

TYPIFICATION IN AND CONTRIBUTIONS TO A REVISION OF *PSAMMISIA* (ERICACEAE: VACCINIEAE)

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ABSTRACT

Since the last complete revision of *Psammisia* (Ericaceae: Vaccinieae) in 1932 many new species, synonyms, and local treatments have been published and genetic information is slowly becoming available. This paper is based on field and herbarium observations made over a period of nearly 50 years and helps to clarify questions of typification and species relationships towards an updated revision. Emphasis is herein given to species occurring in Peru and Bolivia for which a key to the species occurring in that region is made available for the first time. Notes on the poorly understood yet historically important collections of Ruiz & Pavón, Humboldt & Bonpland, Mathews, the Schomburgk brothers, and Linden, Funck, & Schlim are provided as they refer to South American Ericaceae. Neotypes for *Thibaudia formosa* and *Thibaudia nutans* are also included. One new combination, ***Psammisia costerooides*** (Sleumer) Luteyn, is made.

RESUMEN

Desde la última revisión completa de *Psammisia* (Ericaceae: Vaccinieae) en 1932, se han publicado muchas especies nuevas, sinónimos y tratamientos locales, y lentamente, también la información genética se está volviendo accesible. Este documento, basado en observaciones de campo y herbarios, realizadas durante un periodo de casi 50 años, ayuda a aclarar cuestiones de tipificación y relaciones entre especies para una revisión actualizada del género. Aquí se hace hincapié en las especies que se encuentran en Perú y Bolivia, y por primera vez, se ofrece una clave para las especies que se encuentran en esa región. Se proporcionan notas sobre las colecciones de Ruiz & Pavón, Humboldt & Bonpland, Mathews, los hermanos Schomburgk y Linden, Funck, & Schlim, colecciones históricamente mal entendidas pero históricamente importantes ya que se refieren a las Ericaceae sudamericanas. También se incluyen neotipos para *Thibaudia formosa* y *Thibaudia nutans*. Se presenta una nueva combinación, ***Psammisia costerooides*** (Sleumer) Luteyn.

KEY WORDS: Ericaceae, Vaccinieae, *Psammisia*, Neotropics, Andes, taxonomy, classification, typification, generic relationships, morphology, molecular analysis, conservation, extinction, Ruiz, Pavón, Humboldt, Bonpland, Mathews, Schomburgk, Linden, Funck, Schlim

INTRODUCTION

This is the second in a series of papers regarding taxonomic and nomenclatural matters in neotropical Ericaceae with special emphasis on taxa occurring in Peru and Bolivia in anticipation of a formal taxonomic treatment of the plant family Ericaceae for Bolivia and adjacent southern Peru (Luteyn 2018; Luteyn & Pedraza-Peñalosa in prep.).

In “Studien über die natürliche Klasse Bicornes Linné,” J.F. Klotzsch (1851) established the genus *Psammisia* by segregating from *Thibaudia* (of various authors and in the broadest sense) the 17 species with the unique (at that time) staminal feature of spurred anther-connectives. In *Genera Plantarum* (1876), J.D. Hooker further characterized *Psammisia* along with *Macleania* (amongst others) by having stamens shorter than the corolla with anther thecae granular (not smooth) and anther tubules with a typical elongate-conical shape; *Psammisia* also had two distinct anther tubules with usually spurred connectives to distinguish it from *Macleania*, which had unspurred anther tubules fused into one. In “The American species of Thibaudieae,” A.C. Smith (1932) noted a transition from *Macleania* to *Psammisia* through some species of *Macleania* in which the connectives were only slightly thickened distally “a condition from which it is a slight step to the spurred connective of *Psammisia*.”

The most comprehensive treatment of *Psammisia* is that of Smith in 1932 where 25 species were recorded; whereas, the most recent partial treatment of *Psammisia* is Luteyn’s (1987) “Key to the species of *Psammisia*

with globose short corollas.” Since 1932 there have been many publications that simply list the species of *Psammisia* (e.g., Foster 1958; Soukup 1972; Brako & Zarucchi 1993; Luteyn 2002b; León 2006; Luteyn & Maldonado 2014; Pedraza-Peñalosa 2015a) as well as local or regional floristic taxonomic treatments (e.g., Macbride 1959; Maguire et al. 1978; Wilbur & Luteyn 1978; Luteyn 1987, 1996, 1998; Luteyn & Wilbur 2005, 2010; Luteyn et al. 2008b; Luteyn & Vidal-Lemus 2015). Many recent papers have also added to the overall number of *Psammisia* species throughout its geographical range (Maguire et al. 1978; Luteyn 1981, 1987, 1996; Pedraza-Peñalosa 2015b, c). All recent monographers including Smith (1932, 1946, 1950), Sleumer (1941), Wilbur and Luteyn (1978), Luteyn (1987, 1991, 1996, 1998), Luteyn and Wilbur (2010), and Pedraza-Peñalosa (2015b, c), with the only exception being Macbride (1959), have continued to emphasize the morphologically distinctive nature of *Psammisia*, albeit with a close relationship to *Macleania*. In the most recent and comprehensive phylogenetic analyses of Andean “blueberries,” Kron et al. (2002a, b), Powell and Kron (2003), Pedraza-Peñalosa et al. (2013, 2015), and Pedraza-Peñalosa (2015b) all found that *Psammisia* and *Macleania* were closely related, but that neither was monophyletic as currently recognized—instead both were paraphyletic and that *Macleania* was derived from within *Psammisia*. Pedraza-Peñalosa et al. (2015) admitted that the morphological basis of the relationship was “not yet known” although they concluded that even today “Morphology is most frequently the only tool available to determine the taxonomic identity of a new Vaccinieae ...”

Psammisia, like many other genera of neotropical Ericaceae, has historically been poorly understood and therefore over-described. I currently believe, however, that it is best to continue recognition of the two genera *Psammisia* and *Macleania* at this time (see also Luteyn 2019 in prep.). At the minimum we still need to present a workable (i.e., practical) taxonomy for *Psammisia* and related genera in which the names are stabilized by morphologically-based character circumscription and typification that enables students to accurately key, identify, and discuss without confusion the plants being used in current and future studies of taxonomy, phylogeny, pharmacology, and ecology and conservation. This paper brings order to some of the current nomenclatural and taxonomic chaos.

Psammisia currently consists of approximately 70 species, thus equaling *Thibaudia* in species numbers as the second and third largest genera of Vaccinieae in the Neotropics after *Cavendishia* with approximately 150 spp. and ahead of *Macleania* with 30 spp. *Psammisia* ranges from Costa Rica and Panama in Mesoamerica, southwards throughout the Andes into northern Bolivia, and eastwards to French Guiana and Trinidad. It occurs in moist habitats from sea-level to 3700 m altitude. The genus has its center of diversity in Colombia (approx. 48 spp.) and Ecuador (approx. 26 spp.). The plants are often epiphytic shrubs and bear showy flowers in axillary, subfasciculate to racemose clusters, with corollas varying from red through orange, to magenta, or yellow. Most species of *Psammisia* are rare and poorly known, and nearly all occur in montane habitats that are threatened by human intervention. Only *P. guianensis* is widespread, ranging in an arc-like distribution pattern from the Guianas in northern South America, south through the eastern foothills/Amazonian regions of the Andes from Venezuela through northern Bolivia.

The amazing fact that so many species of Vaccinieae (Ericaceae) are endemics and occur only in small localized areas (Luteyn 2002a; Luteyn & Sylva S. 1999) shows that the flora is still relatively unknown and that biodiversity is very high (Pedraza-Peñalosa 2015a; Restrepo P. et al. 1989). This leads me to predict with some degree of certainty that many additional species await discovery in areas that are botanically unexplored or little explored. For the most part, the necessity for so many proposed synonyms in this paper is simply the fact that most previous authors saw so few herbarium specimens with which to compare and most had virtually no or only limited field experience of the kind I have been fortunate to have had. More collections need to be made, species examined, and then the variation in both morphological and molecular data need to be compared before a fuller knowledge of the phylogenetic position of *Psammisia* in particular and all Vaccinieae in general is able to be made. Obviously botanical inventory and phylogenetic analyses are far from complete.

With emphasis on those species of *Psammisia* that occur in Bolivia and adjacent Peru, this paper proposes many new synonyms, lectotypes, and neotypes for species of historically important collections, such as those

of Ruiz and Pavón, Humboldt and Bonpland, and Mathews. It is presented in the hopes that species-oriented baseline studies will continue to prove useful towards our knowledge of *Psammisia* in the extensive and biologically interesting region from Mexico into South America. This study also points out how little we actually know about the content and biogeography of the tropical American flora and that support for fieldwork must be augmented if we are to claim a true knowledge of tropical ecosystems. Finally, it is hoped that this paper will be used as a guide to future researchers and that my experience and ideas will stimulate collections and studies that are so badly needed.

MATERIALS AND METHODS

This paper is based on my personal knowledge of the plant family Ericaceae (especially Vaccinieae) over its entire geographical range in Latin America through extensive and intensive field, herbarium, and library observations that span a period of approximately 50 years (43 while associated with The New York Botanical Garden). I have taken advantage of the study of collections from and/or visits to the following herbaria: A, AAU, B, BM, BOLV, BR, BREM, CGE, CUZ, F, FI, G, GB, GH, K, L, LPB, M, MA, MO, MOL, NY, OXF, P, S, US, USM, USZ, W. Because I have designated several new lectotypes and neotypes and proposed new synonyms in this paper resulting in substantial taxonomic changes in *Psammisia*, I have included full citations for all taxa treated and wherever possible photographs, online illustrations of types and critical specimens, and herbarium barcodes to facilitate exact identifications. In some cases extensive discussions have been necessary to follow and understand my interpretations. Typifications are in accordance with ICN guidelines (Turland et al. 2018) and recent suggestions outlined by McNeill (2014). In my own species and generic concepts I have tried to ignore minor morphological variations to concentrate on shared characters (i.e., characters in common) and similarities over a broad range, as opposed to single characters that are seemingly distinctive, narrowly defined, or local in nature, and thereby continue to employ the morphological species concept basically following Cronquist (1978) and the ideas put forth in Levin (1979) and Stuessy (2009).

The historical photographs of European type specimens taken by J. Francis Macbride (The Field Museum of Natural History, Chicago) between the years 1929–1939 and by Albert C. Smith (The New York Botanical Garden, Bronx) between 1929–1933 are extremely helpful for the identification of Ericaceae types, especially those at Berlin before they were destroyed during the Second World War. Some of Macbride's photographs do not show the entire sheet, thus lacking some information (i.e., photos were cropped). The photos of Smith, however, do show entire sheets along with his 1931 annotation labels and whenever possible the addition of flowers or leaves taken from packets (not shown on the Macbride photos). Of interest also is the fact that some of the original B type sheets that Macbride photographed were subsequently remounted by the time Smith photographed them in 1931, as can be seen by Smith's B photos that often show an overall larger herbarium sheet upon which the original sheet was mounted along with the addition of packets (sometimes) and the inked herbarium stamp "Mus. bot. Berol." in the lower right-hand corner. All of this information indicates that Smith saw and photographed the same specimens as Macbride, but at a later date. For the reasons just given, it is often helpful to use both sets of photographs together. Macbride's photos are excellent in their detail and have been broadly distributed to herbaria throughout the world; whereas those of Smith are not as high quality and are only found at NY. Some of Macbride's photos are of such good quality that I have cited them herein as neotypes. [Note: In the past (Luteyn 1983, for example), I incorrectly cited type photos as "lectotypes," but that should be corrected to "neotypes" in accordance with Article 9.8 of the Code (ICN, Turland et al. 2018).] Both Macbride and Smith were often allowed to remove small pieces of type specimens "in exchange" for their own respective institutions, although sometimes these fragments are called "kleptotypes." In some cases those fragments from type specimens (now seen as syntypes) are all that are left of the original type material and have been designated "lectotypes." In some cases the fragments have been mounted together with their respective type photo and thus are of greater value.

