectotype or neotype was designated. The problem has been largely ignored in this initial phase because lectotypification and neotypification cannot be documented properly without the direct participation of specialists. Identification of lectotypes and neotypes is part of the Stage 3 validation process described earlier, and by the time this level of documentation is possible the system will be modified to include a separate file, linked to the basic file, for recording lectotypes, neotypes, and other pertinent taxonomic or nomenclatural annotations. Such a file for "remarks" will provide a way of recording the names of authorities who have validated the data.

A word is necessary about the relationship of the Type Register project to the Index Nominum Genericorum (ING) project (Cowan, 1970). The object of ING is authoritative typification of all generic plant names. Thus it deals with genera, not species, except for type species, and it is not concerned with type specimens or collection data of any kind. Emphasis is placed on achieving at once, before input, the level of validation that the Type Register is expected to achieve only in the long run. The Register, which is not concerned with the typification of genera, and ING are complementary, therefore, and do not duplicate each other in any way (see also p. 16).

With respect to Flora North America, the closest links are maintained between it and the Type Register project on the one hand and ING on the other hand, to ensure that the work of each project will complement rather than duplicate the others.
Procedures and Standards

Source of Data

The principal source of data at this stage is the permanent card file associated with the type collection of the U.S. National Herbarium (US). The card records are converted into machine-readable form genus by genus in alphabetical order. During the pilot phase cards were pulled from the file by family (e.g., Scrophulariaceae), but this approach is impractical for the file as a whole, which is arranged alphabetically by genus. While that approach was being taken, the cards were being compared with the specimens in the type collection, which are arranged systematically (modified Englerian sequence), prior to input. Now that an alphabetical rather than systematic approach to the file is being taken the specimen-comparison step is being postponed until the whole file is in the computer and can be sorted systematically by family.

Curators of the U.S. National Herbarium have followed the practice of segregating type specimens from the general collection since the early part of the present century. The practice was first established about 1918 by then-curator Paul C. Standley. At the same time an associated card file was started to supplement the specimen data with information from the literature. The file includes a card for every taxon (species, subspecies, variety, form) represented in the type collection, and generally the responsible curator has had the original publication in hand while preparing the card and the standard folder for filing the type specimen(s). Each card includes the original taxonomic name (basionym in cases of later transfer), author, original reference, basic collecting data, and designation of kind of type. To re-create this file today from the specimens and the literature would require at least 10 and more likely 20–30 professional man-years, and there is no reason to suppose that the file could be re-created with any higher professional standards or greater degree of accuracy on the average than the first time. In short, it is scientifically sound as well as eminently practical to create the preliminary edition of the Type Register from the Smithsonian file as it stands.

Of the 65,000 specimens in the US type collection, about 55,000 are types of phanerogamic species and infraspecific taxa, and the other approximately 10,000 are types of cryptogamic taxa—ferns, mosses, and lichens.

Other institutions can contribute to the Type Register in any of a number of ways, as explained in the next section. Basically, there are two ways: (1) annotation of a printout, listing records already registered in the machine file, and (2) submission of completed data forms or some equivalent procedure for new records not presently registered in the machine file. These are complementary procedures which must both be used. Institutions with ready-made card files like the Smithsonian’s are in the best position to contribute in a significant way quickly, and their contributions will spare the smaller herbaria from repeating costly bibliographic research that already has been done somewhere else. The cumulative Register provides a basis for checking rapidly for isotypes and other “duplicate” type material, leaving bibliographic research to be performed only for those cases where new taxa are to be added to the Register. In other words, to conserve effort maximum advantage should be taken of the existing file in the process of adding new data, especially bibliographic data, and of course the larger the machine file becomes the greater can be the economy of scholarship on the part of newly collaborating herbaria.

Monographs and the personal manuscripts or files of monographers are obvious sources of authoritative data for the Register and have been used in a few instances, although there are some distinct disadvantages in using the monograph as the starting point (see p. 7). Future monographers should register data routinely for type specimens of new taxa prior to, or simultaneously with, publication. Likewise, it is hoped that graduate students in plant taxonomy will be advised to submit data on type specimens examined by them in the course of their research.

For every specimen registered in the file, a code is appended at the end of the record which indicates the source of the data according to a broad classification of source categories, summarized later under “Data Source Code.”

Instructions for Contributors

Any herbarium interested in contributing to the Register is advised to consult with the staff at the
Please type. Enter new names only. *Essential fields, information must be given.

1. FAMILY

2. GENUS

3. SPECIES

4. INFRASPECIFIC TAXON  
   (Indicate rank: ssp, var, ssp, for, sspm)

5. AUTHOR(S)

6. CITATION  
   (Cite periodicals and serials according to standards of B-P-H.)

7. COLLECTOR(S)

8. COLLECTION NO.  
   (Indicate whose series if not collector's series.)

   LOCALITY:
10. COUNTRY  
    (Use modern name and cite original as follows: Ethiopia ("Abyssinia").)

11. STATE, PROVINCE, DEPARTMENT, OR EQUIVALENT

12. COUNTY OR EQUIVALENT

13. TOWN OR LOCAL REFERENCE  
    (Place important words first and omit unnecessary words.)

   SHEETS: 
14. HERB. ACRONYM(S)  
15. SHEET NO(S).  
16. KIND(S) OF TYPE(S)
   1st
   2nd
   3rd

17. REMARKS  
   (If more than 2 sheets, indicate to which sheet remarks apply.)

Note: For additional sheets, continue in "Remarks"; for additional collections (e.g., syntypes), continue on back.

Source of information

References checked: 
B-P-H  Gray Card Index  Index Kewensis  Other?

Information provided by:  Date

Figure 2.—Standard Data Collection Form of Botanical Type Specimen Register.
Smithsonian well in advance of initiating a project so that a compatible way of compiling data can be devised before the first record is collected. At present the Type Register staff has its hands full with the internal Smithsonian file but will do its best to cooperate with other potential contributors to set up procedures for submitting data. The most efficient way of collaborating under present circumstances is to submit the records on the standard data form (Figure 2) to the Smithsonian for processing, but with adequate planning it will be possible for another institution to convert its own data into machine-readable form in-house before submitting the data to the Smithsonian and thereby to save time and effort in the overall process, at least where large herbaria are concerned. Complete records, i.e., with all essential data present, submitted by other institutions are placed in the queue and processed in due course as time permits. Incomplete records, particularly those without proper bibliographic citations, are set aside in an inactive file where, for lack of staff to complete them, they may remain indefinitely. Potential contributors should keep in mind, therefore, that any effort that falls short of providing complete records risks becoming a wasted effort.

A collaborating institution should always work from the current catalog in the Type Register, if one exists, of the genus or other taxonomic group concerned. The Carex Catalog, for example, provides a checklist of taxa already registered which can be used as a tool by any herbarium wishing to search its own collections for type specimens of this genus. Working catalogs for other registered groups can be provided at cost by the Smithsonian as they are needed. The purpose of this procedure is to reduce unnecessary effort on the part of both the compiler and the editor. In the system, all specimens pertaining to a given taxon are registered under a single entry, and thus there is one unit record per taxon. It is the editor's responsibility to prevent duplications of the same taxa in the first place and in the second place to discover and delete the occasional duplication that inevitably creeps into a file of the size and complexity of the Type Register. Individual compilers can do much to assist the editor in preventing duplications, however, by keeping themselves informed, through working catalogs, of the current status of the file, and by using procedures that minimize the chances of submitting duplicate information for taxa already recorded.

The procedural details will differ from institution to institution, but these general guidelines should be followed, unless other special arrangements have been made beforehand:

1. All new records—taxa new to the file—should be submitted on the standard data collection form (Figure 1) and according to the technical data specifications used by the Smithsonian. Be sure that the original name and not a later combination is being used.

2. All additions to existing records—supplementary publication or collection data, and collections or specimens new to the file—should be submitted as annotations to the appropriate records in a copy of the working catalog; or, if they are submitted on standard data forms or in a separate typewritten listing, each addition should be properly referenced to the record in the file to which it belongs. Care should be taken to distinguish between specimens that belong to a collection already registered in the file and specimens that introduce a new collection but to an already registered taxon. Both constitute additions but on different levels. The latter situation arises frequently when synotypes are involved, but slight discrepancies in collection data can easily be overlooked by the compiler, leading him to the conclusion that the former situation obtains. If the collection data recorded in the Register are not identical or at least reconcilable with the collection data of the specimen in hand, then the discrepancy should be resolved appropriately or the specimen excluded. In annotating the catalog, it is important to be sure that the additions are clearly associated with the proper collection where two or more collections are registered.

3. All proposed changes to existing information in the file should be submitted with documentation as annotations to the appropriate records in a copy of the working catalog; or, if they are submitted on standard data forms or in a separate typewritten listing, each addition should be properly referenced to the record in the file to which it pertains. Without documentation, proposed changes raise more questions than they answer and complicate the work of the editor.

The most common errors, experience has shown, are mistaking (1) a later combination for an origi-
nal name, (2) the type specimen of a variety or form for the type of the species itself, and (3) a syntype (or isosyntype) for an isotype. The second of these mistakes often turns out to be the explanation for the situation in which the specimen appears to have been collected after the species was described, i.e., the collection date is later than the publication date. An undetected name transfer may lead to puzzling discrepancies or to unnoticed duplication. Frequently, for example, a type collection passing under an undetected later combination becomes the basis for introducing a new taxon to the file, while at the same time the collection already is properly registered under its basionym.

A final note should be added about the use of the Carex Catalog or any similar working catalog in herbaria where type specimens have never been identified and segregated into separate folders or a separate collection. By means of the collector index, it is possible for curators who wish to begin segregating types to use such a catalog as a means of identifying type specimens within their herbaria which belong to collections recorded in the Type Register.

**Record Format and Content**

The data content of a unit record in the Register was established largely according to the conventions long used for the US card file. With the US card format as a standard, the data form shown in Figure 2 was devised for use by contributors at other institutions. This form shows what fields of data should be included, distinguishing between essential and nonessential fields and indicating certain of the basic standards. The fields tagged as "essential" constitute the minimum number of data elements which the processing system is designed either to require or expect. From the botanical-content point of view, however, none of the fields should be regarded as optional. Every effort should be made by the contributor to provide data for all fields. Contributors can obtain blank forms at cost from the Smithsonian or use facsimiles.

Before input to the system, all records are edited to conform with the field-by-field technical specifications that have been established to standardize content and format in the system. A copy of these specifications can be made available to collaborators on request, but most contributors will not want to be bothered with all of the technical details of the system. For purposes of contributing records, it is essential to know only the main conventions and standards that govern the content and format of the data fields. These basic standards are explained below by field, and contributors are strongly urged to follow them closely so that the work of the editor will be simplified. The rules of standardization have been applied more rigorously and consistently to the Carex Catalog than to any other part of the Register, and potential contributors are asked to study this Catalog carefully for specific examples of how standards have been applied to govern content, form, and style. Implicit in this Catalog are the answers to many specific questions about standardization which cannot be answered here. It should be kept in mind, however, that the typical edit format is different from the format of this published Catalog. In the typical format, the information is not strung together (concatenated) in paragraph form, but each field is labeled and printed by itself with room for annotations. Furthermore, certain fields of data (e.g., source code) have not been printed out in the Carex Catalog.

The reference works used most frequently in the course of compiling and editing data for the Type Register are cited in the bibliography. Some of these works have been adopted for editorial purposes as the standard references and authorities for verifying and standardizing new data during initial input. An "authority" (authority file) is an index, thesaurus, or dictionary of terms, names, or titles which is used to standardize some category of data, e.g., *B-P-H* (Lawrence et al., 1968) for titles of botanical periodicals. Published standards have been adopted as authorities whenever possible, but in some instances it has been necessary to begin creating authority files expressly for use in the Type Register project. A "standard reference" is an authoritative and reliable secondary source that provides the editor with a practical means of quickly verifying some category or categories of incoming data, e.g., a name index such as *Index Kewensis* or Willis' *Dictionary of Flowering Plants and Ferns* (7th edition, revised by Airy Shaw, 1966). Verification in this editorial sense of double-checking in secondary sources is not to be confused with verification in the primary scholarly sense discussed earlier in connection with Stage 2 development of the Type Register (p. 7).
The *International Code of Botanical Nomenclature* is, of course, the final authority on all matters of typification and nomenclature. (The 1966 edition, prepared under the chief editorship of Lanjouw and Stafleu, has been used thus far, but the newer 1972 edition of Stafleu et al. is now available.) Of the essential desk-top references, the one most frequently consulted, perhaps, is the seventh edition of *Villis' Dictionary*. Also invaluable as general reference works are Stearn's *Botanical Latin* (1966) and Stafleu's *Taxonomic Literature* (1967). Though hardly desk-top references, *Index Kewensis* and the *Gray Herbarium Index* are indispensable, and the Type Register editorial staff is fortunate in having available to it an integrated version of the former and both the card and book forms of the latter. Insofar as possible, the same procedures and standards are being applied in both the Type Register project and the Flora North America program, so that the data bases will be compatible. Authority files developed especially for the one project are being used also for the other as appropriate.

The main editorial procedures that have been adopted to verify and standardize the ingoing data are summarized below field by field. Collaborators can do much to increase the reliability and standardization of their own data by using these same procedures in the process of compilation. The editorial burden is eased greatly when the editor knows in advance that the essential standards have been upheld consistently by the contributor.

**Level 1—Taxon Data**

The following fields of data are recorded only once each for every species or infraspecific taxon registered in the machine file because these data are unique for each taxon. Furthermore, the taxon is the unit record, and every taxon is entered into the file only once.

**Family.**—The latest edition of *Engler's Syllabus der Pflanzenfamilien* (vol. 1: Melchior and Werdermann, 1954; vol. 2: Melchior, 1964) is the authority for the system of families with the exception that the accepted family name with a regular ending is used in all cases, including the eight cases where the *Syllabus*, following the traditional practice sanctioned by the *ICBN* (see list of *Nomina Familiorum Conservanda*), uses irregular names. These irregular names with their adopted regular equivalents are: Compositeae/ASTERACEAE, Cruciferae/BRASSICACEAE, Gramineae/POACEAE, Guttiferae/CLUSIACEAE, Labiatae/LAMIACEAE, Leguminosae/FABACEAE, Palmae/ARECACEAE, Umbelliferae/APIACEAE. The use of regular family names conforms with practice in the FNA program. *Villis' Dictionary* is used in conjunction with the *Syllabus* to determine the family to which a genus belongs.

**Genus and Genus Synonym.**—*Index Nominum Genericorum*, insofar as it is completed, is the final authority for generic names, to determine their accepted spelling and whether they are validly published. *Villis' Dictionary*, which in any case is an indispensable authoritative handbook on these matters, is consulted for genera not yet covered by ING. Whenever the data are being compiled directly from the primary sources, the generic name is entered on the data form exactly as it was spelled in the original description of the particular species or other taxon in question. If for some reason this spelling is a variant of the currently accepted orthography of the name, then both spellings are entered into the machine file, the accepted spelling in the "Genus" field and the orthographic variant in the "Genus Synonym" field. In no case is more than one spelling permitted in the "Genus" field for the species and infraspecific taxa of any particular genus of plants.

**Species.**—Attempt is made to record the specific epithet exactly as it was spelled originally, except where a minor change is required by the provisions of the *ICBN* governing orthography. (A two-word epithet, for example, is hyphenated to form a single word.) To verify the spelling given on the data form, the editor relies upon the *Gray Herbarium Index* and/or *Index Kewensis* insofar as possible, because to check the primary publications in all cases is impractical at this stage. These two indices, which overlap considerably in coverage, frequently provide a check on each other. Unless the taxon in question is by definition outside the limits of one of the two indices, the second index is checked routinely whenever the first does not confirm the spelling given on the data form. With respect to species regarded as being of hybrid origin, the standard practice of placing an "X" followed by a blank space before the epithet is followed.
Infraspecific Taxon.—An infraspecific taxon of any rank recognized by the ICBN can be accommodated in the Type Register by entering the infraspecific epithet and the appropriate rank designator in this field, e.g., VAR GRACILIS or SFXI CRASSA. Infraspecific names are entered in the Register in the form of trinomial combinations with the appropriate rank designator, because this form is adequate for nomenclatural purposes; and quadrinomials create problems in the system. The Gray Herbarium Index is used to verify infraspecific epithets as to rank and spelling, but it covers only infraspecific taxa of the New World published during the past 100 years. For this reason, many of the infraspecific names must go unverified at this stage when extensive literature research is impractical. Following is a list of the infraspecific ranks and their standard abbreviations used in the Register:

- subspecies: SSP
- variety: VAR
- subvariety: SVR
- form: FOR
- subform: SFM
- nothomorph: NM

Author.—This field carries the full last name and all initials of each author of the binomial or trinomial name under which type specimens are being registered. Whether single or multiple authors, the last name is always placed before the initials. When the use of initials only is certain to lead to confusion, the full first name also is included, e.g., MACOUN, JOHN vs. MACOUN, JAMES M., not MACOUN, J. vs. MACOUN, J. M.

The publishing author or the author of the work, if different from the author of the name, is always included in this field and separated from the author of the name by “IN” or “EX” in accordance with the rules and recommendations of the ICBN. No authority exists for author names, but an author authority file has been started for the Type Register on the basis of the Carex Catalog. Further, the FNA Author File is well underway, and it is planned that the two be compatible and that ultimately they be merged. Meanwhile, the standard references are Barnhart’s Biographical Notes Upon Botanists (1965) and Stafleu’s Taxonomic Literature (1967), but all available biographical references are consulted as necessary. (See also under “Collector[s].”) Many specific problems are encountered in dealing with author names, but the details are beyond the scope of this introduction. Examples of specific solutions can be found in the Carex Catalog.

Title.—The title of the periodical, monograph, or book in which the name of the taxon in question was first validly published is recorded in this field. The title of the article in the periodical or of the chapter in the monograph or book is never included or given in lieu of the title of the periodical or work. In cases where a name was introduced into the literature before it was validly published, reference is made only to the place of valid publication. A name published first without description (nomen nudum), for example, often is later published validly with description. Nomina nuda are not included in the Type Register. All titles are abbreviated consistently. B-P-H is the authority for abbreviating titles of periodicals. For titles of monographs and books, the Type Register project is developing its own authority file, using the principles of abbreviation set forth in B-P-H, and, insofar as possible, taking advantage of the title abbreviation file developed by the ING project. An author’s or editor’s name is not included in this field unless it actually is part of the title; otherwise, it is included in the previous field as the publishing author or editor.

Level 2—Collection Data

Because there may be multiple type collections (e.g., syntypes) for any taxon, the collection data fields may repeat as a set any number of times. The following set of fields is recorded for each collection, insofar as the data exist and are available.

Collector(s).—The names of all collectors of the type collection being registered are recorded in this field exactly as author names are formatted in the “Author(s)” field. The name of a collecting expedition may be recorded here when individual collectors cannot be determined. The Type Register project is developing its own authority file for collectors, but meanwhile the following biographical indices, in addition to those already mentioned under the “Author(s)” field, are being used as standard references: “Index Herbariorum, Part II: Collectors” (Lanjouw and Stafleu, 1954, 1957; Chaudhri et al., 1972—completed for letters A to L); “Index to Principal Collections Represented in
the U. S. National Herbarium” (compiled by U. S. National Herbarium staff for internal use, 1965).

Collection Number.—Ordinarily this will be the collector’s own number, but when there is no trustworthy means of determining his number, or if he had none, a serial collecting number assigned by an institution or expedition may be recorded instead. The field is regarded pragmatically as the place for a number, any number, that has been associated with the collection and which, when combined with the name(s) entered in the “(Collector(s)” field, normally will form a unique reference to the collection. If a distinction can be made between the number of the collector and the number of his expedition or institution, then the name of the expedition or institution assigning the serial number should be placed in the “Collector(s)” field unless one or more collectors’ names already have been entered there; otherwise, this name should be prefixed to the collection number to make clear that the number is not the collector’s own. When there is absolute evidence that the collection never has been numbered in any series, then the abbreviation S.N. (sine numero), meaning “without number,” should be entered in this field. If on the other hand the number is merely unknown or there is doubt about the existence of a number, then dashes (- - -) should be entered in the field.

Collection Date(s).—Collection date is recorded just as accurately as it is known, and if necessary two dates or a range of dates are given. All dates, whether single or in ranges, take the form: 28 Sep 1928. On the data form, dashes should be entered to indicate that the collection date is unknown, and the abbreviation S.D. (sine dato) should be used to indicate that the collection is known to be without a collection date. In using the latter designation, the compiler should be absolutely certain that the collection is undatable; otherwise, he should use dashes (- - -).

Geographic Data Fields.—Four geographic fields are used to pinpoint hierarchically the collecting locality: (1) country; (2) state, province, department, or equivalent; (3) county or equivalent; (4) locality. The specific place is recorded in the fourth or lowest field more or less in the terms of local reference given by the collector himself and should include a town, post office, or other place name that can be found in an atlas. The locality terms in the fourth field are ordered from the largest to the smallest units, and unimportant words are omitted; latitude and longitude, if given, are placed last in this field; and ecological terms, except where required to clarify the geographic location, are omitted. Because locality data from the specimen and the original description often are merged into a single telegraphic statement, the reference given in this fourth field cannot be assumed to be a direct quotation. Every effort is made, however, to stay close to the words of the original collector and/or author of the description, and substantive additions or interpolations by the compiler or editor are indicated appropriately. It is important to the editor, therefore, that compilers set apart clearly their own comments from the original information. Quotation marks are used only when the context requires that the exact original words be identified, as, for example, when some part of the locality statement is so archaic, confusing, or general as to appear to contradict the rest of the geographic information.

The three, higher level geographic data fields are used to place the locality in its proper geopolitical hierarchy. Whereas the vocabulary used in the “Locality” field is standardized for sorting purposes but not controlled, the vocabulary used in these three fields is controlled as well as standardized for purposes of search and retrieval. Insofar as possible, current official political units are used in all three fields so as to avoid overlapping and inconsistent terminology. As the term “geopolitical” implies, concessions to age-old geographic designations, as in the case of certain islands, are made in a few instances, and “country” is not always an independent political unit in the strictest or most modern sense. Such changes are made only within the structure of the controlled vocabulary, however, as explained below. Island names present a particular problem, because often they have long been used in the biogeographic literature but do not fit into a consistent geopolitical hierarchy (e.g., Borneo, Madagascar). Various stratagems, mostly involving comments in the “Locality” field, have been devised to cope with the problem of identifying well-known biogeographic areas within the file structure of the Type Register. If the name used in any of the three higher level fields is not obviously equivalent to the name used originally by the collector, then his original designation is included parenthetically.
with appropriate annotation at the end of the "Locality" field.

All available atlases and gazetteers are used as standard references, the most valuable being *The Columbia Lippincott Gazetteer of the World* (Seltzer, 1962) and the desk-top *Webster's New Geographical Dictionary* (1972). The latter, to the extent that it covers the geographic units and problems encountered, has taken on the force virtually of an authority for geographic standardization. The authority adopted for the system of classification and names of the world’s countries and equivalent political units is the National Bureau of Standards’ Federal Information Processing Standards Publication (FIPS Pub) 10: *Countries, Dependencies and Areas of Special Sovereignty* (1970). With slight modifications for the purposes of Type Register, this publication is used to control the vocabulary used in the first or "Country" field. Any new name must be fitted into this system before it can be used.

From the data-processing point of view, the purpose of the geographic information is to make search and retrieval possible at least by country and state or province. Thus if the first two fields are left blank or if the names are not carefully controlled and standardized the retrieval aim is clearly thwarted. Collaborators should make every effort to provide data in all four geographic fields, but the most important ones are the first, second, and fourth.

**Level 3—Specimen Data**

Because there may be multiple type specimens (e.g., isotypes) in any type collection, the specimen data fields may repeat as a set any number of times. Ordinarily, an institution will be represented by a single type specimen under a given collection, but there is no limit to the number of specimens that may be registered per collection as long as each specimen is uniquely identified. In practice, this means that two or more specimens will be cited for the same institution only if they have different herbarium sheet numbers or represent different kinds of types. The data fields in the specimen citation are: Herbarium Abbreviation/Herbarium Sheet Number/Kind of Type/ Data Source Code. The typical specimen citation takes this form: US 1727345 HOLOTYPE CF.

**Herbarium Abbreviation.**—The standard international abbreviations established in the fifth edition of "*Index Herbariorum*, Part I: The Herbaria of the World" (Lanjouw and Stafleu, 1964) are used to designate the herbaria.

**Herbarium Sheet Number.**—Many herbaria stamp a serial number on every sheet to which an herbarium specimen is attached, and that number is entered into this field. The field may be left blank when the sheet in question lacks a serial number. Because a sheet number represents the single most effective and reliable means of uniquely identifying a specimen, any collaborating herbarium which presently does not number its sheets is strongly urged to number the sheets of type specimens as the data are compiled for the Type Register. From the standpoint of the Register, the serial number is a completely arbitrary datum and need not belong to any general numbering system within the collaborating institution provided that it is part of a unique series. Whenever there is any choice on the matter, a totally numerical series, not a mixed alphabetical/numerical (alphanumeric) series, should be used, to facilitate proper numerical sorting by machine.

**Kind of Type.**—This small field represents the purpose of the Type Register and is certain to evoke more discussion and controversy than any other data field in the unit record. For this reason it is vital that every user of the Carex Catalog or any other part of the Register understand from the outset the limitations of the data recorded in the "Kind of Type" field.

As emphasized repeatedly, the initial aim of the Type Register project is to record the facts just as they exist in the presently available sources so as to put before the taxonomic user community the greatest amount of information in the shortest possible time, leaving until later stages the objective of methodical, authoritative verification and validation. Once comparative data on type specimens are available group by taxonomic group on a large scale, the specialists themselves, who alone are truly qualified to render authoritative decisions on matters of nomenclature and typification, can help enormously to refine the Type Register data base through feedback arising from actual use of the file. The consequence of this register-now-validate-later approach is seen most often in the imprecise if not incorrect terms by which the different kinds
of types are designated. Because the nomenclatural rules have changed through the years and the well-developed modern terminology is of relatively recent origin, it is natural that types have not been designated according to any consistent standards through the years.