In this paper, these historically important photographs are cited by negative number preceded by the herbarium acronym or photographer's initials as follows—"photo F neg. 1540" =negative no. 1540 from the

J.F. Macbride 1929–1933 Berlin Negatives Type Photo Collection (Grimé & Plowman 1987) at The Field Museum of Natural History (Chicago); and “photo ACS neg. 17” =negative no. 17 from A.C. Smith’s 1931–1932 trip to European herbaria that are deposited at The New York Botanical Garden. Other more recent NY photos either lack numbers altogether and are simply given as “NY s.n.” or are listed as for example “photo NY neg. 9743.” It is also important to keep in mind that when A.C. Smith annotated or cited a specimen of Ericaceae/Vacciniaceae (at least between 1930 and 1953) as “TYPE” or “type” he meant the same as holotype in our current concept, and when he cited “TYPE COLL.” or “type coll.,” or that types “are duplicated in ...” or “(dupl. at ...)” he meant isotype(s) (again, in our current concept). He wrote the words “type” or “type coll.” immediately after the acronym of the institution where he was citing the type, for example, “C, GH, K, type, P, Y” meaning that the holotype was at K and isotypes were at C, GH, P, and Y, or for example, “C, GH, K, P, Y, type coll.” meaning that all the specimens cited were isotypes. [At that time Smith also used the acronym “Y” for NY, “M” for MA, and “Acad. Nat. Sci. Phil.” for PH.]

Herbarium specimens that have been digitized and barcoded are cited with the number in parentheses in an abbreviated fashion using the herbarium acronym first followed by a space and then the barcode number without the leading zeros—thus “(K 442212)” not (barcode K000442212). Unless otherwise stated, online type images may be accessed from the JSTOR Global Plants website (JSTOR-Plants 2018) and have been cited as “image!” following the barcode number, e.g., “(K 442212, image!).” Some digital images are not found on Global Plants, but instead only on the website of the respective herbarium—in those cases I simply cite the herbarium acronym followed by “image!,” e.g. “NY image!” All herbarium specimens, photographs, and digital images herein cited have been seen by me unless followed by “n.v.” or the phrase “seen only as digital image.” Color photographs and/or black/white illustrations of many of the species of *Psammisia* may be seen in Maguire et al. (1978), Luteyn (1981, 1987, 1996), Luteyn and Pedraza (2007a, b, c, 2012–onward), Pedraza and Luteyn (2010), Werner and Mendieta-Leiva (2014), Luteyn and Vidal-Lemus (2015), and Pedraza-Peñalosa (2015b, c). Color plates of some species are found in older literature and are then cited with the respective species under discussion. Two plates of color photographs of *Psammisia* species found in Bolivia and Peru are herein included. Herbarium acronyms follow *Index Herbariorum* (IH, 2016). Author abbreviations follow *Authors of Plant Names* (Brummitt & Powell 1996). Sources for the identification of handwriting included: Burdet (1979), Guillemin (1833), Sayre (1975), Stauffer et al. (2012), Steele (1964), and Steinberg (1977), as well as several individuals noted in the Acknowledgments. Journal names are abbreviated as designated by the current online version of *Botanico-Periodicum-Huntianum* (B-P-H, <http://fmhibd.library.cmu.edu/HIBD-DB/bpho/findrecords.php?-link=Find>), and book abbreviations follow *Taxonomic Literature-2* (TL-2, Stafleu & Cowan 1976–1988).

Locations, numbering systems, and publication of some historically important Ericaceae collections from South America

The major impetus for this paper has been typification of South American Vacciniaceae: *Psammisia*. Details concerning several major historically important collections pertinent to Andean Ericaceae are given below along with a brief explanation of some of the numbering systems used by the collectors and subsequent authors, and early publication dates. For some historically important collections the exact geographical locations as well as the distribution/disposition of “original” material has frequently been in doubt and, therefore, it has become necessary to lectotypify many names. Because many duplicates and fragments from these collections were distributed to numerous individuals and herbaria (public and private) over the past two hundred years, it is no wonder that more than one name would have been given to the same collection or duplicates of the same collection and that inaccurate transcriptions of label data have been made, all of which have given rise to a confusing taxonomy/synonymy. Therefore, one of the more difficult (but interesting) aspects of my studies over the last 45 years has been to search for original material of these important collections in the major herbaria of Europe and the United States, to correct any mistakes in the literature and herbaria, and then to carefully typify them. I have done my best to locate, document, and typify the species of *Psammisia* based on all currently available material in the hopes that it will solidify the bases of a future, more comprehensive

monograph. To put into proper context the necessity for some of the nomenclatural decisions presented below, a brief summary of several historically important collections follows.

Ruiz and Pavón.—Most of the Ericaceae collections of botanists Hipólito Ruiz López and José Antonio Pavón Jiménez were made between 1778–1788 in the Pillao and Churupallana (Dept. Huánuco) and Huasahuasi (Dept. Junín) regions of central Peru (Barreiro 1931; Dahlgren 1940; pers. observ.). The first set of their collections was deposited at the Royal Botanical Garden of Madrid (MA), but it was not until 1831 that the Spanish government took full possession of all materials from the expedition including herbarium collections, copper plates, unpublished manuscripts, etc., and it is uncertain if representatives of each of the “original” collections and manuscripts remain at MA. The reason for this uncertainty is that after Ruiz died in 1816 Pavón sold, perhaps indiscriminantly and carelessly, sets of the plant collections as well as manuscripts. Between the years 1817–1824 Pavón sold probably the largest and most important set of duplicate plants to Aylmer Bourke Lambert an “English country gentleman who devoted his life and his fortune to the interests of botany and horticulture” (Miller 1970). Pavón also sold to Lambert some of Ruiz’ unpublished manuscripts from their expedition to Peru and Chile (1777–1788); other important unpublished manuscripts are still at MA (*TL-2* vol. 4:981–982, Stafleu & Cowan 1983; Jaramillo-Arango *in* Schultes & Nemy von Thenen de Jaramillo-Arango 1998). Before his death, Lambert gave many specimens from his personal herbarium to friends, including to W.J. Hooker whose herbarium was purchased by the Royal Botanic Gardens, Kew (K) in 1867. After Lambert’s death in 1842, his library and herbarium—estimated to be upwards of 45,000 plant specimens—was divided and sold in a public auction to many individuals and herbaria including a large and early set of specimens and manuscripts that are now at the British Museum (Natural History) (BM), some of which are still unpublished (see Jaramillo-Arango 1952), others of which were destroyed during WWII (Jaramillo-Arango *in* Schultes & Nemy von Thenen de Jaramillo-Arango 1998). Another large set of plant specimens made its way to the Botanischer Garten und Botanisches Museum Berlin (B) and were cited as “ex herb. LAMBERT” (Urban 1902:116). Unfortunately, nearly all of the B material was destroyed during WWII. Other important sets from Lambert’s herbarium found their way to the Conservatoire et Jardin botaniques de la Ville de Genève, Switzerland (G, G-DC) and to the University of Oxford (OXF). Pavón sold another large set of “original” collections between 1826–1828 to another wealthy Englishman Philip Barker Webb, which collections are now deposited in the Instituto Botanico della Università di Firenze (FI) (for details of Lambert’s life, his association with Ruiz and Pavón, his herbarium, and its distribution see Steele 1964; Miller 1970; Steinberg 1977; and Jaramillo-Arango *in* Schultes & Nemy von Thenen de Jaramillo-Arango 1998). Numerous type fragments are also currently found at The Field Museum of Natural History (F) mostly gathered by J.F. Macbride when he photographed the European types (see also Sleumer 1935:291–294) and at The New York Botanical Garden (NY) mostly gathered by A.C. Smith during his visits to European herbaria. Another problem that complicates typification of Ericaceae collections at MA is their institutional numbering system with many (but not all) sheets having early labels that read, for example, “Herbarium Peruviaum no. 10/48” (currently a species of *Psammisia*), or “Herbarium Peruvianum Ruiz et Pavón no. 15/48” (currently a *Psammisia*), or simply “10/55,” “10/56,” “10/58,” “10/67” or “10/68” (currently all species of *Vaccinium*), or “Herbarium Peruvianum no. 15/52” and “Herbarium Peruvianum no. 15/53” (currently a species of *Thibaudia*). Sometimes sheets with the same label number, e.g., “10/53,” also provide different locality data. There is no consistency in this numbering as far as I can determine, and I cannot determine if these sheets represent one collection (sometimes with duplicates), separate collections (sometimes with duplicates), or one collection (or more) in which the locality data was just not fully or accurately transcribed! I have no explanation for this mess—but thinking about it now shouldn’t every sheet (collection?) be considered a syntype since no one really knows if they are separate collections and/or duplicates of one collection or more?

According to Miller (1970) many visitors worked in Lambert’s herbarium including A. Bonpland, A.-P. de Candolle, W.J. Hooker, G. Bentham, K.F.P. von Martius, and F. Pursh, but it was G. Don who described many new species of Ericaceae from the Ruiz and Pavón collections. George Don was the elder brother of David Don then Lambert’s assistant and “equally valued by Lambert he [George] had ready access to the collections and

apparently worked with a large proportion of them” (Miller 1970). The introduction to Don’s *A General History of the Dichlamydeous Plants* (*Gen. hist.*, G. Don 1831–38) contains the statement “... descriptions of numerous plants never before published, and derived chiefly from the Lambertian Herbarium.” The problem with many of Don’s descriptions in his *Gen. hist.* (at least for the Ericaceae herein discussed) is that **all** are without citation of specimens, collection numbers, or herbaria seen, although most of his specimens are assumed to be from Lambert’s herbarium, where he worked. Sleumer (1935:292) stated that some of Don’s locality data (or lack thereof) was probably inexact because it was not always transcribed from Ruiz’s original labels onto those labels in the Herbarium Lambert, as was also the case for Pavón’s duplicates deposited in the herbaria of de Candolle (G-DC) and Delessert (G) in Geneva. Sleumer also mentioned that he was unable to locate original collections that formed the basis for Don’s descriptions from the Lambert Herbarium and he suggested that perhaps no types at all were designated by Don. Don’s descriptions are very short, mostly without characteristic detail. With regards to the Ericaceae names found in vol. 4 of Ruiz and Pavón’s *Flora peruviana et chilensis* (*Fl. peruv.*, Ruiz & Pavón 1798–1802[1956–1960]), Don’s descriptions do not always agree with those found in Ruiz and Pavón’s text or seen in their plates, and it seems to me that sometimes Don’s descriptions may be based solely on the plates without incorporating the text. In one case Don (1834:861) published Ruiz and Pavón’s *Ceratostema emarginata* (citing their pl. 384) as *Thibaudia emarginata* for no apparent reason (to me), whereas at the same time he (Don 1834:863) left Ruiz and Pavón’s other two species of *Ceratostema*—*C. grandiflora* and *C. hirsuta* (both on pl. 383)—in the genus *Ceratostema*. With but one exception I was unable to locate any of Don’s specimens at BM, Cambridge University (CGE), K, or OXF that I could say were unequivocally Don’s types. That one exception is *Gaylussacia crenata* G. Don [= *Vaccinium crenatum* (G. Don) Sleumer], a sheet from the Lambert Herbarium at OXF that Don himself studied, which has an “original” handwritten label “*Vaccinio* affine. Peru” attached to the sheet, and which, most importantly, has the handwritten name “*G. crenata* Don” written on the sheet itself in the hand of George Don (verified by Stephen Harris, curator at OXF).

Another factor that has caused some confusion with regard to the collections of Ruiz and Pavón is the fact that the original manuscript for vol. 4 of the *Fl. peruv.* (that contained Ericaceae) consisted of plates only. These plates were not published in 1802 as anticipated, although copies of them were “acquired” by Obadiah Rich; he distributed them at about this time to several botanists thus providing effective publication for names of the species such as *Thibaudia coarctata*. The exact date of Rich’s distribution is unknown according to Stafleu (1967; Stafleu & Cowan 1983). At least one botanist, however, Jaume Saint-Hilaire working in Paris, must have seen these plates by 1805 when he published *Exposition des familles naturelles et de la germination des plantes* (*Expos. fam.*, Saint-Hilaire 1805:363). Not only did Saint-Hilaire validate Ruiz and Pavón’s unpublished generic name *Thibaudia* (Saint-Hilaire 1805:362), but he also referred to Ruiz and Pavón’s “printed and figured” plates from vol. 4 of the *Fl. peruv.* [“... doit être imprimé et figuré dans le quatrième volume de ce bel ouvrage.”] when he validly published three of Ruiz and Pavón’s species, viz., “*Thibaudia mellifera* Ruiz. Pav.,” “*T. bracteata* Ruiz. Pav.,” and “*T. punctata* Ruiz. Pav.” Interestingly Saint-Hilaire changed two of Ruiz and Pavón’s names as seen on their pl. 387 and in their unpublished text, viz., “*T. punctatifolia*” to *T. punctata* and “*T. melliflora*” to *T. mellifera*! And, why didn’t Saint-Hilaire validate the other species of *Thibaudia* and *Ceratostema* illustrated in the rest of the privately distributed plates? Perhaps Saint-Hilaire did not see all of the Ericaceae plates in 1805? The text of the Ericaceae in Ruiz and Pavón’s original vol. 4 manuscript (along with all of the plates) was finally and validly published in 1957 by the Instituto Botánico A.J. Cavanilles, CSIC of the Jardín Botánico de Madrid (see Ruiz & Pavón 1956–1960).

Humboldt and Bonpland.—Alexander von Humboldt and Aimé Bonpland collected in Venezuela, Colombia, and Ecuador between 1799–1803, and subsequently split the large collection of their New World specimens after they returned to Europe in 1805. Each maintained his own personal herbarium, but Humboldt is also known to have sent individual collections to friends and/or colleagues for them to describe, whereas Bonpland kept his personal set in his own possession. The remaining plants from their expedition have been divided/distributed into four main sets—the main set is in the Muséum de Histoire Natural in Paris (P-Bonpl.); another set from the first part of the expedition was sent by Humboldt to C.L. Willdenow in Berlin (B-Willd.);

a third set was given by Humboldt to C.S. Kunth when he returned to Berlin in 1829 and is now included in the general herbarium (B) at the Botanical Garden in Berlin-Dahlem, most specimens of which were destroyed in WWII; the fourth set of specimens owned by Bonpland was taken by him to Argentina in 1819 and then donated back to Paris in 1832 where it was incorporated into the general herbarium (P). Bonpland apparently provided descriptions for some Ericaceae to Kunth, but it is Kunth who is given credit as the publishing author for the Ericaceae in the *Nova genera et species plantarum* (*Nov. gen. sp.*, Kunth 1819). The material used by Kunth (who was not allowed to see the collections sent to Willdenow) has always been assumed to be found at Paris (see Lack 2004; Hiepko 2006; Stauffer et al. 2012).

Mathews.—The historically important Ericaceae collections of Andrew Mathews (sometimes spelled ‘Matthews’), a British gardener who was employed by the Horticultural Society of London at Chiswick, originated in northeastern Peru between 1835–36. Most of Mathews’ collections had collection numbers (but not all), most were without precise localities other than “Prov. Chachapoyas” (Dept. Amazonas), and most have been cited with numerous duplicates or apparently similar collections from scattered localities with different names. The largest sets of Mathews’ collections were given to BM, K, and OXF, although other large sets are found at the Botanic Garden Meise, Belgium (BR) and the Royal Botanic Garden Edinburgh, Scotland (E), but see Wurdack (1964) and Vegter (1976) for the location of other duplicate sets.

The Schomburgk(s).—Between 1835–1844 the Schomburgk brothers collected natural history specimens in “British Guiana” (or the “Guianas” of northern South America including areas in current-day Venezuela, Guyana, Surinam, and Brazil). Robert H. Schomburgk (Rob. Schomburgk) collected for the Royal Geographic Society of London and his botanical specimens were sent to George Bentham in London (Bentham 1838); they are mainly deposited at BM, K, and P. Moritz Richard Schomburgk (“Schomburgk” or Rich. Schomburgk) collected for the Prussian government and most of his botanical specimens were sent back to Berlin (B), where they were destroyed during WWII. [For itineraries of their travels see Rich. Schomburgk (1848) and van Dam (2002); for the distribution of their main sets of collections see Vegter (1986) and Steyermark et al. (1995).]

The Schomburgk brothers did not always collect together and their collections were sent back to Europe over different time periods and to different localities/authorities. Furthermore, the brothers used different numbering system(s) that are both complex and not always easy to determine and since they each had his own (or multiple) collection number series, the enumeration of collections with similar collection numbers is at times difficult and it is not always easy to ascertain which of the brother’s collection numbers is in hand, but see van Dam (2002) for an excellent detailed discussion and list of their collection numbers, along with the discussions of Bentham (1838) and Alexander (2011). Fortunately, by interpreting the detailed discussions given in Bentham (1838), van Dam (2002), and Alexander (2011), I have been able to distinguish the numbers of pertinent Ericaceae in the style as noted below in order to lectotypify them. For example, the labels of Robert’s second collection series (i.e., *Rob. ser. 2*) are usually cited with two distinct numbers (double-numbering)—the first being his (Robert’s) collection number, while the second number in parentheses or following a slash (“/”) represented a collection with the same identity, but in Richard’s series and not necessarily from the same locality or the same date. An example of this double-numbering is the Ericaceae collection of *Thibaudia nutans* cited as *Schomburgk 567/873 B*. By understanding the Schomburgk brothers numbering system(s), the fully-detailed reference for *Schomburgk 567/873 B* should be understood as (*Rob. ser. 2*) *Schomburgk 567* with identical species at B listed under *Rich. Schomburgk 873*. [Note: Of interest also is the fact that while searching the internet I found several images of herbarium sheets with the collection number *Rich. Schomburgk 974*, each representing *different* taxa in at least three different families, viz., Ericaceae, Lauraceae, and Vochysiaceae—each with different labels, each deposited at different institutions, and each having dates of 1840 or 1842! Therefore, it would seem that all *Rich. Schomburgk 974* collections must be cited as *Rich. Schomburgk 974p.p.* Similar discrepancies in Robert Schomburgk’s collections were noted by Alexander (2011).]

Linden, Funck, and Schlim.—Because I have also encountered problems with the numbering and attribution of some Ericaceae collections of Jean Jules Linden, Nicolas Funck, and Louis Joseph Schlim from

eastern Colombia and western Venezuela, I will briefly document their trips and manner of assigning collection numbers to hopefully alleviate some of the confusion. The following discussion is based upon literature accounts given in Regel (1874), Urban (1902), Barnhart (*in* Killip 1927), Nevling (1970), Morton (1971), Sayre (1975), and *TL-2* (vols. 3 and 5), and by searches for herbarium collections of Linden, Funck, and Schlim at NY and on the Kew Herbarium Catalogue and The BR Herbarium Catalogue websites.

The Itineraries.—Beginning at the age of 18, Linden traveled in the New World between 1835–1845 collecting plants, sometimes alone but also in the company of others. After his own field work ended in 1844, Linden became a dealer of plants founding his own company named the “ETABLISSEMENT DE BOTANIQUE ET D’HORTICULTURE de J. LINDEN” for the introduction of new plants first in Luxembourg (1845–1852) and then in Brussels/Ghent (1852–1881), and to sponsor a series of collecting trips. The original sets of his herbarium collections and those of his associates (e.g., Funck and Schlim) were sent back to the National Botanical Garden of Belgium (renamed Botanic Garden Meise in 2014) and are now at BR and Ghent University (GENT), although Linden sold herbarium specimens and living materials to many institutions with large sets at P and BM (Chaudhri et al. 1972; Sayre 1975). Linden made three trips to the Americas supported by the Belgian government—the first to Brazil (December 1835–March 1837) therein accompanied by N. Funck as artist and Auguste Boniface Ghiesbreght as zoologist. On Linden’s second trip they (Linden, Funck, Ghiesbreght) went to Cuba (December 1837) and then to Mexico and Guatemala (March 1838–August 1840); Funck and Ghiesbreght actually returned to Europe in August 1840, while Linden went on to Cuba before returning to Belgium in Feb 1841 *fide* Regel (1874:197). Linden’s third trip (December 1841–February 1845) included his half-brother L.J. Schlim as well as Funck; they went to Venezuela in December 1841–1842, in May 1842 the party split up with Linden and Schlim continuing westwards to Bogotá (Colombia) and southwards to the Pacific coast, then again north to Bogotá and eastwards into Venezuela, returning to Caracas on August 17, 1843. Funck, on the other hand, continued on his own in Venezuela and northern Colombia (Barcelona, Cumana, the peninsulas Araya and Paria, Sierra Nevada de Santa Marta in Colombia); he returned to Caracas in December 1842 and then to Europe in 1843 [**Note:** according to Linden (“Avant-propos” p. i, *in* Linden & Planchon 1863), Funck collected alone from 1840 to 1843]. In March of 1844 Linden and Schlim went on to Jamaica and Cuba, leaving Cuba in October of 1844 and returning to Europe via USA in February 1845.

In October 1845 Funck and Schlim returned to South America without Linden, but collected herbarium specimens and living material on behalf of Linden’s “ETABLISSEMENT.” They collected together along the Colombia/Venezuela border area—in western Venezuela during late 1845 to April 1846 and then eastern Colombia in 1846 and into 1847. Funck separated from Schlim sometime in 1846 and traveled eastwards into Venezuela collecting on his way back to Caracas and departing Venezuela via Maracaibo sometime in 1847 to return to Europe. The fact that there exist herbarium specimens with Linden’s printed labels stating “Voyage de L. SCHLIM” (i.e., citing Schlim alone) from May 1846, leads me to postulate that Funck separated from Schlim around that time, although I have not been able to document the exact separation date from the literature. Schlim then collected alone in eastern Colombia in the vicinity of La Baja near Pamplona for more than a year—all of his specimens from that region were lost by shipwreck *fide* Barnhart (*in* Killip 1927) and Nevling (1970). After that experience, Schlim collected mostly around Ocaña, also eastern Colombia. In 1852 towards the end of his trip Schlim spent several months in the Santa Marta mountains in northern Colombia until he returned to Europe in August 1852 [**Note:** according to Linden (“Avant-propos” p. i, *in* Linden & Planchon 1863), Schlim collected alone from 1848 to 1853].

The Labels.—As far as I can tell, all herbarium collections from Linden’s first three trips are cited under his name **only** and in his collection-number series, even if others such as Funck, Ghiesbreght, and Schlim were with him. In some cases, Linden made specially printed labels in a smaller-size format with headings for specific families (e.g., Leguminosae, Gramineae, Cyperaceae, etc.) or for some of his trips (e.g., to Mexico 1838, Venezuela 1844, and Cuba 1844). There were also different printed labels that overlapped in years of collection such as those printed with “Linden 1842. ... New Granada. S. Amer.,” or “J. Linden. 1842–3. ... New Granada. S. Amer.,” or “J. Linden. Jan.–April. 1842. ... Caracas. S. America.”

After Funck's separation from Linden and Schlim in May of 1842 (i.e., during Linden's third trip) and until he returned to Caracas in December 1842, his itinerary can be documented by smaller-size format printed labels with only his name printed on them—sometimes misspelled as “Funcke”—and with the printed location and dates of “Venezuela, &c. . . Coll. 1842–3.” It also seems that Funck used some of the old labels from his 1842–1843 trip when he was alone (i.e., during Linden's third trip, but after the team separated) for some of his collections with Schlim on their joint 1845–1847 trip, until he got his own printed labels for his collections during 1846–7, when he was again alone and on his way back to Caracas. This is evidenced by some “Funcke” [sic] labels (nos. 1159, 1169 and 1291, for example) which have the printed years 1842–3 scratched out with the year “6” added by hand and above that the name “& Schlim” also added by hand thus reading Funck and Schlim together as collectors in 1846 (which also verifies that the two did collect together in Venezuela in 1846 as mentioned above). To complicate the label matter just a little bit more, there are some printed “Linden. 1842 . . . New Granada. S. America” labels on which the names and numbers of *Funck & Schlim 1433* and *Funck & Schlim 1515* (for example) are inked in by hand over a crossed-out Linden and with the year “7” inked in to replace the printed “2” of “1842,” thus the year 1847 when Funck and Schlim were still collecting together; thus it would seem that Funck also used some of Linden's old labels from Linden's 1842 trip while he (Funck) was waiting for labels with only his name on them.