When a type specimen is first registered, its typification is designated by whatever term is indicated in the data source, which usually is a secondary source (card file, specimen file, monograph), unless there is firm evidence to indicate otherwise. Thus any type designation, whether legal or illegal by present nomenclatural rules, may appear in the Type Register.

At the United States National Herbarium, it was customary for many years to designate two basic categories in the segregated collection of type specimens: “type” and “type collection.” Usually, “type” has meant what would now be called “holotype,” while “type collection” has embraced syntypes, isotypes, and even paratypes according to present terminology. “Types” often prove not to be holotypes, however, and it would be very wrong to draw simple equations between the older and newer terms. The collection of type specimens at the New York Botanical Garden provides another example of the problems with archaic terminology. Here the categories “type” and “cotype” were used for many years, and now “type” often but certainly not always translates to “holotype,” while “cotype” may designate any of the kinds of types masquerading under “type collection” at the US.

The authority for designation of kind of type is the ICBN. An auxiliary, highly authoritative standard reference is “An Annotated Glossary of Botanical Nomenclature,” by McVaugh et al. (1968). Whenever the original specimens and literature can be examined and the kind of type validated in accordance with the rules, proper terminology is used. By this terminology, the Register is designed to include primarily holotypes, isotypes, syntypes, and isosyntypes. As explained earlier, the present file structure is not designed to handlelectotypes and neotypes (or isolectotypes and iso-neotypes), although these are entered sometimes by using the fourth geographic field (“Locality”) as a remarks field for the second bibliographic citation. Paratypes are excluded unless other, higher order types cannot be located and there is reason to believe that the paratypes will become important later for purposes of lectotypification. Fragments of holotypes, isotypes, or syntypes may be included at the discretion of the editor (see under “Scope of Register”).

When a holotype has not been designated, as in all the older literature, one usually is faced with a “syntype situation,” which often is difficult to resolve precisely on the basis of the ICBN’s terminology. A syntype, according to the ICBN (Article 7, Note 3), is “any one of two or more specimens cited by the author when no holotype was designated, or any one of two or more specimens simultaneously designated as types,” and an isosyntype is a duplicate of a syntype (see “Guide for the Determination of Types” in the ICBN). “Duplicate” in this context is defined as “part of a single gathering made by a collector at one time.” In other words, a “duplicate” is one of two or more specimens constituting a single “collection,” as this term ordinarily is used by plant taxonomists and is being used in the context of the Type Register.

The distinction between syntype and isosyntype hinges on such relatively subjective criteria as “specimen citation” and whether or not the original author had the specimens in hand (cf. definitions of McVaugh et al., 1968), which are matters for specialists to determine. The older literature, where the problem of syntypes arises, is well known to be less than precise in the manner of citing specimens. The editorial staff of the Type Register must restrict its interpretations to the letter of the ICBN, and for the most part such fine distinctions as between syntype and isosyntype necessarily are deferred for the proper specialists to make at a later time. To do otherwise would be to assume the specialist’s role and responsibility and to introduce false precision at this stage. Accordingly, the term syntype is used for both syntypes and isosyntypes except in the rare cases where the evidence for the isosyntype designation is clear and convincing.

A final point on the use of the term syntype concerns the distinction between single collections and multiple collections. Throughout the older literature there are numerous cases where a single collection has been designated as the type collection, either explicitly or implicitly by virtue of being the only collection cited, even though a holotype has not been set apart. Many specialists would single out a presumptive holotype in these cases on the basis of the specimen(s) which the original author
is presumed to have examined firsthand, but the Type Register editors cannot and should not make authoritative selections in such cases and must regard them all as syntypes. The ICBN does not seem to provide terms for distinguishing this common syntype situation from the other common syntype situations in which two or more type collections are designated simultaneously. Because it is useful to know whether one or more than one type collection is cited, in the Type Register project the term “type collection” has been given a proper meaning for the purpose of distinguishing these two syntype situations. Type collection, in this proper sense, designates a specimen from a single type collection, while “syntype” is reserved for designating a specimen from any one of two or more simultaneously designated type collections.

The catchall term type material is used to designate any specimen presumed for some reason to be a type but for which there is no basis at the time of data input to assign a more precise classification.

Many situations arise in the course of compiling and editing data for the Type Register in which it would be useful to have a collective term for designating a collection as a counterpart to the singular term given in the ICZN for the specimen. In fact, the terms “holotype collection” and “syntype collection” often are used informally within the project as collective counterparts to the singular terms holotype/isotype and syntype/isosyntype.

Data Source Code.—Source of data is indicated according to a classification of source categories, by appending the appropriate code at the end of the specimen citation. It is impossible to document in detail the source of every datum, and any categorization of sources is certain to have many imperfections. The present classification is only a rough first approximation of the kind of documentation needed, but presumably it is a strike in the right direction. It is drawn up largely from the point of view of the central staff and their internal Smithsonian operation, and other categories will have to be added as other institutions join in the effort. Probably codes or numbers will be assigned to individual contributors in the future in the manner of Index Nominum Genericorum. It should be noted that this is more than a classification of sources; up to a point it also is a classification of degree of verification/validation. Obviously, a record based on examination of the original publication and the original specimen is likely to be more reliable than a record based solely on secondary sources. Following is the classification of data source codes:

OS Original publication and type Specimen examined by person compiling data for Register.
OP Original Publication examined by person compiling data for Register, but type specimen not seen; supplementary information about the specimen, if any, derived from secondary source(s).
TS Type Specimen examined by person compiling data for Register, but original publication not seen; citation and other publication data, if any, derived from secondary source(s), including standard indices (Index Kewensis, Gray Herbarium Index), monographs and revisions, annotations on specimen sheet, card files, original descriptions removed from context of publication without exact citation and necessary prefatory matter, and the Type Register catalog itself.
MG Data derived from most recent Monograph of taxonomic group in question without reference to any other source(s) of information.
SS Data derived entirely from Secondary Sources.
CF Data transcribed directly from a card in the Card File of the type collection of the U. S. National Herbarium without verification against the original publication or type specimen.
CO Data from US Card file verified by examination of Original publication.
CS Data from US Card file verified by examination of type Specimen(s).
CM Data from US Card file verified or supplemented by consulting latest Monograph of taxonomic group in question.
UK Source of data UnKnown.

Processing System

The first step is to convert the data to machine-readable form, i.e., to “automate” or “capture” the data, so that they can be processed by computer. No data conversion (automation, capture) system is perfect, and none is capable of handling all applications equally well (Shetler, 1972). Several methods and media have been tried thus far in the Type Register project in an effort to find the data conversion system best suited to this data-processing application. In general, the aim is to use the system that will get the data into the computer with the least amount of error and effort. Because the development of data conversion devices and procedures continues to evolve rapidly, a flexible approach has been taken; the data conversion system is kept as independent as possible from the rest of the processing system so that a new conversion system can be
adopted at any time with minimal impact on the overall Type Register operation.

The following data conversion systems have been used in the chronological order given:

**Paper Tape System.**—Data were mechanically encoded on paper tape with a tape-punching typewriter. The tapes then were read by the computer which converted the holes in the paper tape (i.e., mechanical codes) to electronic codes on magnetic tape and thus transferred the machine-readable data from the medium of capture to the medium of computer processing. This system was used for the duration of the pilot project, and several thousand records, a third of the present file, were captured with it. During the pilot phase, while paper tape was being used, corrections to the machine file were made by means of the standard 80-column punch card.

**On-Line System.**—With a typewriter terminal, data were entered via telephone directly on disk storage of a remote time-sharing computer under the on-line control of a sophisticated text-editing program package. This text-editing software permitted the terminal operator to direct the computer in making any of a whole series of deletions, changes, and additions during the input process so that maximum editorial accuracy could be achieved in the machine-readable data base immediately, before it was output onto magnetic tape for subsequent processing by the information retrieval system.

**Optical Scanning System.**—Data were typed on standard forms with an ordinary 10-pitch IBM Selectric Typewriter equipped with a head having a special optical scanning font. Completed forms were scanned by an optical character reader (OCR) which encoded the data directly on magnetic tape for further computer processing.

**Magnetic Tape System.**—In the system currently being used, a typewriter encodes data electronically on a magnetic cartridge which is compatible with computer tape. The typewriter unit also serves as a communication terminal to transmit the data captured via telephone directly to the computer, where the data are transferred to disk or tape for further processing. Processing programs can be controlled from this same remote terminal. Of the several data conversion systems used, this one seems to offer the best compromise of advantages and disadvantages in the context of the operation as a whole.

**Computer Processing System.**—During the pilot phase of the Type Register project, this system consisted of a set of specially written COBOL programs, designed to run on the Smithsonian's Honeywell 1250 machine, to create and maintain a machine file, and to account for collaborating institutions to which data-collection cards were sent or from which data were received. It was not designed as an information retrieval system in the strict sense, and in terms of output the system was capable chiefly of producing catalogs, either in book or card form. The pilot system proved with use to be highly specialized with too few capabilities and serious weaknesses in file structure such as inability to handle syntypes. It served the purpose of a pilot system, however, to get a file started and thereby define through experience the problems to be solved in the operational system.

After the pilot phase, the specialized COBOL programs were abandoned, and the processing system was completely redesigned around the commercially available, IBM-supported program package known as the "Generalized Information System" (GIS), which runs on the larger models of IBM's System/360 and System/370. This generalized software performs all the normal functions of creating, maintaining, and querying files and of generating reports. It is an information retrieval system, in the proper sense, with the full capability to search, select, and print answers to specific queries on demand in addition to the capability for producing various types of tabulations, tallies, and catalogs. A COBOL preprocessing program ("preprocessor") and a COBOL concatenating program, by which, respectively, the data are prepared for processing by GIS and the data are joined field by field into publishable paragraph output after processing by GIS, form a part of the total operational system. GIS runs only on IBM equipment and is offered by several computer service bureaus in the Washington, D.C., area with IBM machines. Type Register processing with this system so far has been carried out successfully at several different service bureaus, and the project basically is independent of the computing center.

One of the most important initial tasks in developing the Type Register is to build a file of sufficient size to make reliable studies concerning such matters as record comprehensiveness, record format, field format, need for authority files, and
report types and formats. This requires a flexible information processing system that allows for data to be restructured, reports to be reformatted, tallies to be made, and edits and mass updates to be made without reprogramming. From the output standpoint, it must be possible to select records according to the content of any data field, to relate records to each other on the basis of selected fields, and to sort and format selected fields as desired. GIS affords all these capabilities.

The FNA program is using GIS, and it was for this reason particularly that the decision was made to use GIS in the Type Register project so that these botanical data bases would remain fully compatible. The rationale for using a generalized information processing system and a description of the use of GIS in the FNA program have been set forth in separate papers recently by Harriet R. Meadow (1973a, b), who is responsible for the basic design of the Type Register processing system. The two most important features of GIS, from the point of view of biological data retrieval, are its capability of handling hierarchical data structures and its capability of querying two or more files simultaneously for correlated data. With respect to Type Register, for example, the hierarchical feature permits subordination of two or more specimen collections to a single taxon or, in turn, two or more specimens to a single collection within a taxon. The three-level hierarchy of the Type Register is outlined in Figure 3.

The second-generation processing system for the Type Register by no means represents the ultimate system, but it does handle the vast majority of cases very well and solves the most bothersome problems encountered during the pilot phase with the specialized first-generation system. New problems have arisen, however, and with the experience gained by using the present system it will be possible to design a third-generation system in due course that will accommodate all of the special cases that continue to be troublesome, e.g., the case of a lectotype or neotype that requires a second bibliographic citation.

**Statistical Summary of Type Register Contents**

Following is a statistical summary of the records on the machine file as of 30 September, 1972:

![Figure 3. Two oversimplified schematic representations of the three-level record structure in the Botanical Type Specimen Register (from Meadow, 1973a,b).](image-url)
The figures show that the number of collections averages just slightly more than 1/taxon, while the number of specimens averages about 1.3/taxon. The number of specimens will grow rapidly relative to the number of taxa as additional herbaria register their type holdings of taxa already in the file.

This is a tally largely of records input from the type collection of the U.S. National Herbarium (US); i.e., the vast majority of the families and genera are represented only by taxa, collections, and specimens in the US type collection. None of the 135 families is present solely on the basis of types registered from another herbarium, which is to say that at least one taxon in the US collection is registered under every family. The inclusion of a family does not mean, however, that all US types belonging to that family have been recorded. Quite the contrary, the project has only begun, and, as indicated earlier, it now is proceeding alphabetically starting with “A” or “B” are recorded thus far. If a genus is present, however, then all type material in the US collection belonging to that genus is registered. In other words, the file is complete to the genus level with respect to taxa, collections, and specimens in the US type collection.

Before the alphabetical approach was started, registration of US types was essentially completed for several families, and in each case the types of one or more other herbaria also had been recorded. Following is a list of these completed families, showing for each the number of genera, taxa, and specimens registered and the abbreviations of the herbaria for which the file is relatively complete:

- Chrysobalanaceae (12 genera, 216 taxa, 1,110 specimens), many herbaria
- Dichapetalaceae (7 genera, 48 taxa, 158 specimens), many herbaria
- Lamiaceae (84 genera, 1,284 taxa, 1,851 specimens), LA, MO, NY, US
- Scrophulariaceae (85 genera, 943 taxa, 1,075 specimens), US
- Violaceae (17 genera, 282 taxa, 321 specimens), NY, US

The data for the Chrysobalanaceae and Dichapetalaceae were provided by Ghillean T. Prance of the New York Botanical Garden from his manuscripts of family monographs for the *Flora Neotropica* series. All type specimens seen by him in the course of his research on these families as of June 1970 are recorded, which means that many herbaria are represented. With respect to these two families, the Type Register is relatively “complete” in the comprehensive, monographic sense in that the file cites the significant types, regardless of where they are on deposit, as they will be cited in the published monograph. (The monographs of these families have since appeared—see Prance 1972a, b.) At the same time the coverage may not be as thorough for any individual herbarium as in the case of the other three families—Lamiaceae, Scrophulariaceae, Violaceae—for which the data were compiled directly from type collections or card files in the herbaria indicated. Within the Scrophulariaceae, contributions to the genus *Mimulus* have been registered by more than a dozen herbaria (CAN, COLO, DAO, F, GH, JEPS, MICH, NY, OSC, PH, UC, LA, US, WIS) as a result of Hale’s experiment (see “Introduction”), and there are miscellaneous other contributions to this family recorded from MO, NY, and a few other herbaria.

Apart from the families listed and the genus *Carex*, for which the catalog is appended, several other groups have been completed in some sense. Nearly half of the US types of Asteraceae (Compositae) had been recorded when the switch from a systematic to an alphabetical approach was made, and the file for this family contained as of 30 September 1972 the following: 255 genera, 2,600 taxa, and 2,650 specimens. Several important genera of the Brassicaceae (Cruciferae) have been completed at least for the US, and the tallies for these genera as of 30 September 1972 were:

- *Arabis* (97 taxa, 106 specimens), US
- *Draba* (119 taxa, 195 specimens), NY, US
- *Lepidium* (29 taxa, 32 specimens), US
- *Lesquerella* (38 taxa, 43 specimens), US

The data for *Thlaspi* were provided by Patricia Kern Holmgren (1971) of the New York Botanical Garden from her revision of the genus, during which she saw types from the above-indicated ten herbaria. She also provided the data from NY for the genus *Draba*.

Finally, John T. Mickel of the New York Botanical Garden provided significant type data on...
the genus *Anemia* subgenus *Coptophyllum* (Schizaeaceae) and its three segregate genera *Aneminaebotrys*, *Coptophyllum*, and *Trochopteris* from his monograph of the *Anemia* (Mickel, 1962), and the statistics are: 4 genera, 35 taxa, 81 specimens.

**Use of Type Register**

Some of the main uses of the Type Register will be obvious from the discussion in the foregoing sections if not from the concept of the Register itself, and other uses will become apparent through study of the *Carex* Catalog and its indices. It should be emphasized that a catalog of this type with the same or other types of indices can be produced for any taxonomic group, large or small, presently registered, although the data have not been edited to the same high degree in any other group thus far. The *Carex* Catalog and each of its indices represent outputs to particular queries. Many other types of queries are possible, and the amount of output depends on the scope of the query and the depth and comprehensiveness of the data base at the time of querying. For example, the request "Print all records of ferns," would yield a relatively small printout at this stage, because only a few fern types are registered, but eventually such a request could yield an overwhelming printout. In querying the file, the user always must exercise discretion in framing his requests, and to do this he must have a reasonable knowledge of the limits of the machine file beforehand or be guided by someone who is familiar with the file. Otherwise he will make meaningless or impractical requests.

By request the file will be queried at cost for anyone. Any kind of query is welcome, and guidance can be provided in framing queries. It is important at this stage to have feedback from potential users in the form of requests for file queries so that all needs are taken into consideration as the Type Register system undergoes further test and refinement, particularly with respect to report formats. Persons wishing to make extensive use of the Register should plan to spend time in Washington, D.C., working with the project staff at the Smithsonian. The costs and other requirements of such an undertaking should be worked out in advance by consultation with the staff.

The Type Register can be queried or sorted by taxonomic name, author, book or journal title, year of publication, collector, collector's number, date of collection, country, state or province, county, herbarium, and kind of type or any combination of these. With a query or sort on any of these fields can be printed other selected fields from the same records, as illustrated by the *Carex* Catalog, which is sorted by taxonomic name, and its five indices, which are sorted in the lead field by author, collector, country, publication date, and herbarium, respectively.

With the cooperation of specialists willing to devote time to editing of groups of interest to themselves, other catalogs can be published. Anyone is invited to propose collaborations in publishing from the Type Register.
A Catalog of the Genus Carex (Cyperaceae)

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Contributing Institutions

The ten American herbaria that have collaborated in the Carex project to provide data on their respective collections of types in this genus are listed here in descending order of number of specimens registered. The name of each herbarium is preceded by its standard international abbreviation as established in the fifth edition of “Index Herbariorum, Part I, The Herbaria of the World” (Lanjouw and Stafleu 1964).

NY Herbarium, New York Botanical Garden, Bronx Park, New York
GH Gray Herbarium, Harvard University, Cambridge, Massachusetts
US United States National Herbarium, Smithsonian Institution, Washington, D. C.
CAS Herbarium, California Academy of Sciences, San Francisco, California
F John G. Searle Herbarium, Field Museum of Natural History, Chicago, Illinois
MO Herbarium, Missouri Botanical Garden, St. Louis, Missouri
DS Dudley Herbarium, Stanford University, Stanford, California
UC Herbarium, University of California, Berkeley, California
A Herbarium, Arnold Arboretum, Harvard University, Cambridge, Massachusetts
JEPS Jepson Herbarium, University of California, Berkeley, California

Each institution has contributed to the Carex Catalog voluntarily and with little or no outside financial support for work on the Type Register. The FNA program has made use of the Type Register as a pilot project to evaluate various ways of collecting, editing, capturing, and processing hierarchically structured taxon/collection/specimen data. In the course of this work, therefore, small sums of “seed” money were allocated from FNA funds to support data-gathering for the Carex project at several of the above institutions. The Carex project was undertaken in the first place at the suggestion of the FNA Editorial Committee. The Committee saw in Carex a good model of a large genus with a preponderance of North American species which presents a full gamut of nomenclatural and taxonomic problems to cope with in an information system. (The Carex project, insofar as FNA was concerned, went beyond the Type Register. While the data were being gathered for the Register, other morphological data were also being assembled by FNA—unpublished Carex data on Sections Montanae and Ovules collected by A. J. Gilmartin and M. B. Moore—to test the matrix techniques of Morse, 1971, for computer-assisted identification and key construction.) Once the Carex Catalog was established on the basis of several large herbaria, other major herbaria were able to add their data with a surprisingly low investment of man-hours. The Field Museum, for example, reported just under 35 man-hours—less than a man-week—to compile its data on Carex types, at a cost of under $175 for technical labor, but by the time the Museum came into the picture it had the benefit of a basic catalog already including the contributions of A, GH, MO, NY, and US.

Each institution determined its own extent of coverage, and without exception each tried to include all types in the general herbarium which already had been segregated or otherwise identified or which could be identified quickly on the basis of the available computer printout. At the same time, none of the herbaria makes any claim to absolute completeness or thoroughness relative to the number of types in the herbarium, including those still buried in the general collection. A pragmatic philosophy prevailed, with each herbarium doing the best it could under the constraints of its own local
circumstances. It might be assumed in general that the coverage is more complete for the herbaria like NY and US which had separate type collections in the first place and had long-established traditions of segregating type specimens from the main herbarium as they are recognized, than for the herbaria without segregated types, but even this assumption can be questioned. At CAS, a folder-by-folder search of Carex specimens in the herbarium with printout in hand turned up as many unrecognized type specimens as had previously been recognized and segregated into the type collection. A similar search of North American folders at F resulted likewise in doubling the number of recognized types. If one pass through the herbarium can double the number of types, it certainly cannot be concluded that all types have now been found. From a purely curatorial point of view, therefore, the Carex project was very useful in these instances because, as a result, the collection of recognized types was increased by 100 percent.

Clearly it would be unfair to judge the relative size or value of the type collection or even just the Carex type collection of any of these ten herbaria on the basis of the present catalog. Much more extensive development of the Type Register is required before such judgment will be warranted. At the same time, the present ranking is almost predictable. An herbarium that is the major depository for the types of a monographer naturally is expected to have a disproportionate number of types in the group (s) on which the monographer worked. The extensive work of monographer K. K. Mackenzie (1931–35, “Cyperaceae-Cariceae,” in North American Flora) clearly might be expected, therefore, to have put NY in the first position, and no one will be surprised to find GH and US close behind. Comparison of the NY and US type collections of Carex provides a good example of the influence of a monographer on a type collection. Together, NY and US have type specimens for over 400 taxa. Of these taxa, half are represented by type specimens only at NY, while about 40 are represented only at US. Thus, NY has five times more “unique” Carex taxa in the Type Register than US. By contrast comparisons in some other groups show NY and US to have about an equal number of “unique” representatives in the Register. CAS is expected to be strong in types of western taxa. In addition, John Thomas has pointed out (personal correspondence) that CAS has a complete set of H. P. Sartwell’s Carices Americanae Septentrioralis, Part 1 (nos. 1–70, 1848) and Part 2 (nos. 71–143, 1850), and a “rather good set, but not complete,” of S. T. Olney’s Carices Boreali Americanae, distributed in 1870 and 1871. According to Thomas, many CAS specimens bear the annotations of J. W. Stacey, who was connected with CAS and published on western sedges.

Thomas points out these additional interesting facts about the other herbaria in the San Francisco Bay area. Mackenzie, in the course of doing the treatment of Carex for Abrams’ An Illustrated Flora of the Pacific States (Mackenzie, 1923), determined all the Carex specimens at DS from the Pacific States and a number from other regions sometime prior to 1920. The Parish Herbarium, one of the best early collections of southern California plants, is housed at DS. The I. W. Clokey Herbarium, including his sedge types, are at UC, and of course W. L. Jepson’s material is at JEPS. In general, every curator who collaborated in the Carex project felt that his effort had beneficial consequences in the herbarium, and there was a nearly unanimous opinion that the results were well worth the effort from the curatorial standpoint alone.

**Data-Collection Procedure**

The Carex Catalog was initiated with data from the US and MO type collections. For the US, records were converted from the existing card file (see “Source of Data”), while the MO records were captured from data forms filled out at MO in the course of a special search of all the Carex type folders, which are distributed through the herbarium in association with the main collections. The special search was undertaken specifically as part of the Carex project of FNA.

After a common catalog of the US and MO collections was compiled, members of the Type Register staff moved their data-conversion operation to the New York Botanical Garden for two weeks, where, with the assistance of NY personnel, the NY Carex data were compiled and input to the system in a matter of days. The data were compiled from the specimens in the separate type col-
lection, which by and large does not include the literature citations, and supplemented with bibliographic data from reference works, primarily Mackenzie's (1931-35) monograph of Carex.

It should be pointed out that the type collection at NY was first segregated for security reasons during World War II, and the selection had to be done in haste under less than ideal conditions. Consequently, many nontype but historically important specimens, constituting perhaps as much as 25 percent of the total type collection, deliberately were pulled along with the known or presumptive type specimens in the process of going through the main herbarium. The person who compiled Carex data attempted to sort out the nontype material, and further culling was done during the editorial process. Undoubtedly some nontype material still remains in the present Catalog, although it seems unlikely that the percentage of such specimens is much if any higher for NY at this stage than for any of the other nine herbaria. In any event, it will be a simple matter to delete nontypes from the file as they are discovered and brought to the attention of the Type Register editors in the future.

Once the NY data were merged fully with the US and MO data, a union catalog was delivered to Harvard University for additions from A and GH. At Harvard, data on types of taxa already registered were annotated in the catalog, and data for taxa new to the catalog were compiled on standard forms. In general, Harvard provided only specimen data, and the bibliographic data were looked up and supplied later by the Type Register staff at the Smithsonian before annotations and new records were captured and merged with the US + MO + NY machine file.

When the annotated catalog was returned from Harvard, the A and GH annotations were transcribed to the main working catalog at the Smithsonian, and then the Harvard catalog, as annotated, was sent to the Field Museum of Natural History. Sent with the annotated catalog were photocopies of the data forms for the new taxa added by A and GH. In this way it was possible to give the collaborators at F the benefit of the new data supplied by A and GH immediately, while the capture of these new data was still in progress at the Smithsonian. As a further aid to their work, the collaborators at F were provided with an index by collector and collector's number to the US + MO + NY catalog.

The collaborators in the San Francisco Bay area were provided with a new catalog incorporating the A and GH data along with the US, MO, and NY data, and this catalog also included an index by collector and collector's number. This catalog was annotated by them with new data from CAS, DS, JEPS, and UC on taxa already registered, and data for taxa new to the file were compiled on standard forms. The annotated catalog and completed forms then were returned to the Smithsonian Institution for input to the system.

At CAS, DS, F, JEPS, and UC the data were compiled in the first instance from the specimens in the herbarium, but in most cases the original publications also were checked when taxa new to the file were involved. Otherwise the bibliographic data were obtained from secondary sources. The original literature was checked for taxon additions without exception at F.

In summary, a round-robin procedure of sorts was used to collect the data. To the extent possible, each new collaborating institution was given the benefit of the latest cumulative catalog incorporating the contributions of previous collaborating herbaria. In this way, maximum advantage could be taken of previous herbarium and library research, and duplication of effort was kept to a minimum. Once the combined data of CAS, DS, JEPS, and UC were returned to the Smithsonian, the data-collection phase was closed out and final editing began.