On the other hand when Funck and Schlim did collect together during the years October 1845 to about May 1846, their collections were sold with the Linden “ETABLISSEMENT” printed labels with subtitle “Voyage de *Funck et Schlim*.” Those printed labels also included a single printed locality “N^{lle} Grenade, prov. de” with no actual province given (but to be filled in later by hand); they also bore a printed year of “184” with no exact year given (but again to be filled in later by hand). A few examples of collections under “Voyage de *Funck et Schlim*” labels which have some minor chronological discrepancies include: no. 92 from “Janv.,” 1846 “Venezuela, prov. de Caracas. Galipan”; no. 731 was made in “Venezuela, prov. de Merida.” in Feb 1846; no. 1028 was made in “aotût.”; no. 1031 was made in “Venezuela, prov. de Merida.” in Feb 1846; no. 1032 ca. “Valle” [Mérida] in Feb 1846; no. 1475 in February 1847 on a label that gives the general location of “N^{lle} Grenade, prov. de” with the inked-in handwritten exact locality “Pamplona”; no. 1529 was made in “Venezuela, prov. de Merida paramos” in “avril” 1846; and no. 1530 was made in “mars” 1846. All of these examples come from areas geographically close to each other and the minor discrepancies in collection dates may be attributed to the probable assignment of collection numbers days or weeks after the actual collection was made and not on the same day of collection.

After Funck and Schlim separated in (May) 1846, Schlim's name appeared alone on the Linden “ETABLISSEMENT” printed labels but then with the subtitle “Voyage de L. SCHLIM.” Those labels mostly included the printed dates “1846 à 1852” and the printed location as “N^{lle} Grenade, prov. de” with the exact location mostly as “Ocaña” entered later by hand. Some of the early Schlim collection labels, for example *Schlim 4*, had the Linden company printed “ETABLISSEMENT. . . à Luxembourg” heading but with “& Bruxelles” added by hand (evidently Linden had moved to Brussels by that time); other labels had the printed “1849” date but with the “49” scratched out and “51” inked in later; still other early Schlim collection labels had the printed “Voyage de L. *Schlim*” (but in this case with his name in small-case and italics). These examples of minor label permutations seem to have subsided at about *Schlim 223* after which time the printed labels returned to the standard “ETABLISSEMENT . . . à BRUXELLES” . . . “Voyage de L. SCHLIM” . . . “1846 à 1852” format. [Note: One specific example of a mistake on a K specimen as seen on their website (and that should be corrected) is a collection listed and cited as *Linden 704* from a “Voyage de L. SCHLIM” label. That collection should be changed to *Schlim 704*. And when you look further under the collections made by Schlim (on Kew's website), there is no collection number 704 listed for Schlim, although there are nos. 700–703 and 715-onwards with the expected “Voyage de L. SCHLIM” label that are credited to him. So this is just a matter of citing the wrong collector (i.e., Linden) instead of crediting Schlim with no. 704. Other specific examples of incorrectly credited Linden/Funck/Schlim collections pertinent to the typification of neotropical Ericaceae are given immediately below and in the discussion of “*Thibaudia schlimiana*.”]

In summary, collections of Linden, Schlim, and Funck & Schlim have at times been misunderstood, confused, and/or altered. All plants collected on Linden's first and second trips to the New World (1835–1841) bear only Linden's name and collection number. However, when Funck and Schlim collected together or on their own and **without** the physical accompaniment of Linden, it must be stressed that they were collecting under the auspices of Linden as stated on the official company-printed "ETABLISSEMENT" labels. Thus, it should also be understood and followed in practice that for those expeditions with printed labels subtitled "Voyage de *Funck et Schlim*" that the herbarium specimens should be cited as collections of "Funck & Schlim," **never** of Linden; and it follows that all collections with printed labels subtitled "Voyage de L. SCHLIM" should be cited as collections of "Schlim," **never** of Linden or of Funck & Schlim. Sayre (1975:322) also noted that in the literature, "collections of Schlim made in Venezuela and Colombia after Funck's return to Luxembourg are often cited as of Funck and Schlim. Schlim collected alone from 1846 to 1852." Despite some differences in types of printed labels used by these men and minor date and locality discrepancies on handwritten labels, the ultimate problem is the fact that the wrong collector's name has often been assigned to a particular collection and/or collection number. In times past, I believe that the sponsor or patron of an expedition (as in the case of "ETABLISSEMENT ... de J. LINDEN ...") under the auspices of which the expedition was funded was often given credit for making the collections—as Linden was given credit for some collections made by Funck and Schlim. I have also noticed that J. Lindley (1863) assigned Funck and Schlim collections to Linden, seemingly seeing Funck and Schlim only as assistants. Furthermore, original field data (e.g., collector, collector's number, locality, dates, etc.) may have been misunderstood and/or incorrectly copied onto secondary labels by a third party when duplicates were distributed or collections split and then distributed without official company labels as noted on some duplicate collections at K, P, and probably other herbaria. My point here, specifically with Linden, Funck, and Schlim collections, is that credit for a collection needs to be given to the collector(s) who made it, that the accuracy of label data must be carefully sought out and/or copied in cases where original labels were not available, and that the need for a detailed study and understanding of collectors, their collections, and their itineraries must be carefully made especially in cases where typification is the ultimate goal.

TAXONOMIC AND NOMENCLATURAL UPDATES

PSAMMISIA Klotzsch, *Linnaea* 24:42. 1851. LECTOTYPE, designated by Smith (1932), *P. cyathifera* (Benth.) Klotzsch [= *P. falcata* (Kunth in H.B.K.) Klotzsch].

Straggly to compact epiphytic or terrestrial **shrubs**, without root swellings or lignotubers, the mature branches sometimes arching and lianoid, the terminal branches rarely hollow and inhabited by ants; indumentum (when present) of unicellular and multicellular hairs (these eglandular or glandular); axillary buds perulate, the outer pair (=prophylls) inconspicuous, valvate, acute to obtuse, not prominent and acicular (i.e., not "pseudostipulate"). **Leaves** alternate, rarely subopposite or sometimes clustered apically appearing pseudovercillate, exstipulate, the blades small to large, coriaceous to thin-coriaceous, sometimes slightly asymmetrical, the venation pinnate or plinerved, the margins entire and usually somewhat revolute, abaxially usually bearing tiny to minute, roundish, scattered, black laminar glands, sometimes these concentrated near leaf base and then larger to 0.5 mm diam.; petioles terete or canaliculate, sometimes somewhat pulvinate. **Inflorescences** usually solitary, axillary (or in the axils of fallen leaves), or rarely cauliflorous, rarely appearing terminal, long- to short-racemose (then appearing subfasciculate), sometimes pedunculate, with few to many flowers; inflorescence bracts located at base of rachis few, caducous, chartaceous; floral bract 1, located at base of pedicel, persistent, chartaceous; pedicels persistently bibracteolate, sometimes with a ring of setose, unicellular, eglandular hairs at apex. **Flowers** 5-merous, actinomorphic, obdiplostemonous, without odor, the aestivation valvate; calyx articulate with the pedicel (very rarely obscurely articulate to continuous), the tube short-cylindric or campanulate, terete to rarely angled opposite the sinuses, the limb erect or spreading, the lobes (2–4–)5, ovate or triangular, sometimes apiculate, rarely marginally glandular, usually connivent with age, the sinuses obtuse to rounded, U-shaped to flat; corolla carnose, usually bistratose, subglobose to conical (or elongate-urceolate) to long-cylindric, constricted at the throat (frequently contracted to a long and narrow throat), terete

or rarely bluntly angled opposite the lobes (so strongly angled distally in *P. sophiae* Pedraza as to forming broad and blunt solid spurs that surpass the lobes), the lobes triangular and subacute, erect to spreading or reflexed; **stamens** (8–)10(–)12, obdiplostemonous, equal or rarely alternately somewhat unequal in overall length, included, from about 1/3 to often nearly as long as the corolla, distinct or usually more or less adherent to the corolla and falling from the mature flower with it, usually forming a tight conical tube around the style; filaments liguliform, straight or rarely geniculate, carnosous or membranaceous, equal or essentially so, distinct or somewhat connate into a tube, extended distally into slender connectives which are adherent to the anther thecae dorsally, the connectives of equal width or alternately narrowed, sometimes alternately thickened or somewhat humped, with spurs present on alternate connectives only, sometimes on all connectives, rarely only on one margin of a connective, if all connectives are spurred, there is a slight alternate difference in their shape and in the pronouncement of the spurs, the spurs themselves either acute and conspicuous, rounded and not very apparent, to obsolete or lacking; anthers equal, stout, lacking disintegration tissue, sometimes laterally compressed; thecae equal, strongly granular (papillate), basally usually curving inwards, often prognathous, with or without basal appendages; tubules 2, distinct, straight or geniculate, 1/4 to about as long as the thecae, equalling in width the thecae to much narrower, sometimes gradually narrowing distally, smooth (not papillate), dehiscing by introrse clefts (or slits) often nearly as long as the tubules, rarely by oblique apical pores; pollen borne in tetrahedral tetrads, lacking viscin threads; **ovary** inferior, 5-carpellate and loculate, the placentation axile, the ovules numerous in each locule, the nectariferous disc (top of ovary) flat, pulvinate, or slightly concave, the style single, included or often slightly exerted, filiform, hollow, fluted, the stigmatic area punctiform. **Fruit** a spherical, often hard-coriaceous, dryish, usually green berry, the calyx limb sometimes persistent and forming a corona at apex of fruit; seeds small, rarely with mucilaginous sheath; embryo white (never green).

Albert C. Smith (1932:384) effectively lectotypified the genus *Psammisia* when he stated that “The first species mentioned by Klotzsch is *P. cyathifera* (Benth.) Klotzsch, which is synonymous with *P. falcata* (Kunth in H.B.K.) Klotzsch.” This “mechanical method” of lectotypification under our current concept is contrary to Recommendation Art. 9A.2 of the *Code* and “should be avoided” (ICN, Turland et al. 2018). I see no particular reason to over-turn Smith’s “lectotypification” at this time, however, as he was definitely accepting *P. cyathifera* as the type of the genus and he was therefore the typifying author (as per ICN, Turland et al. 2018, Art. 7.11); instead I will herein simply confirm Smith’s lectotypification of *Psammisia* with *P. cyathifera*. [Although the place of deposit of Klotzsch’s Ericaceae types was not given in his 1851 monograph, he worked at and cited only specimens at B, albeit his types were destroyed at B during WWII (TL-2 vol. 2:569, Stafleu & Cowan 1979).]

The 70 species of *Psammisia* range from Costa Rica, south along the Andes into northern Bolivia, and eastward into Suriname, Guayanan Brazil, and Trinidad. Seven species occur in Bolivia and Peru. For the most part, the species of *Psammisia* are distinct, but the primary character that has been used traditionally to define the genus (i.e., spurred anther connectives) is lacking or vestigial in several species while, on the other hand, it is incipient in several species of the closely related genus *Macleania*. Current molecular phylogenetic work indicates that not only are there problems of generic circumscription in neotropical Vaccinieae in general, but that both genera *Macleania* and *Psammisia* are paraphyletic and *Macleania* is derived from within *Psammisia* (see discussion above). Clearly, further generic realignments will be necessary.

Psammisia amazonica Luteyn, Opera Bot. 92:117, fig. 6A–C. 1987. TYPE: PERU. AMAZONAS: Valle of Río Santiago, ca. 65 km N of Pinglo, Quebrada Caterpiza, 2–3 km beyond the community of Caterpiza, 200 m, virgin forest, 28 Nov 1979 (fl), *Huashikat 1410* [HOLOTYPE: MO (MO 38351, image!); ISOTYPES: MO (MO 2152936, image!), NY (NY 10304, image!)]. **Fig. 1D.**

Psammisia amazonica occurs in rainforest at 180–700(–1350–1800) m altitude. It has been collected about seven times in eastern Ecuador and ca. 21 times in northeastern Peru (including 12 times from the type locality given above); it is unknown from Bolivia. *Psammisia amazonica* was distinguished from all other species found in Peru and Ecuador by its small, oblong to oblong-elliptic leaves, (3–)6–10 cm long and apically rounded to rarely somewhat retuse, and by its globose-urceolate corollas (Fig. 1D; Luteyn 1987, 1996). The



FIG. 1. Species of *Psammisia* in Bolivia and Peru. **A**, *P. coarctata*. **B**, *P. urichiana*. **C**, *P. graebneriana* showing conical-urceolate corollas. **D**, *P. amazonica* showing globose-urceolate corollas (Photos A–C: James L. Luteyn; D: B. Ståhl).

only other currently known Peruvian species of *Psammisia* with a globose-urceolate corolla is *P. globosa* A.C.Sm. (see below), but that species has acuminate, linear-lanceolate leaves up to 35 cm long.

The relationships of *Psammisia amazonica* are uncertain at this time, but its position in Luteyn's (1987) key is indicative of phenetic similarity. The "globose-flowered complex" including *P. amazonica* occurs along the eastern-Andean, lowland slopes ("Amazonia") from Napo, Ecuador (0°33' S) to Amazonas, Peru (5°16' S) at 180–900 (–1350–1800) m altitude, in the western shadows of Cerro Sumaco (Cordillera de Galeras), the Cordillera Cutucú, and the Cordillera del Cóndor (north to south). It is seemingly characterized by leaves basally strongly cordate(–amplexicaul) to broadly cuneate, apically broadly acute to rounded and slightly

retuse; venation strongly plinerved from the base to almost pinnate with inner veins arising almost half-way up the midrib; rachises subfasciculate to 4 cm long racemose; calyces mostly with a large circular, often sunken gland opposite each calyx lobe, or in other specimens a smaller circular gland opposite each calyx sinus; and corolla color seemingly yellow to orange or pinkish (Fig.1D)—actually there are very few specimens with mature corollas and some labels give this color to buds or immature fruits. Many more collections need to be made before this complex is understood, but I am happy to be able to call it to the attention of botanists.

[NOTE: Interestingly, in leaf and corolla size and shape *Psammisia amazonica* resembles “*C. [Ceratostema] emarginata*” illustrated in pl. 384a of Ruiz and Pavón’s vol. 4 plates (see Ruiz and Pavón 1957:780 and text p. 759–760), but that species has solitary flowers not racemose inflorescences, etc. The *C. emarginata* of Ruiz and Pavón was validated by Don (1834:861) when he transferred it as *Thibaudia emarginata* (for no apparent reason, but perhaps because of the small corolla). Dunal (1839:561) essentially followed Don in its placement citing it as *T. ? emarginata* Ruiz et Pav. ex G.Don; Klotzsch (1851:40) placed it in his *Thibaudia* uncertain species category as *T. emarginata* Ruiz et Pav. ex Dunal; Hoerold (1909a:273) excluded it from *Thibaudia* and placed it back in *Ceratostema* as “*Th. emarginata* Ruiz et Pav. Fl. Per. t. 384 = *Ceratostema em.*” [sic], but within *Ceratostema* he placed it in his uncertain species as “**C. emarginatum** Ruiz et Pav. Fl. per. IV. t. 384 (*Thibaudia e.* Dun. in DC. Prodr. p. 561)—Peru”; Smith (1932:347) placed it within his *Ceratostema* “doubtful species” as “**Ceratostema emarginatum** R. & P. Fl. Peruv. Chil. 4: pl. 384. 1802. *Thibaudia emarginata* Dun.; DC. Prodr. 7:561. 1839” and stated that the “plant pictured and described in the above references is certainly not a species of *Ceratostema*, and I am inclined to think it belongs in the tribe Vaccinieae, rather than Thibaudieae”; Macbride (1959) did not mention it at all. To my knowledge no herbarium specimen has ever been determined as *C. emarginata* or *T. emarginata* for the apparent reason that no one has ever been able to locate or study a specimen. To me, Ruiz and Pavón’s pl. 384a illustration appears to be that of a “globose-flowered” *Psammisia* related to *P. amazonica*, but without an “original” specimen it remains to this day an enigma.]

Psammisia coarctata (Ruiz & Pav. ex G.Don) A.C. Sm., Contr. U.S. Natl. Herb. 28:401. 1932. “*Thibaudia coarctata*” Ruiz & Pav., Fl. peruv. chil. 4: pl. 385. 1802, *nom. nud.* *Thibaudia coarctata* Ruiz & Pav. ex G. Don, Gen. hist. 3:860. 1834. TYPE: PERU. HUÁNUCO: “Habitat in Peruviae Andium montibus frigidis Pillao, Chinchao, Acomayo, Muña et in Huásahuaci silvis,” Ruiz & Pavón s.n. [LECTOTYPE, here designated: MA (MA 747442, image!); ISOLECTOTYPES: BM (BM 582205, image! photo, NY s.n.), F ex MA (photo, F neg. 59537, F digital photo!), G (G 352117, image!), MA (MA 747441 =EPK neg. 474), MA (MA 747443 n.v., image!), MA (MA 747444, image!).] **Fig. 1A.**

Ruiz and Pavón illustrated *Thibaudia coarctata* by pl. 385 in vol. 4 of their *Fl. peruv.* As mentioned above, these plates were not published in 1802 as anticipated, although they were distributed to botanists before 1805 (see discussion of J. Saint-Hilaire above) by O. Rich thus providing effective publication. Lambert received (purchased?) a copy of these plates from Rich. While working in Lambert’s library and herbarium George Don had access to those plates and other unpublished manuscripts of Ruiz (Steele 1964). In 1834 Don (1834:860) validly published the name “*T.[Thibaudia] coarctata* (Ruiz et Pav. l. c. t. 385.)” based on the name given on the effectively published “t. 385” of vol. 4 of the *Fl. peruv.* (see Ruiz & Pavón 1802[1957:781]) that he saw in Lambert’s library and specifically cited in the protologue, on their epithet “*Thibaudia coarctata*” given in the unpublished text of vol. 4 of the *Fl. peruv.* (see Ruiz & Pavón 1802[1957:762]), **and** on an actual Ruiz and Pavón specimen in Lambert’s herbarium. In the protologue he mentioned that the species was a “Native of Peru” although no actual specimen or collection was cited. The type locality I cite above is taken from the original Ruiz and Pavón description of *T. coarctata* in the text of their vol. 4 (Ruiz & Pavón 1802[1957:762]). Don also cited the name “*T. bicolor*, Dunal. in herb. Lamb.” as a synonym of his name (see more discussion below). It is interesting that Klotzsch (1851) never mentioned the name *T. coarctata* in his monograph, although he did make the new combination *Psammisia bicolor* (Ruiz & Pavón ex Dunal) Klotzsch (*in* Linnaea 24:44. 1851). Hoerold (1909a:273) cited *T. coarctata* in his excluded species as “*Th. coarctata* Ruiz et Pav. Fl. Per. IV. t. 385 = *Psammisia bicolor*.” It was not until 1932 that Smith made the new combination *Psammisia coarctata* (Ruiz & Pav. ex G.Don) A.C.Sm., also citing “Type locality: Peru, probably in Department of Huánuco. Type collected by Ruiz and Pavón” (Smith 1932:401), but without any mention of an actual type collection or herbarium of

deposit.

I have located seven herbarium specimens that I believe are all syntypes of *Thibaudia coarctata* [= *Psammisia coarctata*] and will discuss each now.

1) One syntype of *Thibaudia coarctata* is at BM (BM 582205, image!; photo, NY s.n.). The herbarium sheet bears an old original label (in an unrecognized hand) that states “*Thibaudia coarctata*. Flor. Peruv. hab. in Peruvia ad Pillao. montes nemorosos frigidisculos.” It was annotated as “TYPE COLL.” by Smith in 1931 and also has attached a small printed herbarium label stating Type Specimen. It was probably obtained by the British Museum from purchases of the Lambert Herbarium and thereby probably a specimen from the original Ruiz and Pavón herbarium. The actual mounted herbarium specimen consists of all *T. coarctata* (hereafter = *P. coarctata*) material including stems, leaves, and three mature fruits. [Could this have been the sheet used by Don in 1834 for his publication of “*T. [Thibaudia] coarctata* (Ruiz et Pav. l. c. t. 385.)”?]

2) A second syntype is at G ex Herb. Boissier (G 352117, image!). That sheet bears a modern red printed TYPUS label and another handwritten label (in an unknown hand) that simply states “*Thibaudia coarctata* ... Pillao.” It was annotated in 1932 by Smith as *Psammisia coarctata*, but with no other indication by him if it was part of the type collection—it does, however, match the BM sheet mentioned above. In 2007 I annotated it as “probable isotype.” It may have been obtained by the Swiss botanist Pierre Edmond Boissier from purchases of the Lambert Herbarium and, if so, is probably also a specimen from the original Ruiz and Pavón herbarium. The actual mounted herbarium specimen consists of all *P. coarctata* material including stem, leaves, and two inflorescences with calyces and one corolla.

3) A third syntype is at F (F neg. 59537, F digital photo!) labelled Ex antiquo herbario generali (i.e., ex MA). That sheet has a printed label that reads Herbarium Horti Botanici Matritensis at the top and beneath that *Plantae a Ruiz et Pavón in vice-regno Peruviano et Chilensi lectae (1778–1788)*; then beneath that the typed identification “*Psammisia coarctata* (R. & P. ex Don) A.C.Sm.” and beneath that the location “Pillao, Acomayo, Chinchao, Muña.” It was probably obtained by The Field Museum through exchange with MA. The actual mounted herbarium specimen is a mixed collection—the large leaf at the lower left side and a long-pedicellate flower from the packet being *P. coarctata*, while the twig with leaves on the right upper side and all the leaves plus one short-pedicellate fruit in the packet belong to *Cavendishia bracteata* (Ruiz & Pav. ex J.St.-Hil.) Hoerold. In 1994, 2006, and again in 2007 I annotated the *Psammisia* parts as “possible Isotype of: *Thibaudia coarctata*.”

4) A fourth syntype at MA (*Herbario Ruiz y Pavón* MA 747443, image!) is from the Herbarium Horti Botanici Matritensis. It bears a printed label that states Herbarium Peruvianum Ruiz et Pavon followed by the inked handwritten “no. 15/48.” That label bears the handwritten 1935 annotation of H.O. Sleumer that simply states “*Psammisia coarctata* (R. et P. ex Don) A.C.Sm.”—there is no locality data on the label and no indication of type status on the sheet. The actual mounted herbarium specimen consists of leaf material that matches all other Ruiz and Pavón syntype collections of *P. coarctata* at MA.

5) A fifth syntype specimen at MA (*Herbario Ruiz y Pavón* MA 747441, image!) is also from the Herbarium Horti Botanici Matritensis. In 1932 it was photographed by Elsworth P. Killip (photo EPK neg. 474, Plants in European Herbaria, U.S. National Herbarium, Smithsonian Institution, Washington, D.C.), the photo of which may be seen mounted on a herbarium sheet at P (P 4479792, image!). Killip’s photo was distributed with a small printed label “Plants in European Herbaria” that also read “*Thibaudia coarctata* R. & P. Peru. Ruiz & Pavon. Madrid (type).” The original herbarium specimen from which Killip’s photo was taken showed a single printed label in the lower right-hand corner of the sheet that read “*Thibaudia coarctata* Fl. Peruv.” at the top and “Ex Herbario Fl. Peruv. anno 1828” at the bottom. It can also be seen that the herbarium specimen was a mixed collection—the large leaf at the bottom left of the sheet and the old inflorescence and single immature fruit in the center belong to *Psammisia coarctata*, while the twig with leaves making up the bulk of the specimen belongs to *Cavendishia bracteata*. In my two visits to MA I was not able to locate that specific sheet, and therefore I think that the original MA herbarium sheet photographed by Killip (the basis for photo EPK neg. 474) was re-mounted! The labels and plant parts currently seen on the MA 747441 sheet are identical with those of

the photo EPK neg. 474. Also, in the re-mounted sheet the one large *Psammisia* leaf (shown in the photo EPK neg. 474) has been removed, the *Cavendisia* twig is mounted upside down, the *Psammisia* inflorescence and one fruit remain, and the original label shown in the photo EPK neg. 474 is attached to the lower left-hand corner of the re-mounted sheet. Finally, the remount bears an additional printed-label reading Herbarium Horti Botanici Matritensis and Plantae a Ruiz et Pavon in vice-regno Peruviano et Chilensi lectae (1778–1788) that is mounted on the lower right side, a Sleumer annotation label from 1935 that states “*Psammisia coarctata* (R. et P. ex Don!) A.C.Sm.” and “Original!,” and a modern red printed TYPUS herbarium label.