**Editorial Process**

All entries were edited in accordance with the principles and procedures set forth in the first part, and the editors take final responsibility for the form and style and all other editorial matters of the present Catalog. To integrate new contributions into the accumulating data base, differences between supposedly identical records from different institutions constantly had to be reconciled by turning to standard references and the original literature. Whenever possible, record content was verified by checking the original publication. In the end, nearly every original description cited in the Catalog was seen at least once by the editors and in many cases several times. In many cases, furthermore, the designation of kind of type was validated
according to the ICBN; however, because much of the checking of original literature was done by a technical editor, untrained in the application of the type method and terminology, many of the records were verified without being validated, to use the distinction defined in an earlier section (p. 00). According to this distinction, the development of the Carex file of the Type Register can be said to have attained the Stage 2 “verification” level overall, with some records still at the Stage 1 “registration” level and with a substantial number of others having been “validated” more or less according to Stage 3 standards. Of course the careful scrutiny of specialists, with appropriate feedback from them, is needed over a period of years before the present Carex file can be said to have truly attained Stage 3 development.

While the bibliographic data could be double-checked or supplied (if not provided in the first place) by examining the original publication, the specimen data could be verified in this way only to the extent that the publications gave corroborating details. Ultimately, therefore, each contributing institution is responsible for the reliability of its own specimen data. In the case of NY, however, the editors, who assisted in the data collection itself, share responsibility for the reliability of the specimen data. In any event, citations always were checked against Index Kewensis and/or the Gray Herbarium Index if the original publications could not be examined.

Editing of this type of open-ended file, in which considerable subjective judgment is required, is a never-ending process, and a reasonable degree of thoroughness is achieved only after many editorial “passes” through the file. The editing proceeded in a series of phases and cycles in which all records were examined at a time, by means of inverted listings or indices, for consistency and accuracy, and updated printouts were obtained for another editorial round. Thus, for example, title citations were standardized in one editorial phase, while names of authors were standardized in another phase. The editorial corrections for all fields then were merged into a common working hard-copy of the file before the process of updating the machine file was begun. After one cycle of such editing was finished and the file was thought to be “clean,” a new catalog and set of indices were printed out. Then a whole new cycle of editing was begun. This iterative process continued until the editing began to yield diminishing returns and it became necessary to bring the never-ending process to a reasonable stopping point, which the present Catalog is believed to represent. In such a dynamic system, editorial perfection is relative at best, and at this stage the editors certainly make no claim to perfection in any sense of the word, although every effort has been made to be thorough and consistent.

**Milestone Events**

Computerized data banks are a new development in biology, and there is still much to be learned about the mechanics of creating and maintaining them. The process is all too easily underestimated, especially with respect to manpower requirements, and overly optimistic timetables are the rule. An enormous effort on the part of many individuals went into the creation of the Carex Catalog over a period of more than two years. During this time the tedious editorial work seemed to go on endlessly, while technical problems with the systems development and processing also came in a steady stream. The following chronology of milestones in the more than two-year process has a two-fold purpose—first, to provide a practical example of the laborious steps involved in creating a data bank, and, second, to caution against overenthusiasm and oversimplification on the part of others contemplating similar efforts. It must be stressed, however, that all during the two and one-half years other taxonomic groups were being input to the Type Register along with Carex, and it never was possible to work exclusively on Carex.

**1970**

January  Decision made to begin work on genus as part of FNA Carex project. Editing of data in US card file begun.

February  Collection of data begun at MO and first records returned to US for input. Photocopies of all Carex records in US card file sent to MO.

March     New data-capture procedure organized using online, text-editing system.

April     All US and MO records input, totaling just over 200 taxa and about 250 specimens.

May       First printout of US + MO records produced and edited, and machine file updated. Second printout produced, and copy sent to NY.
May

April

March

February

January

December

November

September

August

July

June

1972

1971

Second printout of US + MO records edited, and machine file updated.

Members of Type Register staff worked at NY for last two weeks during which time all NY Carex records (200+ taxa, 300 specimens), along with records of other groups, were input to the system on-line via telephone to computer in Washington, D.C.

First printout of new taxa added to file by NY produced.

Report on progress to meeting of FNA Program Council in Miami, Florida.

Arrangements made for CAS, DS, JEPS, and UC to contribute, and necessary materials supplied.

Copy of collector index sent to MO.

Critique of sample catalog of 100 Carex received from F. J. Hermann.

Editing of A and GH data completed, and records input to system.

Data collection at F completed.


Four indices in preliminary format generated.

COBOL paragraphing (concatenating) program designed, written, and debugged; GIS/COBOL interface programmed and tested.

All data returned from F to US for input.

All data returned by CAS, DS, JEPS, and UC. Limited input with magnetic cartridge system begun.

Computer program for listing and tallying taxa in Type Register tested.

Data collection phase essentially brought to close.

Sample catalog produced using COBOL concatenation program.

Annotations from catalog used by F and from catalog used by CAS, DS, JEPS, and UC transferred to working copy.

Editing and final data capture continued apace.

COBOL concatenation program, including GIS interface, tested satisfactorily.

New cumulative catalog printed, including 600 taxa, 667 collections, and 854 specimens.

Nine indices printed for final field-by-field editing.

Writing of introductory sections of this paper begun.

New catalog printed, including 609 taxa, 615 collections, and 1,050 specimens.

New set of nine indices also produced.

Editing and updating of file continued.

Final prepublication edition of Catalog printed, along with indices, which included 606 taxa, 612 collections, and 1,059 specimens.

Final format of Catalog established after various tests with COBOL program.

Several types of computer paper tested.

Camera-ready copy of present Catalog and indices produced for Smithsonian Institution Press, including same data base as final catalog in May.

Manuscript and camera-ready copy of Catalog and indices sent to press.
The decision to use Carex for the trial publication was made in September 1970, exactly two years before the manuscript finally went to press. What is obvious from this chronology is that for every additional collaborating institution the preparation of a final catalog is delayed at least a few months. Under the best of circumstances, turnaround time between cycles of data-collecting, editing, and processing quickly add up to days, weeks, and months. Clearly, the task of creating a database of this type is limitless ultimately, and definite bounds must be established if the dynamic process is ever to stand still long enough to yield meaningful products. Desirable as it would have been, therefore, to include many more herbaria in this Catalog, the line had to be drawn finally. If the Catalog had been closed off after the MO, NY, and US contributions, as originally planned, it would have gone to press a year earlier, in mid-1971. The addition of seven more herbaria, including several key ones, surely justifies the year’s delay, but it is doubtful that further delays could be justified at this time for any other herbaria. We believe that it is vitally important now to get the concept of the Type Register across to the botanical community through the medium of the Carex Catalog without further delay.

Use of Carex Catalog

The Carex Catalog consists of the “Catalog of Specimens” and cross-indices to the “Catalog of Specimens” by five different fields (descriptors): (1) “Author Index,” (2) “Publication-Date Index,” (3) “Collector Index,” (4) “Geographic Index,” and (5) “Herbarium Index.” (Hereafter the term “Catalog” is used for the “Catalog of Specimens” proper.) The Catalog is arranged alphabetically by taxon and includes the full unit-record for each taxon, as it is stored in the computer, except for the family and genus names, the data source codes, and several file-control dates and numbers. The family name and genus name, Cyperaceae and Carex, respectively, have been omitted because they are the same for all taxa and, printed at the top of each entry, would constitute unnecessary words that would tend only to hide the key words for alphabetization, the epithets. The Catalog is alphabetized, therefore, by the specific and infraspecific epithets.

The indices, in addition to providing access to the Catalog by other criteria than the taxonomic name, represent data files in their own right which may serve a user’s purpose without his ever taking recourse to the main Catalog. They are independent data files because they all include the name of the taxon and one or more other fields that place the key indexing field in the context of related data. The data source code has not been included record by record because it is usually 0s; furthermore, the classification of sources has been in use for only a short time and was not used throughout the development of the Carex Catalog (see “Data Source Code”).

The Catalog provides citations of original authors and publications, data on type collections, and a list of type specimens known to exist in the ten herbaria surveyed—all subordinated to the taxonomic name. No taxa are included that are not represented by at least one specimen in at least one of the ten herbaria. The organization of the data in the paragraphed unit-entry is as follows:

SPECIFIC EPITHET/RANK/INFRASPECIFIC EPITHET/AUTHOR OF NAME, CITATION OF ORIGINAL PUBLICATION, DATE OF PUBLICATION, COUNTRY: STATE OR PROVINCE: COUNTY: LOCALITY (COMMENT IF ANY) (COLLECTOR, COLLECTOR’S NUMBER, DATE OF COLLECTION) HERBARIUM ABBREVIATION/SHEET NUMBER/KIND OF TYPE HERBARIUM ABBREVIATION [etc., for additional specimen] COUNTRY [etc., for additional collection] HERBARIUM ABBREVIATION [etc.]

The five indices are all cross-referenced to the Catalog by means of the specific epithet instead of a page or record number because the unit records in the Catalog are alphabetical by epithet, allowing for fast look-up. Space did not permit printing infraspecific epithets in four of the indices; therefore, the specific epithet is prefixed by an asterisk (*) if the record being cross-referenced is not the species itself but one of its infraspecific taxa. This device should permit the user to get to the desired entry almost as quickly as if the infraspecific epithet had been printed, as in the “Herbarium Index.” Content and format are more or less self-evident in each of the indices. It should be emphasized that these are only five of an almost infinite number of possible indices. Furthermore, they all were generated directly from the exact same data base from which
the Catalog itself was produced and have identical data wherever content overlaps.

The purpose of the “Author Index” is to point to all taxa in the Catalog described by a particular author or combination of authors, and, therefore, the Index is alphabetized primarily by author and secondarily by specific epithet. Combinations of authors are alphabetized as combinations, not as individual authors, owing to present system limitations. A person interested in a particular taxon described by a particular author or author combination can learn quickly from the Index whether there is an entry in the Catalog for this taxon and then go to it. Persons wishing to study an author's descriptions chronologically, by year of publication, would want to have this Index resequenced with the date rather than the epithet being the secondary sort-key.

The primary sort-key of the “Publication-Date Index” is the year of publication, from the oldest to the youngest, the actual range being from 1803 to 1971. Within each year the secondary sort-key is the specific epithet, which references an entry in the Catalog. This Index should be useful to those who are interested in nomenclatural priority in the genus or in tracing the historical development of knowledge about *Carex*. By itself, the Index, which includes the name of the author or author combination, is a chronological summary of the botanists who have described species in the genus as registered in the Catalog.

The “Collector Index” is in effect a list by collector of collections cited in the Catalog and provides a convenient means of checking any herbarium for type material of taxa recorded thus far in the *Carex* file of the Type Register. Under the name of each collector or combination of collectors are listed the numbers and dates of all collections in the Catalog, cross-referenced by the specific epithets. The name is the primary sort-key, and the specific epithet is the secondary sort-key. A variation of this Index would include a list of all herbaria in which the collector’s type specimens are deposited. In other words, the kind of guide to the location of types that A. S. Hitchcock and his colleagues were trying to compile directly in the 1930s (see “Introduction”) can be produced as a by-product of the Type Register data base. Some interesting observations can be made by comparing the “Collector Index” with the “Author Index.” It becomes clear at once, for example, that while some authors collected almost as many new taxa as they described, others described many more than they collected. Further examination indicates that this difference may reflect the difference between a floristic taxonomist like M. L. Fernald, who tended to describe his own species, and a monographic worker like K. K. Mackenzie, who described taxa from among specimens of many collectors amassed for a study of the genus.

The “Geographic Index” provides access to the collections of the Catalog primarily by country of origin and secondarily by state, province, or equivalent. The specific epithet, which is the cross-reference to the Catalog, is the tertiary sort-key. The value of this Index will be obvious at once to floristic workers who wish to know which taxa in their region are typified by specimens collected within the region, e.g., within the State of California.

The “Herbarium Index,” alphabetized in the first instance by institution, lists alphabetically by specific and infraspecific epithets under each of the ten institutions the taxa in the Catalog for which they hold type specimens. The herbarium sheet number, if there is one, and the kind of type are listed also. The sheet number is the tertiary sort-key. Many of the type designations have not been validated, and the problems of validating kind of type have been discussed at length earlier in this paper (pp. 8 and 19-21). For this reason many of the type specimens registered still carry the original designation of the herbarium submitting the data.

The following informal or archaic terms, which appear in the Catalog and in the “Herbarium Index” but which are not sanctioned by the *ICBN*, require brief definition of their meaning or apparent meaning in the Catalog. It should be pointed out, however, that the presence of a correct term (e.g., holotype, isotype) is no guarantee that it has been used correctly. A large number of the designations have been validated, and where the terminology seems to be used consistently within a collection, e.g., where one holotype and one or more isotypes are indicated, it can be assumed that the designations were validated.
**cotype**  Presumptive syntype or isosyntype, but may be isotype or paratype, if a type at all.

**type**  Presumptive holotype, but may be isotype, syntype, isosyntype, or paratype, if a type at all.

**type collection**  Term used in a proper sense for a specimen of a single collection cited by original author without designating a holotype—in this sense, a syntype or isosyntype according to ICBN (see pp. 19-21); otherwise term flags a presumptive syntype, isosyntype, paratype, or even isotype, if a type at all.

**type fragment**  Presumably fragment of the holotype, but may be fragment of isotype, syntype, isosyntype, paratype, or other kind of type, if of type at all.

**type material**  Presumptive type specimen of some kind—catchall term.

The Catalog and Indices were printed by computer directly from the data base, and not a single change has been made. What is presented here is exactly what was stored on the machine file as of 16 June 1972, with the exception of punctuation between fields which may have been added in the process of concatenation. Because the system provided only for printing in upper case letters, possibilities for variation of typography were limited. **Boldfacing** by overprinting the same words two or more times was used for the specific and infraspecific epithets, and in the process it was necessary also to boldface rank designators connecting epithets. Thus the taxon names stand out from the rest of the text and facilitate searching the Catalog. Insofar as practical, the standard conventions of punctuation in nomenclatural literature were used.

**Errata**

Several errors were detected in the Catalog after the camera-ready copy had been produced. By record number in the Catalog, these are:

No. 2. **ABLATA** BAILEY, L. H. The citation following the author's name is to the place where the neotype is designated, because the original publication did not designate a type specimen, and the citation of Bailey's original publication is cited as a parenthetic remark at the end of the geographic locality. To be consistent with the rest of the Catalog, however, where the citation after the author is always the citation of the original publication, the editors should have reversed the two citations in this record. As a result of this editorial error, Bailey in the “Author Index” and “Publication-Date Index” appears to have described *C. ablata* in 1935, when Mackenzie designated the neotype, rather than in 1888. This error does point up the problem of dealing with neotypes, however, and a certain logic can be advanced for either way of handling the two citations.

No. 99. **CHIHUAHUAENSIS**. Spell CHIHUAHUENSIS, omitting second “A.”

No. 418. **PIRCHINCHENSIS**. Spell PICHINCHENSIS, omitting "R."

No. 424. **PLUVICA**. Spell PLUVIA, omitting "C."

No. 446. **PURPUREOVAGINATA**. Spell PURPUREOVAGINATA, inserting hyphen.

No. 448. **PYCNOTHYROS**. Spell PYCNOTHYRSOS, inserting "R."

No. 544. **TENERA VAR. RICHII** FERNALD, M. L. At the end of the geographic locality, MIDDLESEX FALLS should read MIDDLESEX FELLS.

No. 549. **TERRAE-NOVAE** FERNALD, M. L. The hyphen should be removed from the collector's name GILBERT-JR., F.A. The practice of joining Jr. to the end of the collector's or author's last name by a hyphen in this manner was required by the specifications of the pilot processing system, but this requirement no longer obtains.

**Note:** Changes in spelling of specific epithets also apply wherever these epithets have appeared in the indices.

**Statistical Summary of Catalog**

- 606 taxa (species, subspecies—SSP, varieties—VAR, forms—FOR, nothomorphs—NM.)
- 612 collections
- 1,059 specimens (sheets)
CATALOG OF SPECIMENS

-A-

1. **ABDITA** BICKNELL, E.P., BULL. TORREY BOT. CLUB 35:492. 1908.
   USA: NEW YORK: LONG ISLAND, RICHMOND HILL (BICKNELL, E.P., ---.
   11 MAY 1904)
   NY TYPE

   CANADA: BRITISH COLUMBIA: VANCOUVER ISLAND, MOUNT MARK; ALT.
   2500 FT.; (ORG. PUB.: BOT. GAZ. 13:82. 1888.) (MACOUN, JOHN,
   13401. 26 JUL 1887)
   GH ISONEOTYPE
   NY ISONEOTYPE

3. **ABORIGINUM** JONES, M.E., BULL. MONTANA STATE UNIV., BIOL. SER. 15:69.
   1910.
   USA: IDAHO: ADAMS CO.: INDIAN VALLEY; ALT. 2300 FT.
   (JONES, M.E., ---, 12 JUL 1899)
   CAS 242617 ISOTYPE
   DS 149709 ISOTYPE
   NY ISOTYPE

4. **ABRAMSII** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 36:482. 1909.
   USA: CALIFORNIA: SAN BERNARDINO CO.: SAN BERNARDINO MOUNTAINS,
   BEAR VALLEY (ABRAMS, L., 2816. 31 JUL 1902)
   DS 55317 ISOTYPE
   F 186491 ISOTYPE
   NY HOLOTYPE

5. **ABRUPTA** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 43:618. 1916.
   USA: CALIFORNIA: BUTTE CO.: STIRLING CITY; ALT. 3000 FT.
   (HELLER, A.A., 10820. 07 JUN 1913)
   DS 64125 ISOTYPE
   NY HOLOTYPE

   USA: VIRGINIA: ISLE OF WIGHT CO.: LEE'S MILL (FERNALD, M.L. AND
   LONG, B., 12012. 08 JUN 1940)
   GH ISOTYPE
   MO TYPE COLLECTION
   NY TYPE COLLECTION
   US 2003161 TYPE COLLECTION

   USA: VIRGINIA: SUSSEX CO.: NOTTOWAY RIVER, HUSKE (FERNALD, M.L.
   AND LONG, B., 12969. 13 JUN 1941)
   GH HOLOTYPE
   GH ISOTYPE
   MO 1306480 ISOTYPE
8. **ACCEDENS** HOLM, H.T., AMER. J. SCI. SER. 4, 16:457. 1903.
   USA: OREGON: MULTNOMAH CO.: SAUVIE ISLAND (COLUMBIA RIVER AT MOUTH OF WILLAMETTE RIVER) (HOWELL, T.J., ----. -- MAY 1880)
   GH SYNTYPE
   MO SYNTYPE

   INDONESIA: WEST NEW GUINEA: LAKE HABBEWA; (COUNTRY AS "DUTCH NEW GUINEA") (BRASS, L.J., 9515. -- AUG 1938)
   A ISOTYPE

10. **ACUTA VAR. PALLIDA** BOOTT, F., ILL. GENUS CAREX 4:166, PL.554. 1867.
    USA: OREGON: "FORT COLVILLE TO ROCKY MOUNTAINS, WEST KOOTENAY" (LYALL, DAVID, ----. -- --- 1861)
    GH TYPE COLLECTION

11. **ACUTINA** BAILEY, L.H., MEM. TORREY BOT. CLUB 1:52. 1889.
    USA: OREGON: DESCHUTES RIVER (HOWELL, T.J., 935. 09 MAY 1885)
    F 206585 TYPE MATERIAL
    GH ISOTYPE
    NY TYPE COLLECTION
    US 25164 TYPE COLLECTION
    US 817087 TYPE COLLECTION

    USA: OREGON: -- (HENDERSON, L.F., 13. -- --- 1883)
    US 27286 HOLOTYPE

    CANADA: NEW BRUNSWICK: KENT CO.: SALMON RIVER (FOWLER, J., ----. -- --- 1872)
    GH SYNTYPE

    USA: NEW HAMPSHIRE: GRAFTON CO.: FRANCONIA, FOREST HILLS HOUSE (FAXON, E. AND FAXON, C.E., ----. 23 JUN 1888)
    GH SYNTYPE

15. **AEQUA** CLARKE, C.B., BULL. MISC. INFORM. ADD. SER. 8:86. 1908.
    USA: CALIFORNIA: SAN MATEO CO.: SAN MATEO, CRYSTAL SPRINGS LAKE (BAKER, C.F., 811. 10 MAY 1902)
    GH TYPE COLLECTION
    NY TYPE COLLECTION

    USA: NEW JERSEY: PASSAIC CO.: GREENWOOD LAKE (MACKENZIE, K.K., 2676. 23 JUN 1907)
    GH ISOTYPE
   USA: NORTH CAROLINA: -- (CURTIS, M.A., ----. -- JUL 1841)
   MO TYPE MATERIAL
   NY TYPE MATERIAL

18. **AGGLOMERATA** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 33:442. 1906.
   25 MAY 1902)
   MO TYPE COLLECTION
   US 440179 TYPE COLLECTION

   25 MAY 1902)
   NY TYPE

20. **AGROSTOIDES** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 34:607. 1907.
    USA: NEW MEXICO: SOCORRO CO.: LUNA; ALT. 6500 FT. (WOOTON, E.O., ----. 28 JUL 1900)
    US 617798 TYPE
    US 694342 TYPE

    USA: NORTH CAROLINA: CRAVEN CO.: NEW BERN (CROOM, H.B., ----. ---- 1834)
    NY SYNTYPE

    USA: OHIO: -- (SULLIVANT, W.S., ----. ----)
    GH HOLOTYPE

    USA: CALIFORNIA: SANTA ROSA CREEK (BIGELOW, J.M., ----. ---- 1853-1854)
    NY TYPE COLLECTION

    USA: WYOMING: PARK CO.: NEEDLE MOUNTAIN (CARY, M., 613.
    11 JUL 1910)
    US 858947 TYPE COLLECTION

25. **ALMA** BAILEY, L.H., MEM. TORREY BOT. CLUB 1:50. 1889.
    ---- 1876)
    CAS 497554 ISOTYPE
    NY ISOTYPE

26. **ALOPECOIDEA** TUCKERMAN, E., ENUM. CARIC. 18. 1843.
USA: NEW YORK: YATES CO.: PENN YAN (SARTWELL, H.P., ---- ----)
F  32699 ISOTYPE
F  32700 ISOTYPE
F  56916 ISOTYPE
F  349624 ISOTYPE
F  373673 ISOTYPE
F  373679 ISOTYPE
GH ISOTYPE
NY ISOTYPE

27. ALOPECOIDEA VAR. SPARSI-SPICATA DEWEY, C., AMER. J. SCI. ARTS
SER. 2, 8:350. 1849.
USA: MICHIGAN: MACOMB CO.: WASHINGTON (COOLEY, D., 74. ----)
CAS 553879 ISOTYPE
GH ISOTYPE
NY ISOTYPE

USA: LOUISIANA: ORLEANS PARISH: NEW ORLEANS (DRUMMOND, T., 437. ----)
NY TYPE COLLECTION

USA: NEW YORK: TOMPKINS CO.: ITHACA (WIEGAND, K. M. AND
THOMAS, C. C., 1915. 15 JUN 1914)
GH HOLOTYPE

USA: GEORGIA: GILMER CO.: CHATSWORTH (PYRON, J. H. AND
MCVAUGH, R., 2951. 15 MAY 1938)
US 2231424 TYPE

31. ANGSTOR MACKENZIE, K. K. IN RYDBERG, P. A., FL. ROCKY MOUNT.
124, 1060. 1917.
USA: DISTRICT OF COLUMBIA: -- (STEELE, E. S., ---- ---- 1896)
NY TYPE COLLECTION

32. ANGSTOR VAR. GRACILENTA CLAUSEN, R. T. AND WAHL, H. A., RHODORA
41:30. 1939.
USA: PENNSYLVANIA: CENTRE CO.: INGLEBY (CLAUSEN, R. T. AND
WAHL, H. A., 2532. 06 JUN 1937)
GH TYPE

33. ANTHOXANTHERA PRESL, K. B., REL. HAENK. 3:203. 1828.
USA: ALASKA: NUTKA SOUND ("SINUS NUTKA") (HAENKE, T., ---- ----)
US 865058 TYPE

34. APERTA BOOTT, F., IN HOOKER, W. J., FL. BOR.-AMER. 2:218.
1839 ("1840").
USA: WASHINGTON: COLUMBIA RIVER (SCOUler, J., ---- ----)
GH SYNTYPE

35. APERTA VAR. UMBROSA KUKENTHAL, G., REPERT. SP. NOV. REGNI VEG.
26:254. 1929.
USA: WASHINGTON: KLEICKITAT CO.: BINGEN (SUUKSDORF, W.N., 12347.
---)
CAS 242962 ISOTYPE

36. APERTA VAR. VIRIDANS KUKENTHAL, G., REPERT. SP. NOV. REGNI VEG.
26:254. 1929.
15 SEP-23 OCT 1927)
CAS 242961 SYNTYPE
USA: WASHINGTON: KLEICKITAT CO.: BINGEN (SUUKSDORF, W.N., 12359.
23 OCT 1927)
CAS 242960 SYNTYPE

37. APODA CLOKEY, I.W., AMER. J. SCI. SER. 5, 3:88, PL. 2. 1922.
USA: IDAHO: CUSTER CO.: MACKAY (NELSON, A. AND MACBRIDE, J.F.,
1533. 01 AUG 1911)
NY ISOTYPE
UC 905439 HOLOTYP E

38. APODOSTACHYA OHWI, J., JAP. J. BOT. 7:188. 1934.
TAIWAN: --: MOUNT NANKO-TAISAN (OHWI, J., 4182. -- JUL 1933)
F 1464064 TYPE MATERIAL

1803.
USA: NEW YORK: SENECA CO.: JUNIUS (SARTWELL, H.P., 56. ---)
NY TYPE COLLECTION

40. AQUATILIS VAR. SUBSTRICTA KUKENTHAL, G. IN ENGLER, H.G.A., PFLANZENR.
USA: NEW YORK: SENECA CO.: JUNIUS (SARTWELL, H.P., 56. ---)
CAS 554019 ISOTYPE
GH ISOTYPE
MO TYPE COLLECTION

41. ARAPAHOENSIS CLOKEY, I.W., RHODORA 21:83. 1919.
USA: COLORADO: BOULDER CO.: MOUNT ARAPAHOE; ALT. 11700 FT.
(CLOKEY, I.W., 3227. 29 JUL 1918)
CAS 102030 ISOTYPE
DS 109019 ISOTYPE
GH ISOTYPE
NY ISOTYPE
UC 905436 HOLOTYP E

42. ARCTAEFORMIS MACKENZIE, K.K., N. AMER. FL. 18:97. 1931.
CANADA: BRITISH COLUMBIA: ELGIN (HENRY, J.K., 9152.
C4 JUN 1915)
NY TYPE

43. ARCTICA DEWEY, C., AMER. J. SCI. ARTS SER. 1, 27:239. 1835.
CANADA: SASKATCHEWAN: CARLTON HOUSE (52 51'N., 106 13'W.)
(RICHARDSON, J., ---. ---)
44. **ARGYRANTHA** TUCKERMAN, E. EX DEWEY, C., AMER. J. SCI. ARTS
   SER. 2, 29:346. 1860.
   USA: MASSACHUSETTS: HAMPSHIRE CO.: AMHERST (TUCKERMAN, E., ---)
   GH HOLOTYPE
   GH ISOTYPE

45. **ARISTATA VAR. LONGO-LANCEOLATA** DEWEY, C., AMER. J. SCI. ARTS
   SER. 2, 18:102. 1854.
   USA: NEBRASKA: BAD LANDS ("MAUVAIS TERRES") (HAYDEN, F.V., ---)
   -- --- 1853
   GH HOLOTYPE

46. **ARSENII** KUKENTHAL, G., REPERT. SP. NOV. REGNI VEG. 8:326. 1910.
   MEXICO: MICHOACAN: MORELIA (ARSENE, G. (FRERE), 3054.
   16 JUL 1909
   GH ISOTYPE
   NY ISOTYPE
   US 1030011 TYPE COLLECTION

47. **ARTITECTA VAR. SUBTILIROSTRIS** HERMANN, F.J., RHODORA 40:79. 1938.
   USA: INDIANA: VERMILLION CO.: CLINTON (DEAM, C.C., 54764.
   05 MAY 1934
   GH HOLOTYPE

48. **ASSINIBOINensis** BOOTT, W., BOT. GAZ. 9:91. 1884.
   CANADA: MANITOBA: ASSINIBOINE RAPIDS (MACOUN, JOHN, 52.
   14 JUN 1879)
   GH SYNTYPE

   CANADA: ALBERTA: JASPER NATIONAL PARK, ATHABASCA RIVER,
   ATHABASCA FALLS (HERMANN, F.J., 13498. 28 AUG 1956)
   US 2265958 HOLOTYPE

50. **ATHROSTACHYA** OLNEY, S.T. IN GRAY, A., PROC. AMER. ACAD. ARTS 7:393.
   1868.
   USA: CALIFORNIA: MARIPOSA CO.: YOSEMITE NATIONAL PARK,
   YOSEMITE VALLEY (BOLANDER, H.N., 6213. 17 JUN 1863)
   NY SYNTYPE
   US 319165 SYNTYPE
   USA: CALIFORNIA: MARIPOSA CO.: YOSEMITE NATIONAL PARK,
   YOSEMITE VALLEY (BREWER, W.H., 1650. 17 JUN 1863)
   MO SYNTYPE
   NY SYNTYPE

   MEXICO: CHIAPAS: COMITAN (SHARP, A.J., 45450. 29 APR 1945)
   NY ISOTYPE
   US 2133192 TYPE
52. **ATROFUSCA VAR. DECOLORATA PORSILD, A.E., SARGENTIA 4:20. 1943.**
    CANADA: NORTHWEST TERRITORIES: MACKENZIE DISTRICT: GREAT BEAR LAKE, CAPE MCDONNELL (PORSILD, A.E. AND PORSILD, R.T., 5120. 02 AUG 1928)
    US 2096188 ISOTYPE

53. **ATROSQUAMA MACKENZIE, K.K., PROC. BIOL. SOC. WASH. 25:51. 1912.**
    CANADA: ALBERTA: SMOKY RIVER (HOLLISTER, N., 14. 05 AUG 1911)
    NY ISOTYPE
    US 622651 HOLOTYPE

54. **AUREA VAR. ANDROGYNA OLNEY, S.T. IN WATSON, S.,**
    BOT. U.S. GEOLOG. EXPLOR. 40TH PAR. 371. 1871.
    USA: PENNSYLVANIA: ERIE CO.: ERIE, PRESQUE ISLE (PENINSULA)
    (GARBER, A.P., ---. 09 JUN 1869)
    NY ISOTYPE

55. **AUROLENSIS STEUDEL, E.G., SYN. PL. GLUM. 2:223. 1855.**
    USA: LOUISIANA: ORLEANS PARISH: NEW ORLEANS (DRUMMOND, T., 431. ---. 1832)
    NY TYPE COLLECTION

56. **AUSTRO-CAROLINIANA BAILEY, L.H., BULL. TORREY BOT. CLUB 20:428. 1893.**
    USA: SOUTH CAROLINA: PICKENS CO.: TABLE MOUNTAIN (BUCKLEY, S.B., ---. ---)
    MO 1834152 HOLOTYPE

57. **AUSTROMONTANA PARISH, S.B., BULL. S. CALIF. ACAD. SCI. 4:108, PL.15. 1905.**
    USA: CALIFORNIA: SAN BERNARDINO CO.: MILL CREEK FALLS; ALT. 6000 FT. (PARISH, S.B., 2485. 03 JUL 1892)
    DS 489410 HOLOTYPE

58. **AUTUMNALIS MACKENZIE, K.K., N. AMER. FL. 18:66. 1931.**
    MEXICO: MEXICO: FLOR DE MARIA (PRINGLE, C.G., 4275. 03 OCT 1892)
    F 264169 ISOTYPE
    MO ISOTYPE
    US 817295 HOLOTYPE

59. **AZTECICA MACKENZIE, K.K., N. AMER. FL. 18:229. 1935.**
    MEXICO: OAXACA: SIERRA DE SAN FELIPE; ALT. 2300 M. (PRINGLE, C.G., 4839. 19 AUG 1894)
    GH TYPE COLLECTION
    MO TYPE COLLECTION

60. **AZUAYAE STEYERMARK, J.A., PHYTOLOGIA 9:337. 1964.**
    ECUADOR: AZUAY: TOREADOR (STEYERMARK, J.A., 53105. 15 JUN 1943)
    F 1266184 TYPE MATERIAL
    NY ISOTYPE
    US 1933437 ISOTYPE
61. BACKANA DEWEY, C., AMER. J. SCI. ARTS SER. 1, 29:250. 1836.
CANADA: SASKATCHEWAN: CARLTON HOUSE (52 51° N., 106 13° W.)
(RICHARDSON, J., 417. ---)
GH SYNTYPE
NY TYPE COLLECTION

1839 ("1840").
CANADA: SASKATCHEWAN: CARLTON HOUSE (52 51° N., 106 13° W.)
(RICHARDSON, J., ---. ---)
GH SYNTYPE
NY SYNTYPE

63. BALTZELII CHAPMAN, A.W. EX DEWEY, C., AMER. J. SCI. ARTS
SER. 2, 3:335. 1847.
USA: FLORIDA: BEAR CREEK (CHAPMAN, A.W., ---. ---) NY COTYPE

64. BAMBUSETORUM MERRILL, E.D., PHILIPP. J. SCI. 13:132. 1918.
CHINA: KWANGTUNG: LOH-FAU-SHAN (MOUNTAIN) (MERRILL, E.D., 10985.
12 AUG 1917)
US 2333748 ISOTYPE

ARGENTINA: TIERRA DEL FUEGO (TERRITORY): TIERRA DEL FUEGO
(BANKS, J. AND SOLANDER, D.C., ---. --- 1769)
MO 1611724 SYNTYPE
US 1232938 SYNTYPE

66. BARBARA DEWEY, C. IN TORREY, J. IN EMMORY, W.H.,
REP. U.S. MEX. BOUND. SURV., BOT. 2(1):231. 1859.
USA: CALIFORNIA: LOS ANGELES CO.: SANTA BARBARA (PARRY, C.C.,
---. --- 1850)
GH HOLOTYPE
NY ISOTYPE

67. BARRATTII SCHWEINITZ, L.D. AND TORREY, J.,
ANN. LYCEUM NAT. HIST. NEW YORK 1:361. 1824.
USA: NEW JERSEY: CAPE MAY CO.: CAPE MAY (COLLINS, Z., ---. ---)
NY TYPE COLLECTION

68. BARTLETTII O’NEILL, H.T., PUBL. CARNEGIE INST. WASH. 522:255. 1940.
BRITISH HONDURAS: CAYO: MOUNT PINE RIDGE (BARTLETT, H.H.,
11718A. 24 FEB 1931)
F 999642 TYPE MATERIAL
GH ISOTYPE
NY TYPE

69. BAYARDI FERNALD, M.L., RHODORA 44:71. 1942.
USA: VIRGINIA: SOUTHAMPTON CO.: DREWRYVILLE (FERNALD, M.L.; LONG, B. AND SMART, R.F., 5677. 22 JUN 1936)
GH HOLOTYPE

70. **BILTMOREANA** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 37:234. 1910.
USA: NORTH CAROLINA: SATULA MOUNTAIN (----, 268B. 25 MAY 1897)
GH ISOTYPE
NY TYPE

USA: COLORADO: BOULDER CO.: NEDERLAND, NOWIT RIDGE; ALT. 11500 FT. (HERMANN, F.J., 17059. 15 AUG 1961)
CAS 430881 ISOTYPE

CANADA: YUKON TERRITORY: BONANZA RIVER (WILLIAMS, R.S., ----. 18 JUN 1899)
NY TYPE

73. **BONPLANDII VAR. MINOR** BOOTT, F. IN GRAY, A., PROC. ACAD. NAT. SCI. PHILADELPHIA 1863:77. 1863.
F 314869 ISOTYPE
F 456934 ISOTYPE
GH HOLOTYPE
MO ISOTYPE

USA: OREGON: KLAMATH CO.: CRATER LAKE NATIONAL PARK, CATHEDRAL SPRING (COVILLE, F.V., 1455. 11 SEP 1902)
US 415269 TYPE COLLECTION

75. **BRAINERDII** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 40:534. 1913.
USA: CALIFORNIA: EL DORADO CO.: SIERRA NEVADA RANGE, SLIPPERY FORD (BRAINERD, E., 121. 19 JUL 1897)
US 964504 TYPE COLLECTION

76. **BREVICAULIS** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 40:547. 1913.
USA: OREGON: LINCOLN CO.: YAQUINA BAY (HOWELL, T.J., 2994. -- MAY 1886)
NY TYPE COLLECTION

PAPUA AND NEW GUINEA: PAPUA (TERRITORY): OWEN STANLEY RANGE, MOUNT ALBERT EDWARD; (COUNTRY AS "BRITISH NEW GUINEA") (BRASS, L.J., 4418. -- MAY-JUL 1933)
A ISOTYPE

78. **BREVISQUAMA** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 34:152. 1907.
USA: WYOMING: SWEETWATER CO.: RED DESERT, ORENDO BUTTE (NELSON, A., 7124. 11 JUN 1900)
79. BREWERI BOOTT, F., ILL. GENUS CAREX 4:142, PL.455. 1867.
   -- --- 1863)
   GH ISOTYPE

80. BRONGNIARTII VAR. Densa BAILEY, L.H., PROC. AMER. ACAD. ARTS 22:137.
    1886 ("1887”),
    USA: CALIFORNIA: MARK WEST CREEK (BIGELOW, J.M., ----.
    --- 1853-1854)
    NY SYNTYPE

81. BRUNNEA VAR. SUBTEIOGYNA KUKENTHAL, G., REPERT. SP. NOV. REGNI VEG.
    8:8. 1910.
    PHILIPPINES: BENGUET: LUZON (ISLAND), MOUNT PULOG
    (MERRILL, E.D., 6505. -- MAY 1909)
    US 711129 TYPE

82. BUCKLEYI DEWEY, C., AMER. J. SCI. ARTS SER.1, 48:143. 1845.
    USA: NORTH CAROLINA: MITCHELL CO.: ROAN MOUNTAIN (BUCKLEY, S.B.,
    ----. ----)
    NY TYPE COLLECTION

83. BULBOSTYLIS MACKENZIE, K.K., BULL. TORREY BOT. CLUB 42:617. 1915.
    12 APR 1913)
    MO 710112 TYPE COLLECTION
    US 587668 TYPE COLLECTION

84. BURCHELLIANA BOECKELE, J.O., LINNAEA 41:234. 1877.
    SOUTH AFRICA: ---: -- (BURCHELL, W.J., 1911. ----)
    GH ISOTYPE

    30 APR 1905)
    NY TYPE COLLECTION

86. CAESARIENSIS MACKENZIE, K.K., N. AMER. FL. 18:440. 1935.
    USA: NEW JERSEY: CAMDEN CO.: LAUREL SPRINGS (LONG, B., F23212.
    15 JUN 1920)
    GH ISOTYPE
    NY TYPE

    USA: CALIFORNIA: MENDOCINO CO.: MENDOCINO CITY (BOLANDER, H.N.,
    4741. 01 MAY 1866)
    CAS 383776 TYPE COLLECTION
   USA: OREGON: KLAMATH CO.: CRATER LAKE NATIONAL PARK, CATHEDRAL SPRING (COVILLE, F.V., 1457, 11 SEP 1902)
   US  690937 TYPE COLLECTION

89. **CAMPYLOCARPA SSP. AFFINIS** MAGUIRE, B. AND HOLMGREN, A.H.,
   LEAFL. W. BOT. 4:262. 1946.
   USA: UTAH: JUAB CO.: DEEP CREEK RANGE, INDIAN FARM CREEK
   (MAGUIRE, B. AND HOLMGREN, A.H., 21947, 16 JUL 1943)
   CAS 334353 ISOTYPE
   NY HOLOTYPE
   US 1885701 ISOTYPE

90. **CANESCENS VAR. DISJUNCTA** FERNALD, M.L., PROC. AMER. ACAD. ARTS
   37:488, PL. 5. 1902.
   CANADA: NEW BRUNSWICK: VICTORIA CO.: SERPENTINE RIVER
   (HAY, G.U., 84, 24 JUL 1900)
   GH PARATYPE

   USA: UTAH: BEAR RIVER CANYON; ALT. 10000 FT. (WATSON, S., 1231A. -- AUG 1869)
   NY ISOTYPE

92. **CANESCENS VAR. SPHAEROSTACHYIA** TUCKERMAN, E., ENUM. CARIC. 19. 1843.
   USA: ---: NEW ENGLAND (---, ---. --- 1843)
   GH ISOTYPE
   NY TYPE COLLECTION

93. **CAREYANA** TORREY, J. EX DEWEY, C., AMER. J. SCI. ARTS SER. 1, 30:60. 1836.
   USA: NEW YORK: CAYUGA CO.: AUBURN (CAREY, J., ---. --- MAY 1832)
   NY HOLOTYPE

94. **CAROLINIANA** BUCKLEY, S.B., AMER. J. SCI. ARTS SER. 1, 45:173. 1843.
   USA: SOUTH CAROLINA: PICKENS CO.: TABLE MOUNTAIN (BUCKLEY, S.B., ---. ---)
   GH TYPE COLLECTION
   NY TYPE COLLECTION

95. **CEPHALOPHORA VAR. MAXIMA** DEWEY, C., AMER. J. SCI. ARTS SER. 1, 43:92. 1842.
   USA: NEW YORK: YATES CO.: PENN YAN (SARTWELL, H.P., ---. ---)
   GH TYPE

96. **CHALCIOLEPIS** HOLM, H.T., AMER. J. SCI. SER. 4, 16:21,28. 1903.
97. **CHAPMANI** SARTWELL, H.P., EX DEWEY, C., AMER. J. SCI. ARTS
SER. 2, 19:254. 1855.
USA: FLORIDA: -- (CHAPMAN, A.W., 113. ---)
CAS 553918 ISOTYPE
US 28433 ISOTYPE

MEXICO: CHIAPAS: CHAMULA (BREEDLOVE, D.E., 6714. 30 JUL 1964)
F 1620435 ISOTYPE
NY ISOTYPE
US 2460272 HOLOTYPE

99. **CHIHUAHUAENSIS** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 35:265.
1908.
MEXICO: CHIHUAHUA: PUERTA DE ST. DIEGO; ALT. 6500 FT.
(HARTMAN, C.V., 620. 12 APR 1891)
F 49642 ISOTYPE
NY HOLOTYPE
US 306281 ISOTYPE

CHINA: HUPEH AND YONAN: CHIKUNGSHAN (BAILEY, L.H., ---)
13 JUN 1917
NY TYPE

MEXICO: HIDALGO: LENA STATION (PRINGLE, C.G., 10039.
26 AUG 1905)
CAS 232050 ISOTYPE
CAS 445943 ISOTYPE
F 202021 ISOTYPE
GH HOLOTYPE
MO ISOTYPE
NY ISOTYPE
US 462090 ISOTYPE

1868.
USA: CALIFORNIA: HUMBOLDT CO.: RED MOUNTAIN (BOLANDER, H.N.,
6477. -- --- 1866)
CAS 553874 TYPE FRAGMENT
GH TYPE COLLECTION
US 28457 TYPE COLLECTION
US 319228 TYPE COLLECTION

103. **CIRCINNATA** MEYER, C.A.,
1831.
USA: ALASKA: ALEUTIAN ISLANDS, UNALASKA (ISLAND)
(CHAMISSO, L.A., ---. ---)
GH ISOTYPE

BOLIVIA: --- -- (BANG, M., 2210. ---)
US 350077 TYPE COLLECTION

CANADA: QUEBEC: GASPE CO.: MOUNT SAINT PIERRE (FERNALD, M.L.;
WEATHERBY, C.A. AND STEBBINS, G.L., 2411. 05 JUL 1931)
GH HOLOTYPE
US 1839933 ISOTYPE

106. COLLECTA DEWEY, C., AMER. J. SCI. ARTS SER. 1, 11:314. 1826.
USA: MASSACHUSETTS: HAMPSHIRE CO.: WORTHINGTON (DEWEY, C., ---)
GH HOLOTYPE

107. COLUMBIANA DEWEY, C., AMER. J. SCI. ARTS SER. 1, 30:62. 1836.
USA: --- COLUMBIA RIVER (SCOULER, J., ---. ---)
NY HOLOTYPE

108. COMANS VAR. STRICTA CHEESEMAN, T.F.,
TRANS. & PROC. NEW ZEALAND INST. 24:415. 1892.
NEW ZEALAND: CANTERBURY (DISTRICT): SOUTH ISLAND, LAKE TEKAPO;
ALT. 2500 FT. (CHEESEMAN, T.F., ---. --- JAN 1883)
US 2038822 TYPE COLLECTION

---. --- 1848)
CAS 553913 SYNTYPE

110. CONCINNOIDES MACKENZIE, K.K., BULL. TORREY BOT. CLUB 33:440. 1906.
USA: MONTANA: FLATHEAD CO.: COLUMBIA FALLS (WILLIAMS, R.S., ---.
07 JUN 1893)
NY TYPE

111. CONCERTIFLORA BOOTT, F. IN GRAY, A., MEM. AM. ACAD. ARTS N.S., 6:418. 1859.
JAPAN: HOKKAIDO (PREFECTURE): HAKODATE (WRIGHT, C., ---.
-- JUN 1855)
US 27235 TYPE MATERIAL

112. CONJUNCTA BOOTT, F., ILL. GENUS CAREX 3:122, PL. 392. 1862.
USA: OHIO: FRANKLIN CO.: COLUMBUS (SULLIVANT, W.S., ---.
CAS 383550 SYNTYPE
GH SYNTYPE

MEXICO: PUEBLA: PUEBLA (ARSEN, G. (FRERE), 1359. 01 AUG 1907)
US 1032323 HOLOTYPE

USA: WASHINGTON: YAKIMA CO.: MOUNT ADAMS ("PADD0"), WODEN
VALLEY (SUKSDORF, W.N., 6864. 16 AUG 1909)
CAS 242987 HOLOTYPE
DS 269649 ISOTYPE
NY ISOTYPE

115. CONVOLUTA MACKENZIE, K.K., BULL. TORREY BOT. CLUB 43:428. 1916.
USA: NEW JERSEY: MORRIS CO.: BUDD'S LAKE (MACKENZIE, K.K., 2088.
10 JUN 1906)
NY TYPE

116. COOLEYI DEWEY, C. IN WOOD, A., AMER. J. SCI. ARTS SER. 1, 48:144.
1945.
USA: MICHIGAN: MACOMB CO.: WASHINGTON (COOLEY, D., ---. ---)
GH HOLOTYPE

117. COSTATA SCHWEINITZ, L.D., ANN. LYCEUM NAT. HIST. NEW YORK 1:67.
1824.
USA: PENNSYLVANIA: NORTHAMPTON CO.: EASTON (SCHWEINITZ, L.D.,
---. ---)
NY TYPE COLLECTION

USA: COLORADO: SUMMIT CO.: GRAYS PEAK (JONES, M.E., 834.
28 AUG 1878)
NY TYPE COLLECTION

1902.
USA: NEW HAMPSHIRE: COOS CO.: MOUNT WASHINGTON, BETWEEN
MARSHFIELD AND CRAWFORDS (FAXON, E. AND FAXON, C.E., ---.
06 JUL 1878)
GH SYNTYPE

120. CRAWFORDII VAR. VIGENS FERNALD, M.L., PROC. AMER. ACAD. ARTS
37:470, PL. 1. 1902.
01 AUG 1882)
GH SYNTYPE

121. CREBRIFLORA WIEGAND, K.M., RHODORA 24:197. 1922.
USA: FLORIDA: GAUSDEN CO.: APPALACHICOLA RIVER, CHATTAHOOCHEE
(CURTIS, A.H., 3267. --- SEP 1882)
F 26304 TYPE MATERIAL
GH TYPE
NY TYPE

122. CRINITA VAR. BREVICRINIS FERNALD, M.L., RHODORA 48:54. 1946.
USA: VIRGINIA: DINWIDDIE CO.: ROWANTA (FERNALD, M.L. AND
    USA: New York: Yates Co.: Penn Yan (Sartwell, H.P., 78).
    CAS 553883 Type Collection

    USA: Maine: Piscataquis Co.: Greenville (Fernald, M.L., 264.
    04 Jul 1894)
    GH SYNTAXPE
    US 278555 SYNTAXPE

    USA: New Jersey: -- (--, --, --, --)
    GH ISOTYPE

126. **CRUS-CORVI** Shuttleworth, R.J. Ex Kunze, G., Suppl. Schkuhr’s Riedgr. 128, Pl.32. 1844.
    USA: Louisiana: Orleans Parish: New Orleans (Drummond, T., 432.
    -- -- 1832)
    GH ISOTYPE

    USA: Virginia: Southampton Co.: Drewryville (Fernald, M.L.;
    Long, B. and Smart, R.F., 5677. 22-23 Jun 1936)
    GH HOLOTYPE
    MO 1108572 ISOTYPE
    NY 1682487 ISOTYPE

    USA: New Jersey: Sussex Co.: White Pond (Mackenzie, K.K., 4645.
    26 Jun 1910)
    NY TYPE

    Cuba: Oriente: Pico Turquino (Ekman, E.L., 14506. 21 Jul 1922)
    NY ISOTYPE
    US 1302602 TYPE COLLECTION

    Haiti: --: -- (Ekman, E.L., ---, 08 Aug 1925)
    NY TYPE COLLECTION

    Guatemala: Huehuetenango: Sierra de los Cuchumatanes, Tunima;
ALT. 3400-3500 M. (STEYERMARK, J.A., 48347. 07 JU L 1942)
F 1128952 HOLOTYPE

VENEZUELA: SUCRE: CERRO TURUMQUIRE, EASTERN PEAK; ALT. 2500 M.
(STEYERMARK, J.A., 62605. 06 MAY 1945)
F 1266170 HOLOTYPE

CANADA: NOVA SCOTIA: QUEENS COO.: BROAD RIVER (FERNALD, M.L. AND
BISSELL, C.H., 20311. 16 AUG 1920)
GH HOLOTYPE

134. CUNEATA OHWI, J., MEM. COLL. SCI. KYOTO IMP. UNIV., SER. B, BIOL.
6:256. 1931.
JAPAN: AOMORI (PREFECTURE): HONSHU (ISLAND), AOMORI
(KINASHI, N., ---. -- JUL 1909)
F 1406416 TYPE MATERIAL

USA: ARIZONA: COCONINO COO.: GRAND CANYON NATIONAL PARK, KAIBAB
TRAIL TO ROARING SPRINGS (EASTWOOD, A. AND HOWELL, J.T., 1101.
23 JUN 1933)
CAS 204973 SYNTYPE
CAS 204974 SYNTYPE

136. CUSICKII MACKENZIE, K.K. IN PIPER, C.V. AND BEATTIE, R.K.,
FL. NW. COAST 72. 1915.
USA: OREGON: BAKER COO.: HEAD OF BURNT RIVER (CUSICK, W.C., 1331.
-- JUL 1886)
NY SYNTYPE

-D-

137. DANAENSIS STACEY, J.W., LEAF., W. BOT. 2:166. 1939.
USA: CALIFORNIA: TUOLUMNE COO.: MOUNT DANA (HOWELL, J.T., 14546.
11 AUG 1938)
CAS 259874 ISOTYPE
CAS 259875 HOLOTYPE
GH ISOTYPE
US 1765700 ISOTYPE

25-30 JUN 1897)
GH ISOTYPE
JEPS 2511 ISOTYPE
NY ISOTYPE
UC 50814 HOLOTYPE

USA: INDIANA: PIKE CO.: OTWELL (HERMANN, F.J., 6147. 05 JUL 1934)
F 751055 ISOTYPE

140. DEBILIFORMIS MACKENZIE, K.K., BULL. TORREY BOT. CLUB 37:244. 1910.
USA: CALIFORNIA: MENOCINO CO.: -- (BOLANDER, H.N., 6477. -- -- 1866)
MO TYPE MATERIAL