6) A sixth syntype at MA (*Herbario Ruiz y Pavón*, MA 747442, image!) is also from the Herbarium Horti Botanici Matritensis. On that herbarium sheet there are five separate labels: 1) in the bottom left-hand corner of the sheet there is a formal printed label titled Herbarium Peruvianum Ruiz et Pavon that also bears the more recent handwritten in ink “no. 15/48” in the upper right corner of the label and below that the localities “Pillao, Acomayo, Chinchao muña (Flor. Per. et Chil. t. 4^{to})” in the same hand (but not Sleumer’s); also on that label is written the determination “*Psammisia bicolor* (Ruiz et Pavón) Klotzsch, in *Linnaea* 24 (1851) 44” followed by the synonyms “*Thibaudia bicolor* (R. et P.) Dunal” ... “*Psammisia coarctata* (R. et P.) A.C.Sm.” ... “*Thibaudia coarctata* R. et P.” ... and at the bottom the notation “type collect!” (all in Sleumer’s hand, written in 1934); 2) immediately above the label #1 is a small original inked handwritten label (in Pavón’s hand) that reads “*Thibaudia bicolor*” on the top line with “bicolor” crossed out and “coarctata” written after it, and then “Pillao, Acomayo, Chinchao Muña” on the lowest line; 3) immediately above label #2 is another small original inked handwritten label (again in Pavón’s hand) that reads “*Thibaudia coarctata* Fl. Per. et chil. t. 4^{to}”; 4) immediately above label #3 is my own (JLL) 24 Sep 2000 annotation label determining the sheet as “Lectotype of: *Thibaudia coarctata* R. & P. =*Psammisia coarctata* (R. & P. ex G.Don) A.C.Sm.,” and lastly 5) at the very bottom and to the right of label #1 is the 1935 handwritten annotation label of Sleumer stating “*Psammisia coarctata* (R. et P. ex Don) A.C.Sm. =*Thibaudia coarctata* (R. et P.) Don, Syst. 3. (1834) 860.” The actual mounted herbarium specimen consists of all parts *P. coarctata* including leaves, flowers, and fruit.

7) A probable duplicate sheet of the syntype number six above (therefore a seventh syntype) is also at MA (*Herbario Ruiz y Pavón* MA 747444, image!) and is also from the Herbarium Horti Botanici Matritensis. On that sheet there is only one label, the same label as the #1 label above on the sixth possible syntype, viz., the formal printed label that reads Herbarium Peruvianum Ruiz et Pavon with the inked handwritten “no. 15/48” in the upper right corner. It was also determined in the hand of Sleumer in 1934 as “*Psammisia bicolor* (R. et P.) Klotzsch” and then also by him in 1935 as “=*Psammisia coarctata* (R. et P. ex Don) A.C.Sm.” The actual mounted herbarium specimen consists of seven mature leaves of *P. coarctata*.

Based on the discussion above and my own personal visits to all relevant herbaria discussed, I am herein formally designating as lectotype of *Psammisia coarctata* that herbarium sheet at MA barcoded and imaged as *Herbario Ruiz y Pavón* MA 747442, because it is an unmixed collection of *P. coarctata*, it bears the label most similar to that of the protologue, and I still feel now (as I did in 2006) that it is the best specimen to act as lectotype from amongst the available syntypes.

Thibaudia bicolor Ruiz & Pavón ex Dunal in DC., Prodr. 7:561. 1839. “*Thibaudia bicolor*” Ruiz & Pavón, Fl. peru. chil. mss., nom. nud.
Psammisia bicolor (Ruiz & Pavón ex Dunal) Klotzsch, *Linnaea* 24:44. 1851. *Vaccinium bicolor* (Ruiz & Pavón ex Dunal) F.Muell., Sel. Pl. Indust. Cult. 249. 1876. TYPE: PERU. HUÁNUCO: “ad Pillao, Acomayo, Chinchao et Muña” ... “(v. s. in DC. ex h. Thib.),” [Ruiz & Pavón s.n.] [LECTOTYPE, first-step designated by Dunal (1839:561) and second-step here designated: G-DC (G 322669, image! =photo F neg. 7028, F image!); isolectotypes: MA (MA 747442, image!); MPU (MPU 12375, seen only as digital image!).]

I herein provide Dunal’s entire protologue for reasons of reference that become evident in the discussions below:

T. BICOLOR (R. et Pav. mss. fl. per. t. 4. ex herb. Thib.), caule scandente ramosissimo, ramis longissimis, foliis breviter petiolatis oblongo-lanceolatis apice breviter acuminatis acutis integerrimis subcoriaceis supra nitidis venoso-reticulatis subtus reticulatis pallidioribus, margine subrevolutis, tri-quinque nerviis, racemis solitariis bipollicaribus, pedicellis longis puniceis bracteatis, 3 in Peruviae Andium montibus frigidis ad Pillao, Acomayo, Chinchao et Muña.—Dun. vacc. ined. t. 8.—*Thibaudia coarctata* R. et Pav. fl. per. et chil. 4. t. 385

ined. ex Don gen. syst. 3. p. 860. *Puechato del monte* incolarum, id est florum fasciculus incurvatus montanus.—Frutex 4–6-ularis, glaber. Corolla pollicaris subcylindrica, ad medium faucemque coarctata punicea, superne alba, crassa. Bacca rubicunda, Avellanæ magnitudine, subglobosa calycis limbo coronata. (v. s. in DC. ex h. Thib.)

What is the origin of the epithet Thibaudia bicolor?—After Ruiz and Pavón returned to Spain in the fall of 1788, they immediately began revising their “diarios de campos” (field journals) for publication (which never happened in their lifetime). For example, there are the original unpublished field journals of Ruiz plus two known transcribed and published second and third versions—Barreiro (1931) and Jaramillo-Arango (1952)—that affirmed the many corrections and “crossings out” *vide* Castroviejo (*in* Schultes & Nemry von Thenen de Jaramillo-Arango 1998) and the more recent translation by Schultes and Nemry von Thenen de Jaramillo-Arango (1998). Ruiz and Pavón also revised (more than once) their own individual descriptions of plants that were to be included in the vol. 4 of their *Fl. peruv.* and, therefore, the changing of plant names (or renaming) was not unusual or out of character. For example, the name *Thibaudia bicolor* was not mentioned in Ruiz and Pavón’s published *Flora peruviana, et chilensis prodromus* (*Fl. peruv. prodr.*, Ruiz & Pavón 1794), or their *Systema vegetabilium florum peruviana et chilensis* (*Syst. veg. fl. peruv. chil.*, Ruiz & Pavón 1798), and it is not found in any of the first three published volumes of their *Fl. peruv.* (Ruiz & Pavón 1798–1802). Nor is it mentioned in their original field notes or either of the two known revisions thereof mentioned above. They did, however, use that name on the original labels of some of their collection(s) as is evidenced by the three syntype specimens cited below. Fortunately, Esther García Guillén (Curator of Archives, Real Jardín Botánico, CSIC, MA) recently sent to me digital images of the original handwritten (but **unpublished**) descriptions of new species of Ericaceae intended for publication in vol. 4 of the *Fl. peruv.* including Ruiz’, Pavón’s, and Joseph Dombey’s original handwritten descriptions of *Thibaudia coarctata*. [Dombey was a French colleague who accompanied Ruiz and Pavón on their South American (Peru and Chile) expedition from 1778–1784 at the request of the French government.] [I still do not know the exact titles of these manuscripts or the dates when they were written (but prior to 1802); perhaps they simply come from a “portfolio” of descriptions intended for vol. 4 of the *Fl. peruv.*] It can now be seen from one of those digital images, Ruiz’ handwritten description of a new *Thibaudia*, that he suggested the name “bicolor” in the margin of the diagnosis at the top of the page—that epithet was later crossed out and under it was written **in Pavón’s hand** the epithet “coarctata.” Another digital image, Pavón’s handwritten description for the same new species of *Thibaudia*, shows that he included the complete name “*Thibaudia bicolor*” at the top of the page, but with “bicolor” crossed out and after it “coarctata” is clearly written—that full name was also followed by “Ic. 385” equating the description with the plate 385 of *Thibaudia coarctata* that was effectively published by Rich’s distribution sometime between 1802–1805. The digital image of Dombey’s handwritten description, again for the same new species of *Thibaudia*, shows no specific epithet given, but the name “*Thibaudia coarctata* F. P.” is written at the beginning and end of the description at a later date in Pavón’s hand. Therefore, based on these three original handwritten descriptions it would appear that Ruiz and Pavón decided to change the name of their plant from the original “*Thibaudia bicolor*” to their preferred and intended name “*Thibaudia coarctata*”—most likely in one of their revisions before the plates were distributed. This would also explain why their original herbarium labels had the epithet “*Thibaudia bicolor*” crossed out and replaced with *T. coarctata* in Pavón’s hand as mentioned above, for example, on the sixth syntype sheet of *P. coarctata* at MA (MA 747442), and **also** gives a logical reason for Dunal’s preference for *T. bicolor* as well as his (Dunal’s) handwritten annotation of “*Thibaudia coarctata* mss. Ruiz ...” above Pavón’s handwritten “*Thibaudia bicolor*” on the label of the herbarium specimen at G-DC (G 322669, =F neg. 7028) mentioned below.

The name *Thibaudia bicolor* was used on the labels of at least two herbarium specimens distributed to or purchased by Etienne Thibaud before 1815 as seen on the two sheets at G-DC and MPU (discussed below) that originated from Thibaud’s herbarium (i.e., before Ruiz died in 1816 and before Pavón started selling off their collections in 1817). [The herbarium that Thibaud accumulated when he was in Madrid (2400 specimens) included rare species disseminated by Cavanilles and by Ruiz and Pavón. Sometime around 1815 Thibaud’s

herbarium was purchased by de Candolle and Dunal who eventually divided it in half with 1200 specimens going to de Candolle and now incorporated into G and G-DC **and** 1200 to Dunal for his herbarium in Montpellier, now incorporated into MPU (F. Stauffer, pers. comm.)] Around 1817–1824 Lambert purchased from Pavón a large set of duplicate herbarium specimens (and manuscripts) including some of the Ruiz and Pavón collection(s) in question. Sometime before 1834 Dunal visited Lambert's herbarium and annotated one of the Ruiz and Pavón collections located therein as “T. bicolor, Dunal.” Although Dunal's name is not amongst those visitors mentioned by Miller (1970, and which is not necessarily a complete listing), I know that Dunal travelled widely and saw specimens in many herbaria including that of Lambert, because in his “Vaccinieae” treatments of *Ceratostema* and *Thibaudia* for the *Prodr.* (1839), for example, he cited having seen specimens “in h. Boiss.” (i.e., Geneva), “in h. Jussieu” (i.e., Paris), “in h. Dombey” (i.e., Paris), “**in herb. Lamb.**” [bold mine] (i.e., London), “in h. DC. ex h. Thib.” (i.e., Geneva), “in h. mus. Par.” (i.e., Paris), “in h. Moricand” (i.e., Geneva), etc.

I think that both Don and Dunal, while working in Lambert's herbarium and library (separately or together) with the Ruiz and Pavón plant collections and manuscripts purchased by Lambert from Pavón, had access to the effectively published by privately distributed plates of vol. 4 of the *Fl. peruv.*, possibly to unpublished copies of the text of vol. 4, **and** also possibly to copies of other Ruiz manuscripts or versions of them in which the name “T. bicolor” was given. I know Dunal saw an unpublished manuscript of Ruiz and Pavón of the text of their *Fl. peruv.* vol. 4 that was in Thibaud's personal herbarium, because he cited it as such on p. 560 of his introduction to the genus *Thibaudia* as “THIBAUDIA R. et Pav. fl. per. et chil. t. 4. mss. (ex herb. Thibaud)” and then again on p. 561 when he published his new species “T. BICOLOR (R. et Pav. mss. fl. per. t. 4. ex herb. Thib.)” It should be noted also that Dunal stated “t. 4. mss.” i.e., the unpublished manuscript [tome] of vol. 4 and not “t. 385” i.e., the effectively published plate [tabula] 385 of vol. 4. His protologue (p. 562) also included the common name “Puechato del monte,” a name that is not seen on any herbarium label, but is only seen in each of Ruiz' and Pavón's individual unpublished descriptions of *T. coarctata* discussed above and in their description of *T. coarctata* for the text of their unpublished manuscript of vol. 4 that was finally published about 155 years later (in Ruiz & Pavón 1957:762).