USA: VIRGINIA: GREENSVILLE CO.: ORION (FERNALD, M.L. AND LONG, B., 12016. 13 JUN 1940)
GH HOLOTYPE
US 2003164 ISOTYPE

142. DEBILIS VAR. PUBERA GRAY, A., MAN. BOT. ED. 5, 593. 1867.
USA: PENNSYLVANIA: CENTRE CO.: BEAR MEADOWS (PORTER, T.C., -- --)
GH HOLOTYPE

143. DEVIA CHEESEMAN, T.F., TRANS. & PROC. NEW ZEALAND INST. 15:301. 1883.
NEW ZEALAND: NELSON (DISTRICT): SOUTH ISLAND, NELSON (CHEESEMAN, T.F., 83. -- JAN 1882)
GH ISOTYPE

144. DEWEYANA VAR. COLLECTANEA FERNALD, M.L., RHODORA 15:93. 1913.
GH HOLOTYPE

USA: OREGON: MARION CO.: SALEM (HALL, E., 580. -- -- 1871)
F 455703 TYPE COLLECTION
F 1429766 TYPE COLLECTION
GH TYPE COLLECTION
NY TYPE COLLECTION

146. DIGITALIS VAR. ASYMMETRICA FERNALD, M.L., RHODORA 43:544. 1914.
USA: VIRGINIA: SOUTHAMPTON CO.: APPLEWHITE CHURCH (FERNALD, M.L. AND LONG, B., 11791. 08 MAY 1940)
CAS 336835 ISOTYPE
GH HOLOTYPE
MO 1306425 ISOTYPE
US 2003133 ISOTYPE

147. DIGITALIS VAR. GLAUCO CHAPMAN, A.W., FL. S. U.S. ED. 1, 541. 1860.
USA: FLORIDA: MIDDLE FLORIDA (CHAPMAN, A.W., -- -- -- 1842)
NY TYPE COLLECTION
US 969118 TYPE COLLECTION
   USA: VIRGINIA: GREENSVILLE CO.: -- (Fernald, M.L. and Long, B.,
   7767. 08 APR 1938)
   GH HOLOTYPE
   MO 1129747 ISOTYPE
   NY ISOTYPE
   US 1761151 ISOTYPE

   10 JUN 1949)
   CAS 372834 ISOTYPE

   GUATEMALA: ALTA VERAPAZ: PANSAMALA; ALT. 3800 FT. (Smith, J.O.
   and Turckheim, H., 659. -- JUN 1885)
   US 817314 TYPE COLLECTION

   Ser. 2, 32:41. 1861.
   USA: NEBRASKA: -- (Hayden, F.V., 580. --)
   GH TYPE MATERIAL

152. **DUDLEYI** Mackenzie, K.K., *Erythaea* 8:30. 1922.
   USA: CALIFORNIA: MONTEREY CO.: TASSAJARA HOT SPRINGS
   (Elmer, A.D.E., 3132. -- JUN 1901)
   DS 145619 HOLOTYPE
   DS 629609 ISOTYPE
   MO ISOTYPE
   NY ISOTYPE

153. **X DUMANII** Lepage, E., *Naturaliste Canad.* 83:143, Fig. 4. 1956.
   CANADA: QUEBEC: VIEUX-COMPTEIR (Lepage, E., 32078. 30 JUL 1954)
   GH ISOTYPE
   US 2176489 ISOTYPE

   COSTA RICA: --: CERRO DE BUENA VISTA (Pittier, H. and Tonduz, A.,
   3376. 19 JAN 1891)
   CAS 351155 ISOTYPE
   US 579795 TYPE MATERIAL

   CANADA: SASKATCHEWAN: CARLTON HOUSE (52 51'N., 106 13'W.)
   (Richardson, J., ---, --)
   NY SYNTAXE

   CANADA: MANITOBA: CHURCHILL RIVER, CHURCHILL (Duman, M., 1506.
   08 AUG 1938)
   GH ISOTYPE
USA: OREGON: GRANT CO.: DIXIE MOUNTAIN (HENDERSON, L.F., 5583.
25 JUL 1925)
- CAS 130386 HOLOTYPE
- DS 144009 ISOTYPE
- GH ISOTYPE

USA: COLORADO: EL PASO CO.: PIKES PEAK (CLEMENTS, F., ---.
-- --- 1900)
- NY TYPE

159. **ECHINATA VAR. ORMANTHA** FERNALD, M.L., PROC. AMER. ACAD. ARTS
USA: CALIFORNIA: EL DORADO CO.: SIERRA NEVADA RANGE,
STRAWBERRY CREEK (BRAINERD, E., 160. 18 JUL 1897)
- GH HOLOTYPE

USA: MISSOURI: BUTLER CO.: -- (EGGERT, H., ---. 08 AUG 1893)
- NY TYPE COLLECTION

USA: COLORADO: GUNNISON CO.: MOUNT CARBON, KEBLER PASS
(EGGLESTON, W.W., 6181. 22 AUG 1916)
- US 857864 TYPE

162. **EGGLESTONII VAR. FESTIVELLIFORMIS** HERMANN, F.J., BRITTONIA 12:78.
1960.
MEXICO: NUEVO LEON: GALEANA (SCHNEIDER, R.A., 954. 25 JUL 1938)
- US 2466328 HOLOTYPE

163. **EGREGIA** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 42:414. 1915.
USA: WASHINGTON: KLIICKITAT CO.: FALCON VALLEY (SUJKSDORF, W.N.,
5181. 15 JUL 1905)
- DS 284598 ISOTYPE
- NY TYPE

164. **EKMANII** KUKENTHAL, G., REPERT. SP. NOV. REGNI VEG. 23:221. 1926.
HAITI: OUEST: PETIONVILLE (EKMAN, E.L., H1453. 12 AUG 1924)
- GH ISOTYPE
- NY TYPE MATERIAL
- US 1411790 COTYPE

165. **EKMANII VAR. HOTENSIS** KUKENTHAL, G. AND EKMAN, E.L., ARK. BOT.
HAITI: ---: MORNE CALUMETTE; ALT. 1200-1300 M. (EKMAN, E.L.,
166. **ELBERTANA**  
*Kelso, L., Biol. Leafl. 31:3. 1945.*  
USA: Colorado: Lake Co.: Mount Elbert (Kelso, L., 4967. C1 Aug 1945)  
GH ISOTYPE  
US 1414090 TYPE COLLECTION

167. **ELEOCHARIS**  
Canada: Saskatchewan: Saskatchewan Plains (Macoun, John, 1665. 12 Aug 1872)  
GH ISOTYPE

168. **ELMERI**  
Philippines: Benguet: Luzon (Island), Baguio (Elmer, A.D.E., 8444. -- Mar 1907)  
MO TYPE MATERIAL  
US 854950 TYPE MATERIAL

169. **ELRODI**  
USA: Montana: Beaverhead Co.: Monida (Jones, M.E., ---. 08 Jul 1909)  
DS 149706 ISOTYPE  
NY ISOTYPE  
US 1531248 TYPE MATERIAL

170. **ELYNOIDES**  
USA: Colorado: Mineral Co.: Pagosa Peak; Alt. 12000 Ft. (Baker, C.F., 230. -- Aug 1899)  
GH ISOTYPE  
MO TYPE COLLECTION  
US 368818 TYPE COLLECTION

171. **ENGELMANNI**  
GH HOLOTYPE

172. **EPAPILLOSA**  
USA: Utah: Piute Co.: Marysville (Jones, M.E., 5345. 01 Jun 1874)  
MO ISOTYPE  
NY HOLOTYPE  
NY ISOTYPE  
US 270933 ISOTYPE

173. **EREMOSTACHYA**  
Indonesia: West New Guinea: Lake Habbema; (Country as "Dutch New Guinea") (Brass, L.J., 10255. -- Oct 1938)
   USA: Colorado: Gilpin Co.: Rollinsville (Kelso, L., 6362.
   24 Jul 1948)
   GH TYPE MATERIAL

   USA: Washington: Klickitat Co.: Falcon Valley (Suksdorff, W. N.,
   1284. 26 Jun 1886)
   CAS 242957 SYNTAXE

   26:254. 1929.
   USA: Washington: Klickitat Co.: Falcon Valley (Suksdorff, W. N.,
   11551. 21 Aug 1924)
   CAS 246772 TYPE COLLECTION

   Canada: Alberta: Jasper National Park, Mount Edith Cavell,
   Cavell Lake (Hermann, F. J., 13529. 28 Aug 1956)
   CAS 401490 ISOTYPE
   GH ISOTYPE
   US 2265959 HOLOTYPE

   Malaysia: Sabah (Territory): Mount Kinabalu; Alt. 4000 ft.;
   (Country as "Borneo") (Clemens, J. and Clemens, M. S., 34297.
   28 Jul 1933)
   GH HOLOTYPE
   NY ISOTYPE

179. **X Exsalina** Lepage, E., Naturaliste Canad. 83:133. 1956.
   Canada: Quebec: Piagochiwi River (Dutilly, A.; Lepage, E. and
   Duman, M., 32793. 29 Aug 1954)
   US 2176495 ISOTYPE

   China: Szechwan: Tchen-Keou-Tin (Farges, R. P., ---. ---)
   NY TYPE MATERIAL
   US 1123660 ISOTYPE

   Mexico: Oaxaca: Sierra de San Felipe; Alt. 10000 ft.
   (Pringle, C. G., 4838. 25 Aug 1894)
   GH TYPE COLLECTION
   NY TYPE COLLECTION

183. FESTIVA DEWEY, C., AMER. J. SCI. ARTS SER. 1, 29:246. 1836.
USA: NORTHWEST TERRITORIES: MACKENZIE DISTRICT: GREAT BEAR LAKE ("BEAR LAKE") (RICHARDSON, J., ---. ---)
NY SYNTYPE

184. FESTIVA VAR. DECUMENS HOLM, H.T., AMER. J. SCI. SER. 4, 16:20, 26. 1903.
-- AUG 1899)
F 122779 TYPE MATERIAL
NY TYPE COLLECTION

185. FESTIVA VAR. STRICTA BAILEY, L.H., MEM. TORREY BOT. CLUB 1:51.
1889.
-- --- 1868-1869)
NY TYPE MATERIAL

186. FESTIVELLA MACKENZIE, K.K., BULL. TORREY BOT. CLUB 42:609. 1915.
USA: WYOMING: ALBANY CO.: -- (NELSON, A., 3275. 02 JUL 1897)
GH ISOTYPE
NY TYPE

USA: CALIFORNIA: SONOMA CO.: CLOVERDALE SPRING (BOLANDER, H.N.,
50. ---)
GH HOLOTYPE

188. FILIFOLIA VAR. EROSTRATA KUKENTHAL, G. IN ENGLER, H.G.A., PFLANZENR.
4, FAM. 20:86. 1909.
USA: CALIFORNIA: EL DORADO CO.: ECHO LAKE (BRAINERD, E., 111.
11 JUL 1897)
GH ISOTYPE

189. FISSA MACKENZIE, K.K., N. AMER. FL. 18:64. 1931.
18 MAY 1895)
MO ISOTYPE
NY HOLOTYPE

USA: FLORIDA: SEMINOLE CO.: OVIEDO (RAY, J.D.; WOOD, C.E.;
SMITH, A.C. AND EATON, R.J., 10750. 26 APR 1961)
GH HOLOTYPE
NY ISOTYPE
US 2449506 ISOTYPE

191. FISSURICOLA MACKENZIE, K.K., MUHLENBERGIA 5:53. 1909.
USA: NEVADA: ELKO CO.: RUBY MOUNTAINS, HUMBOLDT RIVER
192. **FLACCIDULA STEUDEL, E.G., SYN. PL. GLUM. 2:199. 1855.**
   USA: OHIO: MIAMI RIVER VALLEY (FRANK, J.C., 55. — --- 1835)
   NY TYPE

193. **FLACCIFOLIA MACKENZIE, K.K., ERYTHEA 8:92. 1922.**
   USA: CALIFORNIA: SOUTHWEST (PART) (GRANT, G.B., ---.
   01 MAY 1902)
   US 468192 TYPE

194. **FLACCOSPERMA DEWEY, C., AMER. J. SCI. ARTS SER. 2, 2:245. 1846.**
   USA: FLORIDA: CAMP SABINE (LEAVENWORTH, M.C., ---.
   -- --- 1846)
   GH HOLOTYPE
   NY ISOTYPE

195. **FLAVA VAR. GASPENDIS FERNALD, M.L., RHODORA 8:200. 1906.**
   CANADA: QUEBEC: BONAVENTURE CO.: BONAVENTURE RIVER, BETWEEN
   BALDE AND BAIE DES CHALEURS (COLLINS, J.F.; FERNALD, M.L. AND
   PEASE, A.S., ---. 05-08 AUG 1904)
   GH HOLOTYPE

196. **FLAVA VAR. RECTIROSTRA GAUDIN, J.F.G.P., FL. HELV. 6:97. 1830.**
   SWITZERLAND: VALAIS (CANTON): ZERMATT (---, ---. -- AUG 1827)
   GH ISOTYPE

197. **FOENEA VAR. PERPLEXA BAILEY, L.H., MEM. TORREY BOT. CLUB 1:27.**
   1889.
   CANADA: NEW BRUNSWICK: KENT CO.: -- (FOWLER, J., ---.
   -- --- 1871)
   GH ISOTYPE

198. **FORMOSA DEWEY, C., AMER. J. SCI. ARTS SER. 1, 8:98. 1824.**
   USA: NEW YORK: YATES CO.: PENN YAN (SARTWELL, H.P., ---.
   ---)
   CAS 102307 ISOTYPE
   CAS 383156 ISOTYPE
   GH ISOTYPE

199. **FRACTA MACKENZIE, K.K., ERYTHEA 8:38. 1922.**
   USA: CALIFORNIA: SISKIYOU CO.: MOUNT SHASTA (PRINGLE, C.G., ---.
   23 AUG 1881)
   US 817810 HOLOTYPE

200. **FRANKLINII BOOTT, F. IN HOOKER, W.J., FL. BOR.—AMER. 2:217, PL. 218.**
   1839 ("1840")
   USA: ---: ROCKY MOUNTAINS (DRUMMOND, T., ---.
   ---)
   GH ISOTYPE
   NY TYPE

201. **FULVESECVS MACKENZIE, K.K., BULL. TORREY BOT. CLUB 37:239. 1910.**
   ST. PIERRE AND MIQUELON: ---: MIQUELON (ISLAND), LANGLADE
   (ARSENE, L. (FRERE), ---. 28 JUL 1902)
<table>
<thead>
<tr>
<th>NY Type</th>
<th>Type Material</th>
<th>Type Collection</th>
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<td>208. GEYERI BOOTT, F., TRANS. LINN. SOC. LONDON 20:118. 1846.</td>
<td>USA: ---: ROCKY MOUNTAINS (GEYER, C.A., 332. ---)</td>
<td>NY GH ISOTYPE</td>
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211. **GRACILIOR** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 43:614. 1916.
    -- APR 1864)
    CAS 103033 ISOTYPE
    DS 145620 HOLOTYPE
    GH ISOTYPE
    MO ISOTYPE
    US 319177 ISOTYPE

212. **GRACILLIMA** SCHWEINITZ, L.D., ANN. LYCEUM NAT. HIST. NEW YORK 1:66.
    1824.
    USA: PENNSYLVANIA: -- (SCHWEINITZ, L.D., ---. ---) ISOTYPE
    GH

    AFGHANISTAN: --: -- (GRIFFITH, W., 78(KEW 6074). --) NY TYPE COLLECTION

214. **GRISEA VAR. RIGIDA** BAILEY, L.H., MEM. TORREY BOT. CLUB 1:56. 1889.
    USA: PENNSYLVANIA: BUCKS CO.: SELLERSVILLE (FRETZ, C.D., ---.
    -- --- 1884) GH HOLOTYPE

    GUATEMALA: HUEHUETENANGO: SIERRA DE LOS CUCHUMATANES, BETWEEN
    TOJIAH AND CHEMAL; ALT. 3380 M. (BEAMAN, J.H., 3880.
    31 JUL 1960) GH HOLOTYPE

    USA: OREGON: HURRICANE CREEK; BOGS AT 6000 FT. (CUSICK, W.C.,
    2487. 28 AUG 1900) MO TYPE MATERIAL
    NY ISOTYPE

    1868.
    USA: CALIFORNIA: MENDOCINO CO.: MENDOCINO CITY (BOLANDER, H.N.,
    4700. -- --- 1866)
    CAS 383986 ISOTYPE
    DS 49500 ISOTYPE
    DS 490408 ISOTYPE
    NY ISOTYPE

    08 AUG 1936)
    **USA: Louisiana:** Mississippi River (Leavenworth, M. C. and
    Hale, D., 683. ---)
    
    **NY** syntype

    **USA: Oregon:** -- (Hall, E., 606. -- --- 1871)
    
    **GH** type collection

221. **Hallii** Olney, S. T. in Porter, T. C. in Hayden, F. V.,
    **USA: Colorado:** Rocky Mountains; lat. 39-41 N. (Hall, E. and
    Harbour, J. P., 617. -- --- 1862)
    
    **F** 314892 syntype
    **F** 456958 syntype
    **GH** syntype
    **MO** syntype
    **NY** syntype
    **US** 29651 syntype
    
    **USA: Idaho:** Pleasant Valley (Porter, T. C., ---. 26-29 Jun 1871)
    
    **NY** syntype

    **USA: Massachusetts:** Hampden Co.: Westfield (Davis, E., ---.
    ---)
    
    **GH** holotype
    **NY** isotype

    **USA: California:** -- (Kellogg, A. and Harford, W. G. W., 1073.
    -- --- 1868-1869)
    
    **NY** holotype
    **US** 28685 isotype

    **USA: Georgia:** Jefferson Co.: Louisville, Rocky Comfort Creek
    (Harper, R. M., 2109. 09 Apr 1904)
    
    **F** 176870 isotype
    **GH** holotype
    **NY** isotype

    **USA: California:** San Bernardo Co.: San Bernardino Mountains,
    San Antonio Canyon; Alt. 4500 ft. (Hasse, H. E., ---.
    -- Jul 1894)
    
    **NY** type collection

    **Taiwan:** Fukien: Kaohsiung ("Takao"), Daijurin (Ohwi, J., 329.
    -- Mar 1933)
    
    **F** 1411493 type material
USA: California: Tuolumne Co.: Mount Dana (Bolander, H.N., 5074.)
GH Syntype

USA: South Dakota: Stanley Co.: Fort Pierre (Hayden, F.V., 21 — 1853-1854)
MO Type Material

GH Holotype

230. HELLERI Mackenzie, K.K., Erythea 8:80. 1922.
USA: Nevada: Washoe Co.: Mount Rose (Heller, A.A., 9975.
23 Jul 1910)
F 283119 Type Material
NY Type
US 509004 Isotype

231. HEPBURNII Boott, F. in Hooker, W.J., Fl. Bor.-Amer. 2:209, Pl. 207. 1839 ("1840").
USA: Colorado: Rocky Mountains, South Park (Drummond, T. — 1840)
GH Syntype

USA: California: Lake Tahoe to Bear Valley (Kellogg, A. — 03 Aug —)
GH Type Material
US 28206 Type Collection

USA: Michigan: Chippewa Co.: Drummond Island (Torrey, J. — 03 Aug 1839)
NY Type

USA: Idaho: Bonner Co.: Hope (Sandberg, J.H., 933. 20 Aug 1892)
NY Isotype

USA: Illinois: — (Vasey, G. — NY Type Collection
236. HITCHCOCKIANA DEWEY, C., AMER. J. SCI. ARTS SER. 1, 10:274. 1826.
USA: MASSACHUSETTS: BERKSHIRE CO.: WILLIAMSTOWN, SADDLE
MOUNTAIN (DAVIS, E., ---. --- 1823)
GH
HOLOTYPE

237. HOLMIANA MACKENZIE, K.K., BULL. TORREY BOT. CLUB 36:481. 1909.
USA: MONTANA: JOHN'S LAKE (VREELAND, F.K., 1121. 19 AUG 1901)
NY
TYPE

USA: CALIFORNIA: -- (KELLOGG, A. AND HARFORD, W.G.W., 1069.
-- --- 1868-1869)
CAS 103098 SYNTYPE
NY
SYNTYPE

1906.
USA: CALIFORNIA: -- (KELLOGG, A. AND HARFORD, W.G.W., 1069.
-- --- 1868-1869)
CAS 103098 SYNTYPE
NY
SYNTYPE

240. HOOKERANA DEWEY, C., AMER. J. SCI. ARTS SER. 1, 29:248. 1836.
CANADA: SASKATCHEWAN: CARLTON HOUSE (52 51'N., 106 13'W.)
(RICHARDSON, J., ---. ---)
GH
TYPE COLLECTION
NY
TYPE COLLECTION

241. HORMATHODES FERNALD, M.L., RHODORA 8:165. 1906.
USA: RHODE ISLAND: PROVIDENCE CO.: PROVIDENCE (OLNEY, S.T., ---.
01 JUL 1867)
GH
SYNTYPE

242. HORSCHUCHIANA VAR. LAURENTIANA FERNALD, M.L. AND WIEGAND, K.M.,
RHODORA 13:130. 1911.
CANADA: NEWFOUNDLAND: PORT AU PORT BAY, TABLE MOUNTAIN
(FERNALD, M.L. AND WIEGAND, K.M., 2897. 16 AUG 1910)
GH
HOLOTYPE
NY
ISOTYPE

243. HOSTIANA VAR. LAURENTIANA FERNALD, M.L. AND WIEGAND, K.M., RHODORA
26:122. 1924.
CANADA: NEWFOUNDLAND: PORT AU PORT BAY, TABLE MOUNTAIN
(FERNALD, M.L. AND WIEGAND, K.M., 2897. 16 AUG 1910)
GH
HOLOTYPE

244. HOUGHTONIANA TORREY, J. EX DEWEY, C., AMER. J. SCI. ARTS
SER. 1, 30:63. 1836.
USA: MINNESOTA: CLEARWATER CO.: LAKE ITASCA ("LAKE LA BICHE,
NEAR SOURCES OF MISSISSIPPI RIVER") (HOUGHTON, D., ---.
13 JUL 1832)
NY
HOLOTYPE
245. HUEHUETECA STANDLEY, P.C., AND STEYERMARK, J.A.,


GUATEMALA: HUEHUETENANGO: SIERRA DE LOS CUCHUMATANES, CANANA;
ALT. 2500 M. (STEYERMARK, J.A., 49055. 18 JUL 1942)
F 1128957 HOLOTYPE

246. HYMENODON OHWI, J., ACTA PHYTOTAX. GEOBOT. 1:298. 1932.

JAPAN: --: HONSHU (ISLAND), OSAMURA IN SHIMOTSUKE
(SEKIMOTO, H., --. 15 JUL 1932)
F 1463659 TYPE MATERIAL

-1-


CHINA: HUPEH: -- (HENRY, A., 7860. -- --- 1885-1888)
US 802160 TYPE MATERIAL


USA: IDAHO: BEAVER CANYON (RYDBERG, P.A., 2339. 07 AUG 1895)
US 235568 TYPE COLLECTION
US 235569 TYPE COLLECTION

249. IGNOTA DEWEY, C., AMER. J. SCI. ARTS SER. 2, 8:348. 1849.

USA: LOUISIANA: RAPIDES PARISH: ALEXANDRIA (HALE, D., 97. --)
CAS 553902 TYPE COLLECTION

NY TYPE COLLECTION

250. ILLINOENSIS DEWEY, C., AMER. J. SCI. ARTS SER. 2, 3:245. 1847.

USA: ILLINOIS: HANCOCK CO.: AUGUSTA (MEAD, S.B., --. ---)
NY TYPE COLLECTION

251. ILLOTA BAILEY, L.H., MEM. TORREY BOT. CLUB 1:15. 1889.

USA: COLORADO: ROCKY MOUNTAINS; LAT. 39-41 N. (HALL, E. AND
HARBOUR, J.P., 591. -- --- 1862)
F 314869 ISOTYPE
F 456934 ISOTYPE
GH HOLOTYPE
MD ISOTYPE


CHILE: --: (LECHLER, W., 1136. -- OCT 1852)
GH ISOTYPE


USA: MASSACHUSETTS: NANTUCKET CO.: NANTUCKET ISLAND
(BICKNELL, E.P., --. 20 JUN 1908)
NY TYPE


CANADA: ALBERTA: RAM RIVER, NORDEGG (HERMANN, F.J., 13347.
15 AUG 1956)
255. **INCURVIFORMIS** MACKENZIE, K.K. IN RYDBERG, P.A., FL. ROCKY MOUNT. 120, 1060. 1917.  
CANADA: ALBERTA: BANFF NATIONAL PARK, BANFF; ALT. 8000 FT.  
(MACOUN, JOHN, ---. 31 JUL 1891)  
GH ISOTYPE  
NY HOLOTYPE

CANADA: QUEBEC: ANTICosti ISLAND, PETITES-RIVIERES  
(MARIE-VICTORIN, (FRERE) AND ROLLAND-GERMAIN, (FRERE), 25767. 20 JUL 1926)  
GH HOLOTYPE

257. **INOPS** BAILEY, L.H., PROC. AMER. ACAD. ARTS 22:126. 1886 ("1887").  
USA: OREGON: CLACKAMAS CO.: MOUNT HOOD (HENDERSON, L.F., ---. 20 JUL 1884)  
CAS 203910 ISOTYPE  
GH HOLOTYPE  
NY ISOTYPE

258. **INTEGRA** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 43:608. 1916.  
USA: CALIFORNIA: PLACER CO.: SUMMIT; ALT. 7000 FT.  
(HELLER, A.A., 9841. 16 JUL 1909)  
NY HOLOTYPE

USA: UTAH: CACHE CO.: TONY GROVE LAKE (MAGUIRE, B., 16098. 05 AUG 1938)  
CAS 348506 ISOTYPE  
GH ISOTYPE  
NY TYPE  
US 1872574 ISOTYPE

USA: NEW YORK: YATES CO.: PENN YAN (SARTWELL, H.P., 36. ---)  
CAS 553999 ISOTYPE  
MO 1816496 TYPE COLLECTION  
NY ISOTYPE