In 1834 Don **validly** published *Thibaudia coarctata* Ruiz & Pav. ex G. Don (*Gen. hist.* 3:860. 1834). It was in his protologue where he also cited the synonym “T. bicolor, Dunal. in herb. Lamb.”—the first published mention of “T. bicolor” that I know of. The wording in *that* citation implies (to me) that Don saw the name “T. bicolor, Dunal” on a Dunal annotation label attached to a specimen in Lambert's herbarium, presumably done at the time of Dunal's aforementioned visit (however, no such herbarium specimen with that annotation label has been located). Don correctly and deliberately acknowledged the Ruiz and Pavón epithet used on pl. 385 and attributed it to them by his valid publication of *T. coarctata* Ruiz & Pav. ex G. Don, while at the same time consciously disregarded Dunal's annotation “T. bicolor.”

When Dunal finally wrote the “Vaccinieae” treatment for de Candolle's *Prodromus* in 1839, he described *Thibaudia bicolor* as a new species based on the Ruiz and Pavón collection from Thibaud's herbarium seen in de Candolle's herbarium in Geneva (“in DC. ex h. Thib.”). By that time, he was aware of both the Ruiz and Pavón plate 385 of vol. 4 of the *Fl. peruv.* as well as a copy of their unpublished text for vol. 4 that was **also** in Thibaud's herbarium then in de Candolle's possession at the time of Dunal's writing (**both** plate and text having used the epithet *T. coarctata*). Dunal was also aware of Don's validly published “*Thibaudia coarctata* R. et Pav. fl. per. et chil. 4. t. 385 ined. ex Don gen. syst. 3. p. 860” as seen in his protologue of *T. bicolor*. However, in his treatment of *Thibaudia*, Dunal did **not** list *T. coarctata* as one of his 29 recognized species, but instead placed *T. coarctata* as a synonym of his *T. bicolor* (see protologue above). Dunal must have felt that the name *T. bicolor* had some sort of precedence over *T. coarctata* and so he attributed it to Ruiz and Pavón thus validating their *original* unpublished manuscript name. Dunal had already used the epithet “T. bicolor” in one of his own unpublished manuscripts, since he referred to it as “Dun. vacc. ined. t. 8” in the protologue of *T. bicolor*. He also referred to that unpublished manuscript in several places in his *Prodr.* “Vaccinieae” treatment, the first time being for the genus *Ceratostema* (Dunal 1839:553) as “C. GRANDIFLORUM ... —Dun. vacc. ined. t. 1. ...” Unfortunately,

that particular manuscript has not been located nor mentioned by anyone else that I know of—it is not at *G fide* F. Stauffer, nor has it been found at MPU *fide* C. Loupe (both pers. comm.).

In 1851 (p. 44) Klotzsch published the new combination "*P. bicolor* Klotzsch" [= *Psammisia bicolor* (Ruiz & Pavon ex G. Don) Klotzsch] and cited "(*Thibaudia bicolor* Ruiz et Pavon fl. per. ined. Dunal in DC. Prodr. l. c. p. 561.)" [= *Thibaudia bicolor* Ruiz & Pavón ex Dunal] in its synonymy. Klotzsch never mentioned the name *T. coarctata*! Hoerold (1909a:271) listed "*P. bicolor* (Ruiz et Pav.) Kl. in Linn. l.c. p. 44 = *Thibaudia b.* Ruiz et Pav. ex Dun. in DC. Prodr. VII. p. 561.—Peru" as an uncertain species of *Psammisia*, and then two pages later (Hoerold 1909a:273) he cited both "*Th. bicolor* Ruiz et Pav. ex Dunal in DC. Prodr. VIII. 561 = *Psammisia b.*" and "*Th. coarctata* Ruiz et Pav. Fl. Per. IV. t. 385 = *Psammisia bicolor*" in his *Thibaudia* excluded species category, thereby not really taking a stand on the status of either *T. bicolor* or *T. coarctata*. In 1932 (p. 401) Smith listed "*Thibaudia bicolor* R. & P." and "*Psammisia bicolor* Klotzsch" in the synonymy of his new combination "*Psammisia coarctata* (R. & P.) A.C.Sm." [= *Psammisia coarctata* (R. & P. ex G. Don) A.C.Sm.] and stated "The name *Thibaudia bicolor* was not published in the fourth volume of Ruiz and Pavón, as was *Thibaudia coarctata*. In making his choice between the two names, Dunal evidently had access to some unpublished manuscript." For whatever reason, Smith did not list or discuss *T. coarctata* Ruiz & Pav. ex G. Don, nor did he ever mention Don or his *Gen. hist.* (1834) in his historical overview. In 1959 (p. 95), Macbride included *T. bicolor* in the synonymy of *P. coarctata* and cited F neg. 7028 as a voucher.

With this historical discussion of the origin of the epithet *T. bicolor* as context, here follows a detailed discussion of the syntypes.

Syntypes of *Thibaudia bicolor*—1) The first syntype sheet at G-DC (G 322669, =F neg. 7028) bears a small original handwritten label in Pavón's hand (in my opinion) stating "*Thibaudia bicolor*" and "Habit in montibus Acomayo, Chinchao et Muña oppid." similar to the handwriting on the label of the MA sheet (MA 747442) (also Pavón's, in my opinion), and which also happens to be the designated lectotype of *Psammisia coarctata* (mentioned above). On that same label, squeezed in above "*Thibaudia bicolor*" and written at a later date and in a different hand, is the annotation "*Thibaudia coarctata* mss. Ruiz ..." (Dunal's hand, in my opinion). The photo F neg. 7028 of this G-DC herbarium sheet shows that the specimen itself consists of a twig with three leaves, one inflorescence, and several flowers without corollas. The more recent image on JSTOR Global Plants (*Thibaudia bicolor*, G 322669) shows several floral and fruit fragments (from packets), a modern red printed TYPUS label, and my own 2007 annotation label stating "Holotype of: *Thibaudia bicolor* Dunal [= *Psammisia coarctata* (Ruiz & Pav. ex G. Don) A.C. Sm.]. I believe that this sheet at G-DC is one of the 2400 specimens from Thibaud's herbarium that was purchased by de Candolle and Dunal in 1815. Although the locality data on the label of the G-DC sheet does not equal the exact wording given in the protologue, I feel confident citing it as "original" material seen and used by Dunal since he also stated in his protologue "(v. s. in DC. ex h. Thib.)."

2) The syntype sheet in the Herbar de l'Universite Montpellier II (MPU 12375) was annotated as "Isosyntype" of *Thibaudia bicolor* by A.J.M. Faure in 2008. The small original handwritten label in the upper right-hand corner of the sheet is stamped "HERB DUNAL" at the very top and then follows the handwritten "*Thibaudia bicolor*" on the first line, "Herb. Thibaud 1815" on the second, and then the locality "Hab. in montib. Acomayo chinchao + Muña oppidor." [All of the handwriting on this label belongs to Dunal based on my comparisons with an original letter of Dunal to A.-P. de Candolle, a copy of which was kindly sent to me by F. Stauffer (G)]. I believe that this sheet at MPU is another of the 2400 specimens from Thibaud's herbarium that was purchased by de Candolle and Dunal in 1815 and then later divided with Dunal receiving 1200 sheets that are now at MPU. Since Dunal did not mention seeing a second sheet of the Ruiz & Pavón s.n. collection from Thibaud's herbarium in de Candolle's herbarium at the time he wrote the protologue of *T. bicolor* wherein it was cited as "(v. s. in DC. ex h. Thib.)," it would seem to me that the specimen used by Dunal was one from the Thibaud herbarium then in de Candolle's herbarium, i.e., one of de Candolle's share of specimens from the Thibaud purchase; thus the sheet at MPU was probably one of Dunal's share of specimens that he received when he and de Candolle divided it at a later date. And since the locality data on the MPU sheet is slightly different from that on de Candolle's sheet, the two sheets should be considered syntypes and possibly in fact

altogether different Ruiz & Pavón *s.n.* collections, not necessarily duplicates. In any event, the sheet at MPU consists of two leaves with several old flowers without corollas and two mature fruits—all equaling the currently recognized *Psammisia coarctata*.

3) The third syntype sheet at MA (MA 747442, image!) is the same sheet designated as the lectotype of *Psammisia coarctata*. As mentioned above, it also has two small original labels, one of which that reads “*Thibaudia bicolor*” and both in Pavón’s handwriting (the same as on the lower lines of the syntype sheet at G-DC). It also bears several other labels that are detailed above.

4) The whereabouts of a fourth possible syntype sheet from Lambert’s herbarium—the sheet mentioned by Don (1834) with Dunal’s annotation label “*T. bicolor*, Dunal” discussed above and used by Don as the basis for his *Thibaudia coarctata*—is unknown at this time.

In summary, I feel that the herbarium sheets herein cited as syntypes—two from Thibaud’s herbarium (one each currently at G-DC and MPU), another currently at MA, and a possible fourth (that sheet seen by Don in Lambert’s herbarium, but the whereabouts of which is unknown)—were all from one (or more) Ruiz and Pavón collection(s) from the vicinity of Pillao, Acomayo, Chinchao, and Muña (Huánuco dept., Peru), **and** were the ones that have been used in the recognition of two different species names—the sheet in Lambert’s herbarium in London being used by Don as the type for his *T. coarctata* Ruiz & Pav. ex G. Don, while the sheet in A.-P. de Candolle’s herbarium in Geneva was used by Dunal for his *T. bicolor*. Therefore, because all four herbarium specimens mentioned above are Ruiz and Pavón collections, are the only known herbarium sheets to have the epithet “*T. bicolor*” written on their original labels, all have similar locality data, all definitely appear to bear plant parts taken from the same plant, **and** all seem to be duplicates of original material from an early Pavón distribution, I consider them all syntypes of *Thibaudia bicolor* and am herein designating as a second-step lectotypification as per ICN, Art. 9.17 Ex. 14 the sheet at G-DC (G 322669), because it is the best sheet of the three known syntypes and it was probably also the specimen used by Dunal in his protologue.

Psammisia guianensis Klotzsch, Linnaea 24:43. 1851 (sometimes spelled “guyanensis”). *Chupalon guianense* (Klotzsch) Kuntze, Revis. gen. pl. 2:384. 1891, **syn. nov.** TYPE: “In monte Roraima Guianae angl., legit cl. Rich. Schomburgk. (u. 1040.)” [=Rich. Schomburgk 1040p.p.], (fl), probable date 1843, B. Neotype, inadvertently designated by Smith (1932:399): British Guiana [Guyana], Mount Roraima, Rich. Schomburgk 974 [B, destroyed during WWII, but represented in photo by ACS neg. 147 at NY; isoneotype: B, sheet not seen by Smith, destroyed during WWII, but represented in photo by F neg. 4691 (F0BN004691 on Global Plants, image!), F frags. ex B sheet represented by F neg. 4691 (Field Museum VTypes Project no. V0077265F, image!), NY frags. ex B sheet represented by ACS neg. 147 (NY 951655)]. **LECTONEOTYPE, here designated:** NY frags. ex B (NY 951655, image!); **ISOLECTONEOTYPE:** F frags. ex B (V0077265F, F image!). [**Notes:** Rich. Schomburgk 974 is not to be equated with (Rob. ser. 2) Schomburgk 670/974 at K (see below). The type locality above probably occurs in present day Venezuela *vide* Steyermark (1981).]

The taxonomic history of *Psammisia guianensis* is messy, but at the same time closely inter-connected with that of two other species, viz., *Thibaudia formosa* and *T. nutans* (Klotzsch) Mansf. Therefore, in order to clarify the entire problem, a detailed account of the status of all three species is herein given.