261. **INTERIOR VAR. CHARLESTONENSIS** CLOKEY, I.W.,  
BULL. S. CALIF. ACAD. SCI. 38:1. 1939.  
USA: NEVADA: CLARK CO.: CHARLESTON PARK (CLOKEY, I.W., 7468. 19 JUN 1937)  
CAS 272528 ISOTYPE  
CAS 272529 ISOTYPE  
DS 278190 ISOTYPE  
F 1076930 ISOTYPE  
GH ISOTYPE  
JEPS 4013 ISOTYPE
SMITHSONIAN CONTRIBUTIONS TO BOTANY

262. INTERIOR VAR. JOSSELYNII FERNALD, M.L., RHODORA 8:115. 1906.
USA: MAINE: AROOSTOOK CO.: SAINT JOHN RIVER, FORT KENT
(FERNALD, M.L., ----. 06 JUL 1904)
GH HOLOTYPE
NY ISOTYPE
US 605797 ISOTYPE

263. INTERIOR VAR. KEWEENAWENSIS HERMANN, F.J., AMER. MIDL. NATURALIST
13 JUL 1936)
GH HOLOTYPE
NY ISOTYPE
US 1697057 ISOTYPE

264. INTERRUPTA VAR. DISTENTA KUKENTHAL, G., REP. PER. SP. NOV. REGNI VEG.
26:254. 1929.
USA: WASHINGTON: KLICKITAT CO.: BINGEN (SUUKSMD, W.N., 12333.
22 AUG-05 SEP 1927)
CAS 242959 TYPE COLLECTION

265. INTUMESCENS FOR. VENTRIOSA FERNALD, M.L., RHODORA 44:321, PL.713.
1942.
USA: VERMONT: ADDISON CO.: RIPTON (BRAINERD, E., ----. 19 JUL 1898)
GH HOLOTYPE

266. INVIOLUCRATELLA MACKENZIE, K.K., N. AMER. FL. 18:50. 1931.
MEXICO: SAN LUIS POTOSI: LAS CANOAS (PRINGLE, C.G., 3126.
08 JUL 1890)
F 263394 TYPE COLLECTION
GH ISOTYPE
MO TYPE MATERIAL
NY TYPE COLLECTION
US 30661 TYPE COLLECTION

-J-

267. JACINTOENSIS PARISH, S.B., BULL. S. CALIF. ACAD. SCI. 4:100, PL.16.
1905.
USA: CALIFORNIA: RIVERSIDE CO.: SAN JACINTO MOUNTAINS,
TAMARACK VALLEY; ALT. 9000 FT. (HALL, H.M., 2483.
-- JUL-AUG 1901)
DS 78003 HOLOTYPE
268. JACOBI-PETERI HULTEN, O.E.G., ACTA UNIV. LUND. N.S., 38:300, FIG.4. 1942.
   USA: ALASKA: TIN CITY (ANDERSON, J.P., 4871, 19 AUG 1938)
   CAS 477664 ISO TYPE

269. JAMESII TORREY, J., ANN. LYCEUM NAT. HIST. NEW YORK 3:398. 1836.
   USA: --: ROCKY MOUNTAINS (JAMES, EDWIN, ---, ---)
   NY HOLOTYPE

   BOLIVIA: --: -- (BANG, M., 2376, ---)
   US 825890 TYPE MATERIAL

   USA: CALIFORNIA: TUOLUMNE CO.: YOSEMITE NATIONAL PARK,
   TUOLUMNE MEADOWS; ALT. 8800 FT. (JEPSON, W.L., 4477.
   20 JUL 1911)
   JEPS 20008 ISO TYPE
   NY HOLOTYPE

   USA: CALIFORNIA: NEVADA CO.: SODA SPRINGS; ALT. 7000 FT.
   (JONES, M.E., ---. 22 JUL 1881)
   NY SYNTYPE

   NEW ZEALAND: OTAGO (DISTRICT): SOUTH ISLAND, CARRICK RANGE;
   ALT. 4000 FT. (PETRIE, D., ---, ---)
   GH ISO TYPE

   USA: MAINE: PISCATAQUIS CO.: MOUNT KATAHDIN, DEPOT POND
   (WILLIAMS, E.F.; CHURCHILL, J.R. AND FERNALD, M.L., ---.
   16 JUL 1900)
   GH HOLOTYPE
   NY ISO TYPE
   US 1325047 ISO TYPE

   -- OCT 1909)
   US 2074700 TYPE MATERIAL

276. KELLOGGII BOOTT, W. IN WATSON, S., GEOLOG. SURV. CALIFORNIA, BOT. 2:240. 1880.
   USA: CALIFORNIA: SIERRA NEVADA RANGE, "LAKE TAHOE TO BEAR
   VALLEY" (KELLOGG, A., ---, ---)
GH  SYNTYPE

USA: ALASKA: KOKRINES MOUNTAINS (PORSILD, A.E. AND PORSILD, R.T.,
711. 23 JUN-05 JUL 1926)
GH  ISOTYPE

CHINA: KIANGSI: KULING; ALT. 2500-3500 FT. (BAILEY, L.H., ---.
18 JUL 1917)
NY  TYPE

USSR: RUSSIAN SFSR: SAKHALIN OBLAST: KURIL ISLANDS, SHIKOTAN
(ISLAND), NOTORO; (COUNTRY AS "JAPAN") (OHWI, J., 813.
11 AUG 1931)
F  1406403  TYPE MATERIAL

-L-

USA: CALIFORNIA: SACRAMENTO RIVER (RICH, WILLIAM,
WILKES EXPED. 1241. -- --- 1838-1842)
NY  TYPE

01 JUL 1902)
F  129242  SYNTYPE
F  1566419  SYNTYPE
MO  SYNTYPE
NY  SYNTYPE
US  430229  SYNTYPE

USA: NEBRASKA: BIG SIOUX RIVER (HAYDEN, F.V., ---. ---)
GH  HOLOTYPE

PAPUA AND NEW GUINEA: PAPUA (TERRITORY): MAFULU; (COUNTRY AS
"BRITISH NEW GUINEA") (BRASS, L.J., 5323. -- SEP-NOV 1933)
A  ISOTYPE

CHINA: HUPEH: -- (HENRY, A., 5467. ---)
US  801132  SYNTYPE

USA: CALIFORNIA: TULARE CO.: UPPER KERN RIVER, VOLCANO CREEK
(HALL, H.M. AND BABCOCK, H.D., 5472. -- JUL 1904)
NY  ISOTYPE
UC 127723 HOLOTYPE

   CANADA: NEWFOUNDLAND: GARGAMELLE COVE (FERNALD, M.L.; LONG, B.
   AND FOGG-JR., J.M., 1374. 20 JUL 1929)
   F 1481645 ISOTYPE
   GH HOLOTYPE

   VENEZUELA: LARA: BETWEEN BUENOS AIRES AND PARAMO DE LAS ROSAS
   (STEYERMARK, J.A., 55470. 11 FEB 1944)
   F 55470 HOLOTYPE
   US 1932015 ISOTYPE

   USA: INDIANA: KOSCIUSKO CO.: LEESBURG (DEAM, C.C., 10927.
   05 JUN 1912)
   NY TYPE

   CANADA: NOVA SCOTIA: YARMOUTH CO.: ARGYLE (PEASE, A.S. AND
   LONG, B., 20519. 09 JUL 1920)
   GH HOLOTYPE

   USA: OKLAHOMA: MCCURTAIN CO.: BROKEN BOW (WATERFALL, U.T.,
   11380. 19 APR 1953)
   CAS 384438 ISOTYPE
   GH ISOTYPE
   MO 1692174 ISOTYPE

   06 JUL 1893)
   F 267758 ISOTYPE
   GH HOLOTYPE
   MO ISOTYPE
   NY ISOTYPE

   USA: INDIANA: CLARK CO.: -- (DEAM, C.C., 6458. 25 MAY 1910)
   GH HOLOTYPE
   NY ISOTYPE

293. **LEAVENWORTHII** DEWEY, C., *AMER. J. SCI. ARTS SER. 2, 2:246. 1846.
   USA: LOUISIANA: -- (LEAVENWORTH, M.C., --. -- -- 1845)
   NY TYPE COLLECTION

294. **LEIOCARPA** MEYER, C.A.,
   MEM. ACAD. IMP. SCI. ST.-PETERSBOURG DIVERS SAVANS 1:208, PL.5.
   1831.
   USA: ALASKA: SITKA (MERTENS, C.H., --. --)
   GH ISOTYPE
    Canada: Yukon Territory: Carcross (Eastwood, A., 725 A.
    16 Jul 1914)
    CAS 102481 ISOTYPE
    GH ISOTYPE
    US 538796 HOLOTYPE

    4, Fam. 20:405. 1909.
    Costa Rica: ---: Cerro De Buena Vista (Pittier, H. and Tanduz, A.,
    3381. 19 Jan 1891)
    CAS 264341 SYNTYPE

297. **Lemmoni** Boott, W., Bot. Gaz. 9:93. 1884.
    USA: California: Sierra Nevada Range (Lemmon, J.G., ---.
    -- --- 1875)
    GH TYPE COLLECTION
    US 29211 TYPE COLLECTION

298. **Lenticularis** var. **Paullifructus** Kukenthal, G. in Engler, H.G.A.,
    Pflanzenr. 4, Fam. 20:308. 1909.
    -- Jun 1897)
    NY ISOTYPE

299. **Leporina** var. **Americana** Olney, S.T. ex Bailey, L.H.,
    USA: Oregon: Clackamas Co.: Mount Hood (Hall, E., 583.
    01 Aug 1871)
    F 455706 TYPE COLLECTION
    F 1425899 TYPE COLLECTION
    GH TYPE COLLECTION
    MO TYPE COLLECTION
    NY TYPE COLLECTION

    USA: California: El Dorado Co.: Pyramid Peak (Hall, H.M. and
    Chandler, H.A., 4716. 01-02 Aug 1903)
    DS 490443 ISOTYPE
    GH ISOTYPE
    UC 55234 HOLOTYPE

301. **Leptopoda** Mackenzie, K.K. in Rydberg, P.A., Fl. Rocky Moun.
    124, 1060. 1917.
    USA: Oregon: Clackamas Co.: Oswego, Elk Rock (Heller, A.A.,
    10052. 20 May 1910)
    CAS 186427 ISOTYPE
    DS 13923 ISOTYPE
    NY TYPE

21 AUG 1955
US 2231577 HOLOTYPE

CANADA: NEWFOUNDLAND: STRAIT OF BELLE ISLE, FOUR-MILE COVE
(FERNALD, M.L.; WIEGAND, K.M. AND LONG, B., 27673. 20 JUL 1925)
GH HOLOTYPE

1903.
CHINA: HUPEH: -- (HENRY, A., 4266. ----)
US 800846 SYNTYPE

305. LONGICULMIS PETRIE, D., TRANS. & PROC. NEW ZEALAND INST. 14:363.
1882.
NEW ZEALAND: OTAGO (DISTRICT): SOUTHLAND SUBDIVISION: STEWART
ISLAND, PATTERSONS INLET (PETRIE, D., ----. -- JAN 1880)
GH ISOTYPE

1877.
CANADA: MANITOBA: WINNIPEG (BOURGEAU, E., ----.
-- ---- 1857-1859)
NY TYPE COLLECTION

USA: MISSOURI: JACKSON CO.: OAK GROVE (BUSH, B.F., 7020.
02 JUN 1913)
NY TYPE

308. LUZULAЕFOLIA VAR. STROBILANTHA HOLM, H.T., AMER. J. SCI.
SER. 4, 20:305. 1905.
USA: CALIFORNIA: NEVADA CO.: DONNER PASS; ALT. 7500 FT.
(HELLER, A.A., 7187. 17 AUG 1903)
CAS 136 ISOTYPE
CAS 231121 ISOTYPE

1868.
USA: CALIFORNIA: MENDOCINO CO.: MENDOCINO CITY (BOLANDER, H.N.,
4740. -- ---- 1866)
CAS 384084 ISOTYPE
DS 76794 ISOTYPE
GH TYPE COLLECTION
MO TYPE MATERIAL
NY TYPE COLLECTION
US 964880 TYPE COLLECTION

-M-

JAPAN: KANAGAWA (PREFECTURE): HONSHU (ISLAND): YOKOSUKA (SAVATIER, L., 1414. -- --- 1866-1874)
US 27238 TYPE MATERIAL

312. MACROKOLEA STEUDEL, E.G., SYN. PL. GLUM. 2:223. 1855.
USA: LOUISIANA: ORLEANS PARISH: NEW ORLEANS (DRUMMOND, T., 420. -- --- 1832)
NY COTYPE

313. MACROSUPERMA MACKENZIE, K.K., BULL. TORREY BOT. CLUB 36:477. 1909.
MEXICO: OAXACA: SIERRA DE SAN FELIPE; ALT. 6000-7000 FT. (PRINGLE, C.G., 4840. 27 AUG 1894)
NY TYPE

MEXICO: DURANGO: SIERRA MADRE OCCIDENTAL (ROSE, J.N., 2357. 16 AUG 1897)
NY ISOTYPE
US 301267 TYPE

315. MAGNIFOLIA MACKENZIE, K.K. IN SMALL, J.K., FL. SE. U.S. ED.2, 1325. 1913.
USA: FLORIDA: -- (CHAPMAN, A.W., ---. ---)
US 969118 TYPE MATERIAL

BOLIVIA: ---: --- (MANDON, G., 1429. ---)
NY ISOTYPE

317. MARCIDA VAR. DEBILIS BAILEY, L.H., PROC. AMER. ACAD. ARTS 22:136. 1886 ("1887").
USA: OREGON: HARNEY CO.: HARNEY VALLEY (HOWELL, T.J., 937. 27 MAY 1885)
F 206587 TYPE COLLECTION
NY TYPE

USA: CALIFORNIA: TUOLUMNE CO.: YOSEMITE NATIONAL PARK, TUOLUMNE MEADOWS (JEPSON, W.L., 4476. 20 JUL 1911)
JEPS 19722 ISOTYPE
NY HOLOTYPE

319. MEADII DEWEY, C., AMER. J. SCI. ARTS SER.1, 43:90. 1842.
USA: ILLINOIS: HANCOCK CO.: AUGUSTA (MEAD, S.B., ---. ---)
CAS 553885 ISOTYPE
320. **MEDITERRANIA** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 33:441. 1906.
USA: DISTRICT OF COLUMBIA: WASHINGTON (STEELE, E.S., ---).
23 MAY 1898
NY TYPE

USA: NEBRASKA: WHITE RIVER (HAYDEN, F.V., ---).
GH TYPE COLLECTION

INDONESIA: WEST NEW GUINEA: ORANGE RANGE, MOUNT WILHELMINA;
(COUNTRY AS "DUTCH NEW GUINEA") (BRASS, L.J. AND MEYER-DREES, E., 9828. -- SEP 1938)
GH ISOTYPE

323. **MELOZITNENSIS** PORSILD, A.E., RHODORA 41:209. 1939.
USA: ALASKA: KOKRINES MOUNTAINS, MELOZITNA RIVER (PORSILD, A.E. AND PORSILD, R.T., 713.
23 JUN-05 JUL 1926)
GH ISOTYPE
US 1789621 ISOTYPE

324. **MENDOCINENSIS** OLNEY, S.T. EX BOOTT, W. IN WATSON, S.,
GEOG. SURV. CALIFORNIA, BOT. 2:249. 1880.
USA: CALIFORNIA: MENDOCINO CO.: MENDOCINO CITY (BOLANDER, H.N.,
4701. -- 1866)
CAS 553875 TYPE FRAGMENT
DS 54832 ISOTYPE
GH HOLOTYPE
MO ISOTYPE
NY ISOTYPE
UC 1098 ISOTYPE
US 29453 ISOTYPE

1855.
INDIA: ---: NILAGIRI (HOHENACKER, R.F., 943. -- 1851)
A ISOTYPE

PHILIPPINES: BENGUET: LUZON (ISLAND), PAUAI (MERRILL, E.D.,
6623. -- MAY 1909)
NY TYPE MATERIAL
US 711171 TYPE MATERIAL

327. **MERRITT-FERNALDII** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 49:370.
1923.
USA: MAINE: PENOBSCOT CO.: ORONO (FERNALD, M.L., ---).
03 JUL 1897
GH HOLOTYPE
    USA: District of Columbia: Washington (Steele, E. S., ---)
    GH ISOTYPE

    1859.
    Japan: ---: Sinoda (Wright, C., ---. ---)
    US 27281 TYPE MATERIAL

    Korea: ---: Kam-Quen (Faurie, U., 919. 28 Jun 1901)
    US 2501314 ISOTYPE

    Canada: Yukon Territory: Klondike, Indian Divide (Macoun, John,
    53877. 14 Aug 1902)
    GH ISOTYPE

    1899.
    Chile: Magallanes: Tierra del Fuego ("Fuegia"), Orange Harbor
    (Wilkes Explor. Exped., ---. --- 1838-1842)
    US 30695 ISOTYPE

333. **Microptera** Mackenzie, K. K., Muhlenbergia 5:56. 1909.
    USA: Nevada: Elko Co.: Deeth (Heller, A. A., 9067. 21 Jul 1908)
    CAS 234896 ISOTYPE
    NY TYPE

    USA: Colorado: Ouray Co.: Engineer Pass (Johnson, W. M., 594.
    14 Aug 1967)
    US 2543807 HOLOTYPE

    Canada: New Brunswick: King's Co.: Kennebecasis River
    (Fowler, J., ---. ---)
    GH HOLOTYPE

    USA: Massachusetts: Franklin Co.: Deerfield (Dewey, C., ---)
    GH HOLOTYPE

    37:473, Pl. 2. 1902.
    USA: New Hampshire: Hillsboro Co.: New Ipswich (Fernald, M. L.,
    ---. 05 Jun 1896)
    GH SYNTYPE

1902.
CANADA: NEW BRUNSWICK: SAINT JOHN RIVER (MACOUN, JOHN, 22.
04 JUL 1899)
GH SYNTYPE

CANADA: NEWFOUNDLAND: PORT AU PORT BAY, TABLE MOUNTAIN
(ST. JOHN, H. AND FERNALD, M.L., 10801. 16-17 JUL 1914)
GH HOLOTYPE
NY ISOTYPE

USA: NORTH CAROLINA: MITCHELL CO.: ROAN MOUNTAIN (BUCKLEY, S.B.,
---. ---)
NY ISOTYPE

USA: WASHINGTON: CHELAN CO.: CHIWAUKUM LAKE (EGGLESTON, W.W.,
13567. 19-20 AUG 1916)
US 886422 HOLOTYPE

342. MOHRIANA MACKENZIE, K.K., N. AMER. FL. 18: 106. 1931.
USA: FLORIDA: HARDEE CO.: WAUCHULA (CURTISS, A.H., 6761.
15 APR 1901)
NY HOLOTYPE
US 2133195 ISOTYPE

343. MOLESTA MACKENZIE, K.K., N. AMER. FL. 18: 151. 1931.
USA: KANSAS: WYANDOTTE CO.: QUINDARO (MACKENZIE, K.K., ---.
30 MAY 1897)
NY HOLOTYPE

344. MONTANESEISI BAILEY, L.H., BOT. GAZ. 17: 152. 1892.
03 AUG 1883)
NY SYNTYPE
US 23257 SYNTYPE

345. MONTEREYENSIS MACKENZIE, K.K., ERYTHEA 8: 92. 1922.
24 JUL 1905)
GH HOLOTYPE

CANADA: NEWFOUNDLAND: LABRADOR, CAPE MUGFORD (PORSILD, A.E.,
173. 26 AUG 1937)
US 2095886 ISOTYPE

347. MULTICOSTATA MACKENZIE, K.K., BULL. TORREY BOT. CLUB 43: 604. 1916.
USA: CALIFORNIA: SAN BERNARDINO CO.: SAN BERNARDINO MOUNTAINS,
BEAR VALLEY DAM (PARISH, S.B., 3609. -- JUN 1895)
DS 489409 HOLOTYPE
CAS 194659 ISOTYPE

-N-

349. **NANA BOOTT, F.** IN GRAY, A., MEM. AMER. ACAD. ARTS N.S., 6:418. 1859.
JAPAN: HOKKAIDO (PREFECTURE): HAKODATE (WRIGHT, C. --- --- 1853-1856)
NY 27280 TYPE MATERIAL

USA: NEBRASKA: -- (HAYDEN, F.V., --- ---)
NY ISOTYPE

351. **NEBRASKENSIS VAR. ERUCAEFORMIS SUKSDORF, W.N.**, WERDENDA 1:5. 1923.
USA: WASHINGTON: Klickitat Co.: Falcon Valley (SUKSDORF, W.N., 10249. 22 JUN 1919)
DS 171453 ISOTYPE
MO 952735 TYPE COLLECTION
NY 1438017 TYPE COLLECTION

USA: WASHINGTON: Adams Co.: Ritzville (SANDBERG, J.H. AND LEIBERG, J.B., 194. 09 JUN 1893)
NY ISOTYPE

353. **NELSONII MACKENZIE, K.K.** IN RYDBERG, P.A., FL. ROCKY MOUNT.
137, 1060. 1917.
USA: WYOMING: La Plata Mines (NELSON, A. AND NELSON, E., 5264. 30 AUG 1898)
GH ISOTYPE
NY HOLOTYPE

GH ISOTYPE
NY ISOTYPE
US 2433719 ISOTYPE

CANADA: NEWFOUNDLAND: Bonne Bay, Main River, Main Arm (FERNALD, M.L.; LONG, B. AND FOGG-JR., J.M., 1449. 19 AUG 1929)
GH HOLOTYPE

USA: NEW MEXICO: SANTA RITA DEL COBRA (BIGELOW, J.M., 1547).
Canada: Quebec: Paint Hills (Dutilly, A.; Lepage, E. and Duman, M., 32975. 03 Sep 1954)
GH ISOTYPE
US 2176496 ISOTYPE

USA: California: Sierra Nevada Range, Summit Camp (Kellogg, A., 10 Jul 1870)
GH HOLOTYPE
US 286861 ISOTYPE

USA: Washington: Chelan Co.: Cascade Mountains, Stevens Pass (Sandberg, J.H. and Leiberg, J.B., 773. 18 Aug 1893)
GH ISOTYPE
NY ISOTYPE

360. *Nigericans* Meyer, C.A.,
USA: Alaska: Aleutian Islands, Unalaska (Island)
(CHamisso, L.A., 1822)
GH ISOTYPE

USA: North Carolina: Forsyth Co.: Winston-Salem ("Salem")
(Dos, L., 1822)
NY TYPE COLLECTION

USA: Massachusetts: Berkshire Co.: Williamstown, Saddle Mountain (Dewey, C., 1822)
GH ISOTYPE

Canada: Quebec: James Bay, Eastmain (Lepage, E., 33131. 27 Jul 1955)
GH ISOTYPE

GH ISOTYPE

SMITHSONIAN CONTRIBUTIONS TO BOTANY

USA: CALIFORNIA: MARISS (BOLANDER, H.N., 2299.
--- --- 1860-1867)
MO
TYPE MATERIAL

366. NUDATA VAR. FIRMIOR KUKENTHAL, G. IN ENGLER, H.G.A., PFLANZENR.
4, FAM. 20: 337. 1909.
USA: ARIZONA: WILLOW SPRINGS (PALMER, E., 546. -- JUN 1890)
DS
ISOTYPE

367. NUTANS VAR. JAPONICA FRANCHET, A. AND SAVATIER, L., ENUM. PL. JAP.
2: 154. 1879.
JAPAN: KANAGAWA (PREFECTURE): HONSHU (ISLAND), YOKOSUKA
(SAVATIER, L., 1404. -- --- 1866-1874)
US 31277 TYPE MATERIAL

368. NUTTALLII DEWEY, C., AMER. J. SCI. ARTS SER. 1, 43: 92. 1842.
USA: --: ROCKY MOUNTAINS (NUTTALL, T., 17. ---)
GH HOLOTYPE
NY ISOTYPE
--0--

MEXICO: OAXACA: SIERRA DE SAN FELIPE (PRINGLE, C.G., 4842.
29 AUG 1894)
GH ISOTYPE
MO TYPE COLLECTION
US 251772 TYPE COLLECTION
US 817656 TYPE COLLECTION

USA: CALIFORNIA: SAN LUIS OBISPO CO.: SAN LUIS OBISPO, STEINER
CREEK (EASTWOOD, A. AND HOWELL, J.T., 2271. 07 MAY 1936)
CAS 235733 HOLOTYPE
CAS 237824 ISOTYPE
CAS 237908 ISOTYPE
DS 270930 ISOTYPE
F 866418 ISOTYPE
GH ISOTYPE
NY ISOTYPE
US 1678188 ISOTYPE

CHINA: KWANGTUNG: CHUNG TUNG, TAI TSANG, YING TAK (TAK, T.W.
AND CHOW, W.K., 3202. 20 NOV 1926)
UC 319673 HOLOTYPE

372. OBOVOIDEA CRONQUIST, A., MADRONO 7: 78. 1943.
03 JUL 1941)
GH ISOTYPE
373. OEDERI VAR. ROUSSEAUIANA MARIE-VICTORIN, (FRERE), PROC. & TRANS. ROY. SOC. CANADA SER. 3, 23(2), SECT. 5: 262. 1929.
CANADA: QUEBEC: MONTMAGNY CO.: L'ESTUAIRE DU ST. LAURENT; BERTHIER-EN-BAS (ROUSSEAU, J., 24989. 27 JUL 1926)
NY TYPE

374. OKLAHOMENSIS MACKENZIE, K.K., TORREYA 14: 126. 1914.
USA: OKLAHOMA: CATALE (BUSH, B.F., 993. 22 MAY 1895)
MO TYPE MATERIAL
NY TYPE

CHILE: MAGALLANES: TIERRA DEL FUEGO ("FUEGIA"), ORANGE HARBOR (WILKES EXPLOR. EXPEL., ----. -- --- 1838-1842)
US 30695 ISOTYPE

376. Oligocarpa VAR. LATIFOLIA GRAY, A. EX TORREY, J.;
ANN. LYCEUM NAT. HIST. NEW YORK 3: 415. 1836.
USA: NEW YORK: JEFFERSON CO.: WATERTOWN (CRAWE, J.B., ----. ----)
GH HOLOTYPE

USA: WASHINGTON: CLALLAM CO.: OLYMPIC MOUNTAINS (ELMER, A.D.E., 2700. -- JUN 1900)
NY SYNTYPE

USA: TEXAS: TARRANT CO.: -- (RUTH, A., 458. 24 APR 1914)
CAS 351152 ISOTYPE
NY TYPE
US 504456 ISOTYPE

USA: OREGON: -- (HALL, E., 605. -- --- 1871)
F 455736 SYNTYPE
NY SYNTYPE

USA: NEW HAMPSHIRE: GRAFTON CO.: FRANCONIA, LITTLETON HILL (FAXON, E. AND FAXON, C.E., ----. 27 MAY 1896)
GH HOLOTYPE

USA: MAINE: PENOBSCOT CO.: ORONO (FERNALD, M.L., ----. 30 JUN 1891)
GH HOLOTYPE
NY ISOTYPE
382. **OXYCARPA HOLM, H.T., AMER. J. SCI. SER. 4, 20:303. 1905.**
   USA: WASHINGTON: KLICKITAT CO.: COLUMBIA (SUUKSDORF, W.N., 816.
   02 JUN 1885)
   F  96129  TYPE MATERIAL
   F  211365  TYPE MATERIAL
   US  27292  TYPE MATERIAL

383. **OXYLEPIS VAR. PUBESCENTS UNDERWOOD, J.K., AMER. MIDL. NATURALIST
   33:635. 1945.**
   12 JUL 1939)
   NY  TYPE COLLECTION

384. **PACHYCARPA MACKENZIE, K.K., BULL. TORREY BOT. CLUB 43:616. 1916.**
   USA: CALIFORNIA: ALPINE CO.: SILVER VALLEY, BIG TREE ROAD;
   ALT. 8000 FT. (BREWER, W.H., 1977. 31 JUL 1863)
   UC  1060  HOLOTYPE

   1855.**
   USA: ALASKA: ALEUTIAN ISLANDS, UNALASKA (ISLAND)
   (CHAMISSO, L.A., ---, ---)
   GH  ISOTYPE

386. **PACHYSTOMA HOLM, H.T., AMER. J. SCI. SER. 4, 20:302. 1905.**
   USA: OREGON: KLAMATH CO.: CRATER LAKE NATIONAL PARK, ANNA
   CREEK CANYON (COVILLE, F.V., 1362. 03 SEP 1902)
   US  415172  TYPE

387. **PADDOENSIS SUUKSDORF, W.N., ALLG. BOT. Z. SYST. 12:43. 1906.**
   USA: WASHINGTON: YAKIMA CO.: MOUNT ADAMS ("PADO")
   (SUUKSDORF, W.N., 1296. 13 AUG 1897)
   F  223512  TYPE MATERIAL
   F  1471489  TYPE MATERIAL
   GH  ISOTYPE
   NY  ISOTYPE
   US  529528  TYPE MATERIAL

388. **PALAWANENSIS KUKENTHAL, G. IN ELMER, A.D.E., LEAFL. PHILIPP. BOT.
   4:1169. 1911.**
   PHILIPPINES: PALAWAN: PUERTO PRINCESA, MOUNT PULGAR
   (ELMER, A.D.E., 13146. -- MAY 1911)
   GH  ISOTYPE
   NY  TYPE MATERIAL
   US  872800  TYPE MATERIAL

   1942.**
   CANADA: NEWFOUNDLAND: GANDER RIVER VALLEY, GLENWOOD
(FERNALD, M.L. AND WIEGAND, K.M., 4918. 12-13 Jul 1911)
   GH   HOLOTYPE

   USA: Oregon: Clatsop Co.: Clatsop (HENDERSON, L.F., 1482.
   31 JUL 1886-20 AUG 1887)
   DS  490462 SYNTYPE
   NY  SYNTYPE

   Japan: Hokkaido (Prefecture): Hakodate (WRIGHT, C., ---.
   --- --- 1853-1856)
   GH   HOLOTYPE
   NY   ISOTYPE
   Us   31344 ISOTYPE

   Japan: Hokkaido (Prefecture): Hakodate (WRIGHT, C., ---.
   US   27275 TYPE MATERIAL

   Canada: ---: Hudson Bay (RICHARDSON, J., ---.
   NY   TYPE COLLECTION

394. X Patuensis Lepage, E., Naturaliste Canad. 89:113, Fig. 1. 1962.
   Canada: Quebec: Ungava Bay, Lake Patu (DUTILLY, A. and
   LEPAGE, E., 39329: 19 Aug 1961)
   GH   ISOTYPE

395. Paucicostata Mackenzie, K.K., Erythea 8:74. 1922.
   USA: California: Mariposa Co.: Yosemite National Park,
   Yosemite Valley (BOLANDER, H.N., 6198. --- Jul 1866)
   DS  49738 TYPE COLLECTION
   F   309086 TYPE MATERIAL
   MO  TYPE MATERIAL
   NY  TYPE COLLECTION

   Canada: Quebec: Ile aux Coudres (Marie-Victorin, (Frere), 4021.
   --- Jun 1917)
   GH   HOLOTYPE

   01 JUL 1878)
   GH   HOLOTYPE

   USA: Wyoming: Teton Co.: Grand Teton National Park, Jackson
   Hole Valley (PAYSON, E.B. and PAYSON, L.B., 2224. 06 Aug 1920)
   GH   ISOTYPE
   UC  905434 HOLOTYPE
   15 AUG 1933)
   CAS 239452 ISOTYPE
   NY HOLOTYPE

   MEXICO: CHIHUAHUA: MADERA (MULLER, C.H., 3520. 27 SEP 1939)
   CAS 369422 ISOTYPE
   US 2133207 TYPE

401. **PERGLOBOSA** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 34:606. 1907.
   USA: COLORADO: SUMMIT CO.: MOUNT BALDY, BRECKENRIDGE
   (MACKENZIE, K.K., 167. --- AUG 1901)
   MO TYPE MATERIAL
   NY HOLOTYPE

   INDONESIA: WEST NEW GUINEA: LAKE HABBEBA; (COUNTRY AS "DUTCH
   NEW GUINEA") (BRASS, L.J., 9583. --- AUG 1938)
   A ISOTYPE

   MEXICO: HIDALGO: TRINIDAD IRON WORKS; ALT. 1585 M.
   (PRINGLE, C.G., 8863. 02 JUN 1904)
   CAS 155657 ISOTYPE
   CAS 193005 ISOTYPE
   F 178542 ISOTYPE
   GH HOLOTYPE
   MO ISOTYPE
   NY ISOTYPE
   US 461358 ISOTYPE

404. **PERSTRICTA** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 36:479. 1909.
   MEXICO: NUEVO LEON: MONTERREY (PRINGLE, C.G., 2630.
   05 JUN 1889)
   GH ISOTYPE
   NY TYPE

405. **PETASATA** DEWEY, C., AMER. J. SCI. ARTS SER. 1, 29:246. 1836.
   USA: ---: ROCKY MOUNTAINS (DRUMMOND, T., ---. ---)
   NY TYPE

406. **PETRICOSA** DEWEY, C., AMER. J. SCI. ARTS SER. 1, 29:246. 1836.
   USA: ---: ROCKY MOUNTAINS (DRUMMOND, T., ---. ---)
   NY TYPE

407. **PETRIEI** CHEESEMAN, T.F., TRANS. & PROC. NEW ZEALAND INST. 16:413.
   1884.
   NEW ZEALAND: CANTERBURY (DISTRICT): SOUTH ISLAND, BROKEN RIVER
   (CHEESEMAN, T.F., ---. --- JAN 1883)
   GH ISOTYPE
USA: OREGON: CLACKAMAS CO.: MOUNT HOOD (HALL, E., 583.
01 AUG 1871)
F  455706 TYPE COLLECTION
F  1425899 TYPE COLLECTION
GH TYPE COLLECTION
MO TYPE COLLECTION
NY TYPE COLLECTION

USA: OREGON: CROOK CO.: BEAR BUTTES (LEIBERG, J.B., 335.
26 JUN 1894)
NY ISOTYPE

410. PHALAROIDES VAR. PARVULA GROSS, R., REPERT. SP. NOV. REGNI VEG.
50:211. 1941.
15 FEB 1927)
US 1545831 TYPE

411. PHILOCRENNA KRECZETOWICZ, V.I.,
TRUDY SREDNE-AZIATSK. GOSUD. UNIV., SER. 88, BOT. 17:75. 1934.
USSR: TADZHIKISTAN: PAMIRS; ALT. 8200 FT. (LIPSKY, V.I., 2732.
19 JUL 1899)
NY TYPE MATERIAL

412. PHYLLOMANICA BOOTT, W. IN WATSON, S., GEOL. SURV. CALIFORNIA, BOT.
2:233. 1880.
USA: CALIFORNIA: MENDOCINO CO.: MENDOCINO CITY (BOLANDER, H.N.,
4746. -- --- 1866)
GH HOLOTYPE
MO ISOTYPE
NY ISOTYPE

413. PHYSOCHLAENA HOLM, H.T., AMER. J. SCI. SER. 4, 17:317. 1904.
USA: ALASKA: YUKON VALLEY, COAL CREEK HILL (FUNSTON, F., 139.
30 JUL 1893)
F  755322 TYPE MATERIAL
MO 920815 TYPE COLLECTION
NY TYPE COLLECTION

414. PICTA BOOTT, F. IN GRAY, A., MEM. AMER. ACAD. ARTS N.S., 6:418.
1859.
JAPAN: HOKKAIDO (PREFECTURE): HAKODATE (WRIGHT, C., ---. ---)
US 31374 TYPE MATERIAL

415. PICTA STEUDEL, E.G., SYN. PL. GLUM. 2:184. 1855.
USA: LOUISIANA: ORLEANS PARISH: NEW ORLEANS (DRUMMOND, T., ---.
---)
NY TYPE COLLECTION

416. PINETORUM VAR. ELATIOR KUKENTHAL, G. IN ENGLER, H.G.A., PFLANZENR.
CANADA: BRITISH COLUMBIA: VANCOUVER ISLAND, CEDAR HILL
(MACOUN, JOHN, ---, 31 MAY 1887)
GH ISOTYPE
NY ISOTYPE

418. PIRCHINCHENSIS VAR. SIMPLEX GROSS, R., REPERT. SP. NOV. REGNI VEG.
50: 211. 1941.
COLOMBIA: ---; -- (MUTIS, J.C., KILLIP NO. 5715.
-- --- 1760-1808)
US 1563811 TYPE

419. PITYOPHILA MACKENZIE, K.K., BULL. TORREY BOT. CLUB 40:545. 1913.
USA: NEW MEXICO: RIO ARIBA CO.: TIERRA AMARILLA
(EGGLESTON, W.W., 6605. 18 APR-25 MAY 1911)
CAS 383889 ISOTYPE
NY TYPE MATERIAL
US 660821 TYPE

1879.
JAPAN: KANAGAWA (PREFECTURE): HONSHU (ISLAND), YOKOSUKA
(SAVATIER, L., 2059. -- --- 1866-1874)
US 27269 TYPE MATERIAL

421. PLATYLEPIS MACKENZIE, K.K., N. AMER. FL. 18:142. 1931.
USA: WYOMING: BIG HORN CO.: BIG HORN MOUNTAINS, TEN SLEEP LAKES
(WILLIAMS, T.A., 2951. 19 AUG 1897)
NY HOLOTYPE

422. PLATYPHYLLA CAREY, J., AMER. J. SCI. ARTS SER. 2, 4:23. 1847.
USA: NEW YORK: ("NOV. EBOR.") (CAREY, J., ---. ---)
GH TYPE MATERIAL

USA: MONTANA: GLACIER CO.: GLACIER NATIONAL PARK, LOGAN PASS, HIDDEN LAKE; ALT. 7300 FT. (HERMANN, F.J., 18120.
21 AUG 1962)
CAS 416360 ISOTYPE
US 2420276 HOLOTYPE

USA: HAWAII: HONOLULU CO.: OAHU (ISLAND), KOOLAU MOUNTAINS
(HOSAKA, E.Y., 594. 04 JUL 1932)
US 2074725 TYPE MATERIAL

425. PODOCARPA BROWN, R. IN RICHARDSON, J. IN FRANKLIN, J.
<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Authors</th>
<th>Year</th>
<th>Country</th>
<th>Location</th>
<th>Collector</th>
<th>Specimen Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>429.</td>
<td>Praeceptorium Mackenzie, K.K.</td>
<td>N. Amer. fl. 18:95. 1931.</td>
<td>USA: WASHINGTON: Klickitat Co.: Simcoe Mountains, Goldendale (PECK, M.E.); 13 AUG 1917</td>
<td>NY HOLOTYPE</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>434.</td>
<td>Pratensis var. Furva Bailey, L.H.</td>
<td>In Macoun, John, Cat. Canadian Pl. 5:377. 1890.</td>
<td>CANADA: BRITISH COLUMBIA: VANCOUVER ISLAND, CEDAR HILL (MACOUN, JOHN);</td>
<td>GH ISOTYPE</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Australia: ---- -- (PREISS, L., 1825. ----)
GH SYNTYPE
Australia: Western Australia: Perth (PREISS, L., 1861.
-- JUL 1839)
MO 2002968 SYNTYPE

USA: Alaska: Nutka Sound ("Sinus Nutka") (Haenke, T., ----. ----)
US 865056 TYPE MATERIAL

PRINGLEI Bailey, L.H., BOT. Gaz. 17:151. 1892.
Mexico: San Luis Potosi: Hacienda de Angustura, 100 miles East
of San Luis Potosi (Pringle, C.G., 3801. 04 Aug 1891)
F 105551 TYPE COLLECTION
F 1607711 TYPE COLLECTION
GH TYPE COLLECTION
MO TYPE COLLECTION
NY TYPE COLLECTION
US 817724 TYPE COLLECTION

USA: Idaho: Divide Between Saint Joe and Clearwater Rivers
(Leiberg, J.B., 125. 10 JUL 1895)
NY TYPE COLLECTION

Canada: New Brunswick: Kent Co.: Kouchibouguac (Fowler, J., ----.
-- ---- 1872)
GH ISOTYPE
NY TYPE COLLECTION

PROPOSITA Mackenzie, K.K.; N. Amer. Fl. 18:126. 1931.
USA: Idaho: Blaine Co.: Smoky Mountains; Alt. 2700 M.
CAS 102638 ISOTYPE
GH ISOTYPE
NY HOLOTYPE

Canada: Newfoundland: Port au Port Bay, Table Mountain
(Fernald, M.L. and Wiegand, K.M., 4258. 16 Aug 1910)
GH HOLOTYPE

1908.
USA: California: Nevada Co.: Sierra Nevada Range, Donner Lake;
Alt. 2750 M. (Heller, A.A., 7187. 17 Aug 1903)
F 215918 TYPE COLLECTION
NY TYPE COLLECTION
**CHINA: YUNNAN:** -- (Delavay, R.P., 4829. 15 Jul 1889)  
US 1123683 ISOTYPE

**USA: LOUISIANA: ORLEANS PARISH: NEW ORLEANS (Drummond, T., 424. -- --- 1832)**  
NY TYPE COLLECTION

**BRAZIL: RIO DE JANEIRO: ITATIAIA (Chase, A., 8283. 17 Jan 1925)**  
US 1282178 TYPE

**USA: TENNESSEE: CAMPBELL CO.: CHASKA (Bright, J., --- 18 May 1923)**  
NY TYPE COLLECTION

**PHILIPPINES: NEGROS OCCIDENTAL: MOUNT CANLAON (VOLCANO) (Merrill, E.D., 543. -- APR 1910)**  
US 1398830 TYPE MATERIAL

- Q -

**USA: CALIFORNIA: TUOLUMNE CO.: MOUNT DANA, TUOLUMNE RIVER (Bolander, H.N., 5046. -- --- 1866)**  
DS 55002 SYNTYPE  
NY SYNTYPE

**USA: CALIFORNIA: TUOLUMNE CO.: MOUNT DANA, TUOLUMNE RIVER (Bolander, H.N., 5046. -- --- 1866)**  
NY SYNTYPE

GH ISOTYPE  
NY ISOTYPE  
US 2433718 ISOTYPE

**GUATEMALA: QUICHE: NEBAJ (Sharp, A.J., 45144. 07 Feb 1945)**  
US 2133193 TYPE
453. RACHILLIS MAGUIRE, B., BRITTONIA 5:199. 1944.
USA: UTAH: GILBERT PEAK (MAGUIRE, B. AND MAGUIRE, R.R., 14668.
16 AUG 1936)
CAS 325253 ISOTYPE
NY TYPE
US 1872576 TYPE MATERIAL

454. RAMOSII KUKENTHAL, G., REPERT. SP. NOV. REGNI VEG. 8:8. 1910.
PHILIPPINES: RIZAL: LUZON (ISLAND), MORONG (RAMOS, M.,
BUR. SCI. 1434. -- AUG 1906)
US 626608 TYPE MATERIAL

455. RAYNOLDSII DEWEY, C., AMER. J. SCI. ARTS SER. 2, 32:39. 1861.
USA: IDAHO: FREMONT CO.: PIERRE'S HOLE AND HENRY'S FORK
(HAYDEN, F. V., --. 20 JUN 1860)
GH SYNTYPE

456. RETROCURVA DEWEY, C. IN WOOD, A., CLASS-BOOK BOT. 423. 1845.
USA: NEW YORK: JEFFERSON CO.: -- (WOOD, W. A., --. --)
GH HOLOTYPE

01 JUN 1886)
GH ISOTYPE

1805.
USA: TEXAS: -- (DRUMMOND, T., --. --)
NY TYPE

459. RHYNCHACHAENIUM CLARKE, C. B. IN MERRILL, E. D.,
PUBL. BUR. SCI. GOV. LAB. 35:5. 1906 ("1905").
PHILIPPINES: BATAAN: MOUNT MARIVELES; ALT. 1100 M.
(ELMER, A. D. E., 6983. -- NOV 1904)
NY COTYPE

460. RICHARDSONII BROWN, R. IN RICHARDSON, J. IN FRANKLIN, J.,
NARR. JOURNEY POLAR SEA 751. 1819.
CANADA: --: -- (RICHARDSON, J., --. --)
GH TYPE MATERIAL

USA: ILLINOIS: HANCOCK CO.: AUGUSTA (MEAD, S. B., --. --)
GH HOLOTYPE

USA: TENNESSEE: CARTER CO.: ROAN MOUNTAIN; ALT. 4700 FT.
VENezUELA: BOLIVAR: MOUNT RORAIMA; ALT. 2700-2740 M.
(STEYERMARK, J.A., 5887C. 28 SEP 1944)
F 1263854 HOLOTYPE
NY ISOTYPE

464. **ROSAEOIDES** HOWE, E.C. IN GORDINIER, H.C. AND HOWE, E.C.,
FL. RENSSELAER CO. 33. 1894.
USA: NEW YORK: RENSSELAER CO.: LANSINGBURGH (HOWE, E.C., ---).
30 MAY 1887
NY ISOTYPE

USA: ARKANSAS: PULASKI CO.: LITTLE ROCK, LA FOURCHE CREEK
(HASSE, H.E., ---. 01 MAY 1886)
GH HOLOTYPE
NY ISOTYPE

466. **ROSEA VAR. PUSILLA** PECK, C.H., ANNUAL REP. NEW YORK STATE MUS.
48:132. 1895.
USA: NEW YORK: LIVINGSTONE CO.: PORTAGE (PECK, C.H., ---).
-- JUN 1894
NY TYPE

467. **ROSEA VAR. STAMINATA** PECK, C.H., ANNUAL REP. NEW YORK STATE MUS.
47:164. 1894.
-- JUN 1893)
NY TYPE

1934.
CHINA: KWANGTUNG: LOH-FAU-SHAN (MOUNTAIN), POK-LO (TSUI, T.M.,
74. -- MAR-APR 1932)
A ISOTYPE
GH ISOTYPE
MO 1260436 ISOTYPE
NY TYPE
US 1754487 ISOTYPE

469. **RUGATA** FERNALD, M.L., RHODORA 43:545, PL. 671. 1941.
USA: VIRGINIA: SUSSEX CO.: HOMEVILLE (FERNALD, M.L. AND LONG, B.,
11787. 07 MAY 1940)
CAS 336836 ISOTYPE
F 1489429 ISOTYPE
GH HOLOTYPE
MO 1306478 ISOTYPE
NY ISOTYPE
US 2003132 ISOTYPE
   Japan: --- Honshu (Island), Mount Daimonji in Yamashiro
   (Ohwi, J., 29. 04 May 1931)
   F 1463953 Type material

   USA: New Jersey: Ocean Co.: Tuckerton (Mackenzie, K.K., 9871.
   -- May 1911)
   NY Type

472. **Rusbyi Mackenzie, K.K., Smithsonian Misc. Collect. 65(7):2. 1915.**
   USA: Arizona: Yavapai Co.: -- (Rusby, H.H., 859. -- --- 1883)
   NY Type
   US 30267 Type collection

473. **Ruthii Mackenzie, K.K., N. Amer. Fl. 18:112. 1931.**
   USA: North Carolina: Buncombe Co.: Craggy Mountain (Ruth, A.,
   ---. -- Jul 1900)
   NY Holotype

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   USA: California: Mendocino Co.: Mendocino City (Bolander, H.N.,
   4702. -- --- 1866)
   CAS 383801 Type collection
   DS 293480 Type collection
   F 30885 Type material
   MO Type material
   NY Type collection
   US 29888 Type collection
   US 319226 Type collection

475. **Saltaensis Gross, R., Repert. Sp. Nov. Regni Veg. 50:211. 1941.**
   Argentina: Salta: Rosario Dept.: Campo Quijano (Venturi, S.,
   8650. -- --- 1929)
   US 1545752 Type

   Afghanistan: --- -- (Griffith, W., 96 (Kew 6094). ---)
   NY Type collection

   Papua and New Guinea: North-East New Guinea (Territory):
   Morobe District: Finisterre Range, Mount Sarawaket
   (Clemens, J. and Clemens, M.S., 5546. -- Mar 1937)
   A Isotype

   1868.
   USA: California: Mariposa Co.: Yosemite National Park,
Yosemite Valley (Brewer, W.H., 1636. -- --- 1863)
GH Holotype

USA: New York: Seneca Co.: Junius (Sartwell, H.P., 12. ---)
CAS 383407 Type Collection
CAS 553975 Type Collection
NY Type Collection

Western Samoa: ---: Savaii Island (Christophersen, E., 800. 24 Sep 1929)
NY Isotype

Canada: Quebec: James Bay, Fort George (Dutilly, A.; Lepage, E. and Dumant, M., 32357. 14 Aug 1954)
GH Isotype
US 2176493 Isotype

USA: Colorado: Larimer Co.: Fort Collins (Baker, C.F., ---)
MO Type Material
NY Type Material

USA: New York: Yates Co.: Penn Yan (Sartwell, H.P., 72. ---)
CAS 553877 Isotype

USA: Washington: Cascade Mountains (Cusick, W.C., 2849. 30 Jun 1902)
DS 490735 Isotype
MO Isotype
NY Type
US 528631 Isotype

China: Kwangtung: Loh-Fau-Shan (Mountain) (Ford, C., --- 1883?)
MO 2002967 Type Collection

Mexico: San Luis Potosi: San Luis Potosi (Schaffner, J.G., 546. --- 1877)
GH Isotype

488. **SCHWEINITZII** DEWEY, C., AMER. J. SCI. ARTS SER. 1, 9:68. 1825.  
USA: MASSACHUSETTS: BERKSHIRE CO.: WILLIAMSTOWN (DEWEY, C., --- ---)  
GH HOLOTYP E

489. **SCIRPIFORMIS** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 35:270. 1908.  
CANADA: ALBERTA: BANFF NATIONAL PARK, BANFF (MCCALLA, W.C., 2348. 28 JUL 1899)  
NY TYPE

USA: CALIFORNIA: SISKIYOU CO.: MOUNT EDDY (PRINGLE, C.G., --- 19 AUG 1881)  
F 210109 TYPE COLLECTION  
NY TYPE COLLECTION

CANADA: BRITISH COLUMBIA: CHILLIWACK VALLEY (MACOUN, J.M., 33728. 12 JUL 1901)  
NY TYPE COLLECTION

492. **SCOPARIA VAR. CONDENS A** FERNALD, M.L., PROC. AMER. ACAD. ARTS 37:468, PL.1. 1902.  
USA: MASSACHUSETTS: MIDDLESEX CO.: MEDFORD (BOOTT, W., --- 26 JUL 1865)  
GH HOLOTYP E

493. **SCOPARIA VAR. FULVA** BOOTT, W. IN WATSON, S.,  
GEOL. SURV. CALIFORNIA, BOT. 2:237. 1880.  
GH SYNTYPE

USA: NEW HAMPSHIRE: WHITE MOUNTAINS (TUCKERMAN, E., --- ---)  
NY TYPE COLLECTION

495. **SCOPARIA VAR. MONILIFORMIS** TUCKERMAN, E., ENUM. CARIC. 17. 1843.  
USA: MASSACHUSETTS: MIDDLESEX CO.: CAMBRIDGE (TUCKERMAN, E., --- ---)  
GH HOLOTYP E

GH HOLOTYP E

497. **SCOPARIA VAR. SUBTURBINATA** FERNALD, M.L. AND WIEGAND, K.M., RHODORA
<table>
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| 14:116 | 1912.

Canada: Newfoundland: Exploits River Valley, Grand Falls Area, Rushy Pond (Fernald, M. L. and Wiegand, K. M., 4796.
28 Aug 1911)

F 464432 SYNTYPE
GH HOLOTYPE
NY ISOTYPE


08 Jul 1909)

GH HOLOTYPE
NY ISOTYPE


USA: British Columbia: "Western Shore of America, Observatory Inlet" (Arm of Portland Inlet) (Scouler, J., 296. ---)
NY HOLOTYPE


Mexico: Hidalgo: Tula (Pringle, C. G., 7452. 24 Jun 1897)

CAS 445940 ISOTYPE
GH ISOTYPE
US 305734 TYPE COLLECTION


USA: Oregon: Union Co.: Clark's Creek (Sheldon, E. P., 8854.
09 Sep 1897)

NY ISOTYPE
NY TYPE
US 528495 TYPE COLLECTION


USA: Massachusetts: Hampden Co.: Westfield (Davis, E., ---)

NY TYPE COLLECTION


29 Jun 1900)

NY HOLOTYPE


USA: Georgia: Tattnall Co.: Reidsville (Harper, R. M., 2159.
26 Apr 1904)

US 511177 TYPE COLLECTION


USA: California: Sonoma Co.: Sebastopol, Pitkin Marsh (Howell, J. T. and Stacey, J. W., 13042. 06 Jun 1937)

CAS 246086 HOLOTYPE
CAS 246636 ISOTYPE
506. **Soperia** Raup, H.M., Sargentia 6:129, Fig. 12. 1947.
Canada: Northwest Territories: Mackenzie District: Brinell Lake (Raup, H.M. and Soper, J.H., 9534. 18 Jul 1939)
GH Holotype

USA: California: Alpine Co.: Silver Valley (Brewer, W.H., 1969. 31 Jul 1863)
CAS 232289 Syntype
US 30329 Syntype

USA: Arizona: Coconino Co.: Inscription House (Howell, J.T., 24609. 23 Jun 1948)
CAS 342552 Isotype
CAS 342553 Holotype
DS 337970 Isotype
GH Isotype
NY Isotype
US 2006386 Isotype

USA: Oregon: Multnomah Co.: Sauvie Island (Columbia River at mouth of Willamette River) (Howell, T.J., ---. -- May 1880)
GH Type Collection
MO Type Collection

Guatemala: Jalapa: Aguacate (Williams, L.O., 13178. 06 Jul 1947)
F 1252385 Holotype

USA: Montana: Stanton Lake (Williams, R.S., ---. 11 Aug 1894)
NY Type

512. **Stellata** Mackenzie, K.K., N. Amer. Fl. 18:226. 1935.
NY Isotype
US 452499 Holotype

514. STENOPHYLLA VAR. DESERTORUM LITVINOV, D.I., ALLG. BOT. Z. SYST. 1899.
    USSR: TURKESTAN: -- (LITVINOV, D.I., 153. -- 1897)
    US 616142 TYPE MATERIAL

515. STENOPTERA MACKENZIE, K.K., ERYTHEA 8:28. 1922.
    USA: CALIFORNIA: LOS ANGELES CO.: SAN ANTONIO MOUNTAINS, ICE HOUSE CANYON (JOHNSTON, I.M., 1505. 31 JUL 1917)
    DS 83850 ISOTYPE

    USA: NEW YORK: SENECA CO.: JUNIUS (SARTWELL, H.P., 35. --)
    NY ISOTYPE

517. STEUDELII KUNTH, C.S., ENUM. PL. 2:480. 1837.
    USA: OHIO: MIAMI RIVER VALLEY (FRANK, J.C., --)
    NY TYPE COLLECTION

518. STEYERMARKII STANDLEY, P.C., PUBL. FIELD MUS. NAT. HIST., BOT. SER. 23:196. 1847.
    14 JUL 1942)
    F 1129096 HOLOTYPE

519. STIPATA VAR. LAEVIVAGINATA KUKENTHAL, G. IN ENGLER, H.G.A.,
    USA: NORTH CAROLINA: BUNCOMBE CO.: BILTMORE (NEAR ASHEVILLE)
    (BILTMORE HERBARIUM, 262A. 28 MAY 1897)
    F 813737 TYPE COLLECTION

520. STIPATA VAR. MAXIMA CHAPMAN, A.W. EX BOOTT, F., ILL. GENUS CAREX
    3:121, PL.391. 1862.
    USA: FLORIDA: APPALACHICOLA (CHAPMAN, A.W., --)
    US 969091 TYPE COLLECTION

521. STIPATA VAR. SUBSECUETA PECK, C.H., ANNUAL REP. NEW YORK STATE MUS.
    48:128. 1895.
    USA: NEW YORK: RENSSELAER CO.: BERLIN (PECK, C.H., --)
    -- JUN 1894
    NY TYPE COLLECTION

    USA: ALABAMA: MOBILE RIVER (MOHR, C., --)
    NY ISOTYPE
   Canada: New Brunswick: Kent Co.: -- (Fowler, J., ---).
   -- Jul 1870
   GH SYNTYPE
   MO SYNTYPE
   NY SYNTYPE

   Canada: Ontario: Lambton Co.: Wyoming (Macoun, John, 26624. 24 Jun 1901)
   GH SYNTYPE

   USA: Mississippi: Oktibbeha Co.: Starkville (Tracy, S.M., 17. 23 May 1888)
   NY SYNTYPE

   USA: New York: Steuben Co.: Prattsburgh (Wright, S.H., ---)
   ---
   NY TYPE COLLECTION

   USA: North Carolina: Macon Co.: Mountains (Buckley, S.B., ---)
   ---
   MO TYPE COLLECTION
   NY TYPE COLLECTION

   USA: Oregon: Multnomah Co.: Sauvie Island (Columbia River at Mouth of Willamette River) (Howell, T.J., ---. 22 May 1880)
   GH SYNTYPE
   MO SYNTYPE

   USA: California: Alameda Co.: Oakland (Bolander, H.N., ---)
   --- --- 1860 CA.
   GH ISOTYPE
   NY HOLOTYPE
   US 28683 ISOTYPE

   USA: California: Lake Tahoe to Bear Valley (Kellogg, A., ---)
   ---
   GH ISOTYPE

531. **Subimpressa** Clokey, I.W., Rhodora 21:84. 1919.
USA: ILLINOIS: MACON CO.: -- (CLOKEY, I.W., 2338. 06 AUG 1915)
CAS  162423 ISOTYPE
UC    905433 HOLOTYPE

USA: CALIFORNIA: TUOLUMNE CO.: MOUNT DANA (HOWELL, J.T., 14519.
11 AUG 1938)
CAS  259816 HOLOTYPE
US  1765699 ISOTYPE

533. SUBORBICULATA MACKENZIE, K.K. IN ABRAMS, L., ILL. FL. PACIFIC STATES
1:338. 1923.
USA: WASHINGTON: Klickitat CO.: -- (SUUKSDORF, W.N., 1315.
-- JUL 1883)
NY TYPE

PHILIPPINES: BENGUET: LUZON (ISLAND), PAUAI (MERRILL, E.D.,
473C. -- OCT-NOV 1905)
NY TYPE MATERIAL
US  710428 TYPE MATERIAL

535. SUUKSDORFII KUKENTHAL, G., REPERT. SP. NOV. REGNI VEG. 16:434.
1920.
USA: WASHINGTON: YAKIMA CO.: MOUNT ADAMS ("PADDO")
(SUUKSDORF, W.N., 7383. 27 AUG 1912)
CAS  152864 ISOTYPE
CAS  243333 ISOTYPE
DS    171455 ISOTYPE
DS    269641 ISOTYPE
GH    ISOTYPE
MO    95212 TYPE COLLECTION
NY TYPE
US  1437926 TYPE COLLECTION

536. SUUKSDORFII VAR. OVALIS KUKENTHAL, G., REPERT. SP. NOV. REGNI VEG.
16:434. 1920.
USA: WASHINGTON: YAKIMA CO.: MOUNT ADAMS ("PADDO")
(SUUKSDORF, W.N., 5259. 21 AUG-20 SEP 1905)
DS    269625 SYNTYPE
NY SYNTYPE

CHINA: KWANGTUNG: SIN-FUNG DISTRICT: SAI-LIN-SHAN VILLAGE,
NGOK SHING SHAN (TAAM, Y.W., 502. 1-16 APR 1938)
A HOLOTYPE

538. SYCHNOCEPHALA CAREY, J., AMER. J. SCI. ARTS SER. 2, 4:24. 1847.
USA: NEW YORK: JEFFERSON CO.: WATERTOWN (CAREY, J., --. --)
GH ISOTYPE
15 JUL 1944)

F 1263858 HOLOTYPE
US 1932033 ISOTYPE

FRENCH POLYNESIA: ---: SOCIETY ISLANDS, TAHITI, MOUNT OROHENA (MACDANIELS, L.H., 1542. 15 MAY 1927)

A ISOTYPE

541. **TAMAKII** KOYAMA, T., BULL. ARTS SCI. DIV. RYUKYU UNIV. 3:75. 1959.
RYUKYU ISLANDS: OKINAWA (PREFECTURE): OKINAWA (ISLAND), YONA OKINAWA (ISLAND), YONA EXPERIMENTAL FOREST OF RYUKYU UNIVERSITY; (COUNTRY AS "JAPAN") (KOYAMA, T., ---. 23 NOV 1958)

NY HOLOTYPE

15 JUL 1944)

F 1263857 HOLOTYPE

543. **TENERA** DEWEY, C., AMER. J. SCI. ARTS SER. 1, 8:97. 1824.
USA: MASSACHUSETTS: BERKSHIRE CO.: WILLIAMSTOWN, SADDLE MOUNTAIN (DEWEY, C., ---. 20 JUN ----)

GH HOLOTYPE

USA: MASSACHUSETTS: MIDDLESEX CO.: MIDDLESEX FALLS (RICH, W.P., ---. 05 JUN 1894)

GH HOLOTYPE

545. **TENERAEFORMIS** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 43:609. 1916.
USA: CALIFORNIA: BUTTE CO.: JONESVILLE; ALT. 5100 FT. (HALL, H.M., 9781. 25 JUL 1914)

NY HOLOTYPE

USA: NEW YORK: YATES CO.: PENN YAN (SARTWELL, H.P., 138. ---)
CAS 553943 TYPE COLLECTION

547. **TENUIFLORA VAR. SETACEA** KUKENTHAL, G. IN ENGLER, H.G.A., PFLANZENR.
USA: MICHIGAN: INGHAM CO.: LANSING (WHEELER, C. F., ----.
28 JUN 1890)
GH ISOTYPE

548. TERETIUSCULA VAR. AMPLA BAILEY, L. H., MEM. TORREY BOT. CLUB 1:53.
1889.
USA: OREGON: BAKER CO.: HEAD OF BURNT RIVER (CUSICK, W. C., 1331.
-- JUL 1886)
NY SYNTYPE

CANADA: NEWFOUNDLAND: SAINT JOHN BAY, SAINT JOHN ISLAND
HOTCHKISS, N., 27567. 31 JUL 1925)
GH HOLOTYPE

RYUKYU ISLANDS: OKINAWA (PREFERENCES): OKINAWA (ISLAND);
(COUNTRY AS "JAPAN") (AMANO, T., 6358. -- MAY 1951)
US 2092356 TYPE MATERIAL

551. THURBERI DEWEY, C. IN TORREY, J. IN EMORY, W. H.,
MEXICO: SONORA: MABIBI (THURBER, G., ----. -- JUN 1850)
GH HOLOTYPE

GUATEMALA: HUEHUETENANGO: SIERRA DE LOS CUCHUMATANES, BETWEEN
TOJQUIA AND CAXIN (STEHMERK, J. A., 50150. 06 AUG 1942)
F 1129085 TYPE MATERIAL
F 1129086 TYPE MATERIAL

USA: CALIFORNIA: FRESNO CO.: KINGS RIVER CANYON, COPPER CREEK
TRAIL (HOWELL, J. T., 35333. 06 JUN 1960)
CAS 428953 HOLOTYPE
CAS 429306 ISOTYPE
NY ISOTYPE
US 2604281 ISOTYPE

ECUADOR: AZUAY: TOREADOR; ALT. 3810-3930 M. (STEHMERK, J. A.,
53095. 15 JUN 1943)
F 1266183 TYPE MATERIAL
NY ISOTYPE

555. TORTA VAR. STAMINATA PECK, C. H., ANNUAL REP. NEW YORK STATE MUS.
46:131. 1893.
USA: NEW YORK: ONEIDA CO.: TABERG (PECK, C. H., ----.
-- JUN 1892)
NY TYPE COLLECTION
556. **TOWNSENDII** MACKENZIE, K.K., N. AMER. FL. 18:111. 1931.
   MEXICO: CHIHUAHUA: COLONIA GARCIA; ALT. 2250 M.
   (TOWNSEND, C.H.T. AND BARBER, C.M., 157. 21 JUL 1899)
   CAS 351161 ISOTYPE
   NY ISOTYPE
   US 568126 HOLOTYPE

557. **TRACYI** MACKENZIE, K.K., ERYTHEA 8:41. 1922.
   USA: CALIFORNIA: HUMBOLDT CO.: BALD MOUNTAIN (TRACY, J.P., 4547.
   04 JUL 1914)
   NY TYPE

   USA: TEXAS: -- (DRUMMOND, T., ---. ---)
   NY ISOTYPE

559. **TRIBULOIDES VAR. SANGAMONENSIS** CLOKEY, I.W., RHODORA 21:84. 1919.
   USA: ILLINOIS: MACON CO.: -- (CLOKEY, I.W., 2364. 07 AUG 1915)
   UC 9,5441 HOLOTYPE

   USA: MAINE: AROOSTOOK CO.: FORT FAIRFIELD (WILLIAMS, E.F.;
   COLLINS, J.F. AND FERNALD, M.L., 11C. 19 JUL 1902)
   GH HOLOTYPE

561. **TRICHOPHYLLA NELMES**, E., MEM. MUS. NATL. HIST. NAT., SER. B, BOT.
   4:106. 1955.
   VIET-NAM, NORTH: TONKIN: CHAPU: (COUNTRY AS "INDOCHINA")
   (BOETLOT, P.A., 5325. -- JUL 1930)
   GH HOLOTYPE

   USA: MASSACHUSETTS: -- (DEWEY, C., ---. ---)
   NY ISOTYPE

563. **TRISPERMA VAR. BILLINGSII** KNIGHT, O.W., RHODORA 8:185. 1906.
   USA: MAINE: SOMERSET CO.: PLEASANT RIDGE, JEWETT BROOK BOG
   (WARE, R.A.; ROLLINS, S. AND KNIGHT, O.W., 5066. 05 JUL 1906)
   GH ISOTYPE

   CHINA: KWANGTUNG (ISLAND); DING KA TO WEN FA SHI
   (CHUN, N.K. AND TSOI, C.L., 43680. -- --- 1932-1933)
   GH ISOTYPE
   NY TYPE
   US 1675!2C TYPE MATERIAL

565. **TUMULICOLA** MACKENZIE, K.K., BULL. TORREY BOT. CLUB 34:154. 1907.
   USA: CALIFORNIA: ALAMEDA CO.: LAKE TEMESCAL (BIOLETTI, F.T., 1.
   25 JUN 1893)
   NY HOLOTYPE

GUATEMALA: HUEHUETENANGO: SIERRA DE LOS CUCHUMATANES, TUNIMA (STEYERMARK, J.A., 48334, 07 JUL 1942) F
1128966 TYPE

567. TURGESCENS TORREY, J., ANN. LYCEUM NAT. HIST. NEW YORK 3:419. 1836.
USA: LOUISIANA: ORLEANS PARISH: NEW ORLEANS (INGALLS, T., --)
--- NY TYPE

1951.
VENEZUELA: SUCRE: CERRO TURUMIQUIRE, RIDGE DIVIDING HEADWATERS OF RIO MANZANARES AND RIO DE AMANA; ALT. 1900-2000 M.
(STEYERMARK, J.A., 62705, 10 MAY 1945) F
1266150 HOLOTYPE
GH ISOTYPE
NY ISOTYPE
US 1933688 ISOTYPE

-U-

569. ULTRA BAILEY, L.H., PROC. AMER. ACAD. ARTS 22:83. 1886 ("1887").
21 JUN 1882) DS 63991 ISOTYPE
DS 64032 ISOTYPE

570. UMBELLATA VAR. VICINA DEWEY, C., AMER. J. SCI. ARTS SER. 1, 11:317.
1826.
USA: --- -- (DEWEY, C., --)
GH HOLOTYPE

USA: COLORADO: LA PLATA CO.: LA PLATA MOUNTAINS, MOUNT HESPERUS, GOLD KING MINE (KELSO, L., 6058, 03 JUL 1947) GH ISOTYPE

JAMAICA: --: SALT HILL MARSH (UNDERWOOD, L.M., 158.
29 JAN 1903) NY

573. UNILATERALIS MACKENZIE, K.K., ERYTHEA 8:43. 1922.
21 JUL 1912) NY

TYPE
574. **VAGANS** HOLM, H.T., AMER. J. SCI. SER. 4, 17:301. 1904.
   USA: OREGON: HANREY CO.: STEEN MOUNTAIN, ANDREWS (LEIBERG, J.B., 2558. 10 JUL 1896)
   NY ISOTYPE

575. **VAGINATA VAR. ALTO-CALUSIS** DEWEY, C., AMER. J. SCI. ARTS
   SER. 2, 41:227. 1866.
   USA: NEW YORK: GENESEE CO.: BERGEN (PAINE, J.A., ---. ----)
   GH HOLOTYPE

576. **VALLICOLA** DEWEY, C., AMER. J. SCI. ARTS SER. 2, 32:40. 1861.
   USA: WYOMING: TETON CO.: SNAKE RIVER, JACKSON HOLE VALLEY (DEWEY, C., 10. 18 JUN 1860)
   GH HOLOTYPE

   1953.
   GUATEMALA: HUEHUETENANGO: SIERRA DE LOS CUCHUMATANES, CERRO HUITZ, BETWEEN MIMANHUITZ AND YULHUITZ; ALT. 2600 M.
   (STAYERMARK, J.A., 48554. 14 JUL 1942)
   F 1129094 HOLOTYPE
   GH ISOTYPE

578. **VERNACULA VAR. HOBSONII** MAGUIRE, B., BRITTONIA 5:199. 1944.
   USA: UTAH: BEAR RIVER RANGE, WHITE PINE LAKE (MAGUIRE, B.; HOBSON, D.A. AND MAGUIRE, R.R., 14013. 16 JUL 1936)
   CAS 348507 ISOTYPE
   GH ISOTYPE
   NY HOLOTYPE
   US 1872573 ISOTYPE

   USA: MAINE: AROOSTOOK CO.: MADAWASKA LAKE (WILLIAMS, E.F., ---. -- AUG 1900)
   GH HOLOTYPE

   CANADA: NEWFOUNDLAND: SAINT JOHN'S (FERNALD, M.L.; LONG, B. AND FOGG-JR., J.M., 1474. 31 JUL 1929)
   GH HOLOTYPE
   US 2050647 ISOTYPE

   USA: MASSACHUSETTS: MIDDLESEX CO.: WILMINGTON, SILVER LAKE (KENNEDY, G.G., ---. 11 JUN 1899)
   GH HOLOTYPE

USA: FLORIDA: HENDRY CO.: CLEWISTON (DEAM, C.C., 61177. 19 MAR 1941)
US 2231425 HOLOTYPE

583. VICARIA BAILEY, L.H., MEM. TORREY BOT. CLUB 1:49. 1889.
USA: OREGON: -- (HALL, E., ---. --- --- 1871)
GH HOLOTYPE

584. VIOLACEA CLARKE, C.B., BULL. MISC. INFORM. ADD. SER. 8:87. 1908.
MO TYPE COLLECTION

585. VIRIDIOR MACKENZIE, K.K. IN ABRAMS, L., ILL. FL. PACIFIC STATES 1:331. 1923.
US 886234 TYPE

CANADA: QUEBEC: UNGAVA BAY, SWAMPY BAY (DUTILLY, A. AND LEPAGE, E., 39274. 16 AUG 1961)
GH ISOTYPE

FIJI: --- VITI LEVU (ISLAND) (ST. JOHN, H., 18330. 18 AUG 1937)
US 1967819 ISOTYPE

USA: CALIFORNIA: RIVERSIDE CO.: PALM SPRINGS (PARISH, S.B., 4144. 04-13 APR 1896)
F 89120 TYPE MATERIAL
MO ISOTYPE
US 279151 ISOTYPE

USA: MICHIGAN: EMMET CO.: BIG STONE BAY (HERMANN, F.J., 6408. 14 AUG 1934)
GH HOLOTYPE

-W-

590. WAHUENSIS VAR. RUBIGINOSA KRAUSS, R., PACIFIC SCI. 4:257, FIG. 2, 3A-D. 1950.
USA: HAWAII: KILAUEA IKI (BEAN, R.S.; HOSAKA, E.Y. AND ST. JOHN, H., 11228. 21 DEC 1931)
US 2074653 TYPE COLLECTION

USA: NEVADA: ORMSBY CO.: CARSON CITY (WATSON, S., 1246.
CHILE: LLANQUIHUE; ALT. 700 M. (WERDERMANN, E., 1687.
-- MAR 1925)
NY TYPE COLLECTION

USA: CALIFORNIA: TUOLUMNE CO.: MOUNT DANA; ALT. 12000 FT.
(BOLANDER, H.N., 5086. -- --- 1866)
MO SYNTYPE
NY SYNTYPE
USA: CALIFORNIA: MARIPOSA CO.: YOSEMITE NATIONAL PARK,
YOSEMITE VALLEY (BOLANDER, H.N., 6198. -- --- 1866)
F 309085 SYNTYPE
F 309086 SYNTYPE
MO SYNTYPE
NY SYNTYPE
USA: CALIFORNIA: NEVADA CO.: SODA SPRINGS; ALT. 9000 FT.
(BREWER, W.H., 1778. 04 JUL 1863)
MO SYNTYPE
NY SYNTYPE

CANADA: NEWFOUNDLAND: BAY OF ISLANDS, HUMBER ARM, CURLING
(FERNALD, M.L. AND WIEGAND, K.M., 2776. 21 JUL 1910)
GH ISOTYPE

1854.
USA: CALIFORNIA: SACRAMENTO RIVER (WILKES EXPLOR. EXPED., ---
--- 1838-1842)
NY TYPE COLLECTION

596. WILLDENOVII VAR. PAUCIFLORA
OLNEY, S.T. EX BAILEY, L.H. IN COULTER, J.M.,
CONTR. U.S. NATL. HERB. 2:482. 1894.
USA: TEXAS: HARRIS CO.: HOUSTON (HALL, E., ---. -- --- 1872)
GH TYPE COLLECTION

597. WILLDENOWII VAR. MEGARRHYNCHA HERMANN, F.J., AMER. MIDL. NATURALIST
USA: GEORGIA: JASPER CO.: OCMULGEE (SMITH, S.J. AND DUNCAN, W.H.,
4872. 06 APR 1949)
US 2133191 TYPE COLLECTION

598. WILLIAMSSII BRITTON, N.L., BULL. NEW YORK BOT. GARD. 2:159. 1901.
CANADA: YUKON TERRITORY: DAWSON (WILLIAMS, R.S., ---.
12 JUN 1899) NY TYPE
599. WOODII DEWEY, C., AMER. J. SCI. ARTS SER. 2, 2: 249. 1846.
USA: NEW YORK: JEFFERSON CO.: PERCH LAKE, PERCH RIVER
(CRAWFORD, I. B. AND WOOD, W. A., ---, ---)
NY TYPE COLLECTION

600. WRIGHTII DEWEY, C. IN TORREY, J. IN EMBRY, W. H.,
USA: TEXAS: --- (WRIGHT, C., 1561. --- --- 1850)
NY TYPE COLLECTION

-X-

CANADA: NEWFOUNDLAND: MAIN RIVER (FERNALD, M. L. AND LONG, B.,
1455. 27 AUG 1929)
GH HOLOTYPE
US 2050636 ISOTYPE

602. XANTHOCARPA VAR. ANNECTANS BICKNELL, E. P., BULL. TORREY BOT. CLUB
USA: NEW YORK: LONG ISLAND, RICHMOND VALLEY (BRITTON, N. L., ---.
06 JUL 1895)
NY TYPE

603. XEANTICA BAILLY, L. H., BOT. GAZ. 17: 151. 1892.
CANADA: SASKATCHEWAN: FILE HILLS; 50.5N., 104W. (MACOUN, JOHN,
---. 04 JUL 1879)
GH SYNTYPE
NY SYNTYPE

604. XEROCARPA WRIGHT, S. H. IN DEWEY, C., AMER. J. SCI. ARTS
SER. 2, 42: 334. 1866.
USA: NEW YORK: STEUBEN CO.: PRATTSTON (WRIGHT, S. H., ---.
---)
NY TYPE COLLECTION

-Y-

605. YUKONENSIS BRITTON, N. L., BULL. NEW YORK BOT. GARD. 2: 159. 1901.
CANADA: YUKON TERRITORY: BONANZA RIVER (WILLIAMS, R. S., ---.
18 JUN 1899)
NY TYPE

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CHINA: YUNNAN: -- (TSAI, H. T., 62809. -- --- 1934)
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| Type Collection | Pringlei |       |
| Isotype    | Projecta    |       |
| Isotype    | Proposita   |       |
| Holotype   | X Pseudo-Fulva |       |
| Isotype    | X Quebecensis |       |
| Syntype    | Raynoldsi    |       |
| Holotype   | Retrocurva   | Var copulata |
| Isotype    | Retrocurva   |       |
| Type Material | Richardsonii |       |
| Holotype   | Richardsonii | For exserta |
| Holotype   | Rosea        | Var arkansana |
| Isotype    | Rubro-Brunnea | Var elineolata |
| Holotype   | Rugata       |       |
| Holotype   | Sartwelliana |       |
| Isotype    | X Saxenii    | NM. ferruginea |
| Isotype    | Schaffneri   |       |
| Holotype   | Schneideri   |       |
| Holotype   | Schweinitzii |       |
| Holotype   | Scoparia     | Var condensa |
| Syntype    | Scoparia     | Var fulva |
| Holotype   | Scoparia     | Var moniliformis |
| Holotype   | Scoparia     | For peracuta |
| Holotype   | Scoparia     | Var subturbinata |
| Holotype   | Scoparia     | Var tesselata |
| Isotype    | Seatoniana   |       |
| Isotype    | Sonomensis   |       |
| Holotype   | Soperi       |       |
| Isotype    | Specuicola   |       |
| Type Collection | Spreta |       |
| Type Collection | Stipata | Var laevivaginata |
| Syntype    | Straminea    | Var cumulata |
| Syntype    | Straminea    | Var echinodes |
| Syntype    | Stylosa      | Var virens |
| Isotype    | Sub-bracteata |       |
| Isotype    | Subfusca     |       |
| Isotype    | Suksdorfii   |       |
| Isotype    | Sychnocephala |       |
| Holotype   | Tenera       |       |
| Holotype   | Tenera       | Var richii |
| Isotype    | Tenuiflora   | Var setacea |
| Holotype   | Terrae-NOVAE |       |
| Holotype   | Thurberi     |       |
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| 1834152 | HOLOTYPE | AUSTRO-CAROLINIANA |
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