Klotzsch (in Schomburgk 1848) contributed the Ericaceae treatment in the third volume of Richard Schomburgk’s (1848) *Reisen in Britisch-Guiana*. In it Klotzsch proposed (a.o.) three names in the genus *Thibaudia*, viz., “*Th. nutans* Kl. *nov. spec. Mss.*,” “*Th. formosa* Kl. *nov. spec. Mss.*,” and “*Th. guianensis* Kl. *nov. spec. Mss.*” (the names, authority abbreviations, and italics are given here as shown in the book)—all three are manuscript names and *nomina nuda* following Art. 38 Ex. 1, Rec. 50B of the *Code* (Turland et al. 2018). Walpers (1851:1092) was the first to note that Klotzsch’s “*T. formosa*” was published without a diagnosis [“(absq. diagn.)”], but he did not mention the other two manuscript names. Klotzsch’s name “*Th. guianensis* Kl. *nov. spec. Mss.*” was only mentioned one other time that I know of, viz , in Niedenzu’s (1889:208) key to the species that he studied of the tribe “*Thibaudieae*,” where for the keyed species “*Psammisia guianensis* Kl.” Niedenzu cited the *nomen nudum* “*Th. guianensis* Kl. *nov. spec. Mss.*” as a synonym—specifically he stated “*Psammisia guianensis* Kl. —*Thibaudia guianensis* Kl , wahrscheinlich mit *Psammisia guianensis* Kl. identisch.”

1) In his 1851 monograph Klotzsch gave the same collection, Rich. Schomburgk 1040, as the type for two of his new taxa—*Psammisia formosa* (1851:46) and *Psammisia guianensis* (1851:43; this new *P. guianensis* should **not** be mistaken for Klotzsch’s *nom. nud.* “*Th. guianensis* Kl. *nov. spec. Mss.*” of 1848, which Klotzsch himself

did not include as a synonym or as the basis for his new "*Psammisia guianensis*"). Evidently Klotzsch was somehow unaware that *Rich. Schomburgk 1040* was a mixed collection or for some reason he did not mention it in his treatment, such as by citing the collections as *Rich. Schomburgk 1040p.p.* That mistake was first recognized by Carl Friedrich Meisner (1863:127) in *Flora brasiliensis* when he also cited "*Rich. Schomburgk 1040*" as the type collection for both "*P. guyanensis* Kl." and "*P. formosa* Kl."; however, he cited the two collections by stating "*Rich. Schomburgk n. 1040 (ex parte)*" (i.e., *Rich. Schomburgk 1040p.p.*), thus bringing attention to Klotzsch's mistake. Currently the photo F neg. 4628 is the only representation (herbarium specimen or photo) known to me of the collection *Rich. Schomburgk 1040p.p.* showing *T. formosa* (Klotzsch) Hoerold. There are no herbarium specimens or photos known to me of *P. guianensis* Klotzsch as validly described in Klotzsch's protologue (1851:43), but see below the discussion of the NY photo ACS neg. 147.

No further mention of the name *Psammisia guianensis* Klotzsch is found in the literature until Smith (1932:400) incorrectly cited [*Rich.*] *Schomburgk 974* as the type for *P. guianensis* Klotzsch by stating "British Guiana: Mount Roraima, Schomburgk 974 (B, type, K)" and thereby specifying that the B specimen was the "holotype" and that at K the "isotype" *fide* Smith's way of citing types (see above). Smith's identification remained unchallenged until the present day—this paper. Did Smith not see any collection of *Rich. Schomburgk 1040p.p.* that he could identify as *P. guianensis* at B or anywhere else that would verify or correct Klotzsch's mistake? The only place in Smith's 1932 monograph where he cited the *Rich. Schomburgk 1040* collection was in his "Index to Numbered Specimens" (p. 543) and there representing only "*Thibaudia Formosa*." Did Smith not see Meisner's (1863:127) correction of Klotzsch's mistake when Meisner noted that *Rich. Schomburgk 1040* was a mixed collection of both "*P. guyanensis* Kl." and "*P. formosa* Kl."? Smith did cite Meisner (1863) as a reference in his 1932 monograph, so he must have seen Meisner's correction, but he did not acknowledge it! Or was Smith, in his own way, actually acknowledging Klotzsch's mistake and confirming Meisner's recognition of that mistake and thus attempting to correct Klotzsch's original mistake (again in Smith's own way) by citing [*Rich.*] "*Schomburgk 974 (B, type, K)*" as his (Smith's) type of *P. guianensis* (Smith 1932:399) even though he himself did not confirm in his monograph that *Rich. Schomburgk 1040* was a mixed collection and needed correction—i.e., was Smith consciously or inadvertently citing a "neotype" as per our modern concept for *P. guianensis* when he cited the B sheet of *Schomburgk 974* as the "TYPE"? In the same "Index to Numbered Specimens" mentioned above, Smith (1932:543) cited the collection [Richard] *Schomburgk 974* only as "*Psammisia guyanensis*." If Smith was citing a new collection as the type of *P. guianensis*, why did he choose "*Schomburgk 974*" as the replacement type? That was a reasonable choice on Smith's part since [*Rich.*] *Schomburgk 974* came from the same general collecting locality and date as *Rich. Schomburgk 1040p.p.* (the actual type for *P. guianensis*) and represented the same species concept that he as well as the Schomburgk brothers had for Klotzsch's *P. guianensis*. Although I have no special insight as to the reasons for his decisions, Smith was known to have been a very astute and meticulous taxonomist. Therefore, I am going to suggest that for whatever reason Smith never saw a collection of *Rich. Schomburgk 1040p.p.* that he could identify as *P. guianensis* in any herbarium, but only collections of *Rich. Schomburgk 1040p.p.* that he could determine as "*P. formosa* Kl." [= *Thibaudia formosa* (Klotzsch) Hoerold] and, therefore for that reason, he cited a new type altogether. Following this same line of reasoning, I am also going to credit Smith with recognizing Klotzsch's original 1851 mixed-collection mistake and correcting that mistake in his own way by citing as a neotype (according to our modern concept) the collection [*Rich.*] "*Schomburgk 974*."

Adding to the overall problem of "what is the type of *Psammisia guianensis*?" is the fact that there are two different photographs from two different herbarium specimens of *Rich. Schomburgk 974* at Berlin, both stating to show the "type" specimen of *P. guianensis*—the Macbride photo F neg. 4691 distributed as "TYPES OF THE BERLIN HERBARIUM" and the photo ACS neg. 147 found only at NY that was one of Smith's European Ericaceae type photos! The Macbride photo F neg. 4691 is mounted on a herbarium sheet together with fragments consisting of portions of two leaves and three floral pieces taken from a B "type" sheet. That herbarium sheet at F (FOBN009 on Global Plants, image! also =Field Museum VTypes Project no. V0077265F, F image!) bears a printed label stating Ex Museo botanico Berolinensi on which is written in hand the annotations "Neg.

4691,” ... “*Psammisia guianensis* Kl.,” ... “Schomburgk 974,” and “Br. Guiana.” I annotated that F sheet as “Isolectotype” of *P. guianensis* in 2007. What the actual B herbarium sheet represented in photo by F neg. 4691 shows, however, is an original herbarium specimen with a handwritten label in the lower left-hand corner of the sheet that reads “Hb. Kunth” with a collection number “974,” the locality as “Guiana angl. pr. Roraima,” the collector as “Rich. Schomburgk,” and the dates “acces. 1843” and “Nov. 1842.” This original handwritten label appears to me to be Klotzsch’s when compared with his known hand on a specimen sent to me from B-Willd. by R. Vogt. In the lower right-hand corner of the same sheet is the handwritten annotation “HG” the mark of the Berlin Herbarium Generale *vide* R. Vogt (pers. comm.). The herbarium sheet does not have any annotation label by Klotzsch, Hoerold, Smith, Sleumer, or anyone else stating that it is a type. Macbride (1959:97) said that *P. guianensis* “Probably should be included in *T. coarctata*, at least as to Peru ...” and cited F neg. 4691 as a voucher.

The NY photo ACS neg. 147, on the other hand, shows a different B herbarium specimen than the photo F neg. 4691 and one that Smith annotated in 1931 as “*Psammisia guyanensis* TYPE.” The ACS neg. 147 photo shows a sheet with two separate mounted twigs: the one on the right-hand side of the sheet, a sterile twig with four leaves and below it a packet without any writing on it, and a second fertile twig on the left-hand side of the sheet that bears two leaves along with a packet immediately beneath the twig that had handwriting on it. Although the left-hand packet flaps obscure most of the writing, what I can make out at the top quite clearly appears “... [g]uianensis” and the number “1040” (i.e., the species name “guianensis” and the type collection number of Schomburgk from the protologue); then below it the word “Linnaea” and Roman numerals “XXIV” (i.e., the journal name and volume number of Klotzsch’s 1851 protologue); then below that more words that include “Klotzsch”; and then at the very bottom the words “*Psammisia guianensis*” and “Schomburgk”—altogether possibly signifying that the fertile piece of the left side of the sheet was from *Rich. Schomburgk 1040p.p.* or perhaps it may have been just a reference to the protologue and not an indication of any collection material—it will never be possible to know. Separately and at the very bottom of the herbarium sheet, more or less in the middle, is the main original handwritten label with the single number “974” at the top left, beneath that the determination “*Psammisia guianensis* Kl.,” below that “(*Thibaudia guianensis* Kl.),” and at the very bottom “Guiana angl. Rich. Schomburgk.” In the bottom right-hand corner of the sheet is the handwritten “HG” for Herbarium General. On the right-hand side of the sheet overall is the 1931 Smith annotation label “*Psammisia guyanensis* Kl.” (printed) and “TYPE” (in the hand of A.C. Smith). Whether these two twigs with their respective packets represent two different collections mounted on one sheet as often happened in those days—possibly the number 1040 on the left-hand packet implied that twig was from *Schomburgk 1040*, whereas the twig on the right without any number on the packet was from another collection possibly *Schomburgk 974*—or only one collection (that probably *Schomburgk 974*) cannot be determined. Furthermore, if two separate collections were represented and if the fertile twig on the left was from the *Schomburgk 1040p.p.* type collection of *P. guianensis*, then it would have represented the only known specimen of *Schomburgk 1040p.p.* that could be determined as *P. guianensis*. But, I am going to give Smith the benefit of the doubt (again) and say that since he studied and annotated in 1931 the B sheet represented in photo ACS neg. 147 as “*Psammisia guyanensis* TYPE”—and with his annotation label on the right-hand side of the sheet—that he considered all of the plant material on that sheet as *Schomburgk 974* and the writing on the left-hand packet as just a citation of the protologue, and that is also why he cited it as such in his 1932 monograph. [Perhaps there may have been a sheet of *Schomburgk 1040p.p.* that actually represented Klotzsch’s *T. guianensis*, but it was lost or misplaced so no one else saw it; unfortunately, all material was destroyed in WWII.] A lectotype needs to be designated, however, and both Macbride’s and Smith’s sheets are still valid fragments (syntypes) available for lectotypification.

Now, let us look more closely at the so-called “*P. guyanensis*” isotype sheet at K (K 370388) that Smith (1932:400) cited as “... Schomburgk 974 (B, type, K).” That sheet has an old printed annotation label that reads “British Guiana, Schomburgk, 184” with a handwritten “3” added thus setting the year of collection as “1843.” That same printed annotation label also bears the handwritten collection number and determination “670/974 *Thibaudia*”—using the **double-numbering** system of Robert Schomburgk. We now know that the first number

“670” referred to the collection number of Robert Schomburgk, i.e., (*Rob. ser. 2*) *Schomburgk 670* and which he (Robert) thereby equated as the same species with the second collection number “974” that referred to a collection of his brother Richard, i.e., *Rich. Schomburgk 974* deposited at B. In this manner, Robert Schomburgk determined that both collections represented the same species, but as different collections with different collection numbers and possibly from different localities as explained by van Dam (2002:121). The K sheet identified with the double-numbered collection “670/974 Thibaudia” and **not** the solitary number “Schomburgk 974” as mentioned in Smith’s citation bears a 1931 annotation label of Smith that reads “*Psammisia guyanensis* Kl.” written with a typewriter and “TYPE COLL.” written beneath it by hand verifying that this was the sheet he was referring to in his 1932 monograph, but that we are now able to see he therein incorrectly equated with the B type collection of *Richard Schomburgk 974* as is confirmed in Smith’s “Index to Numbered Specimens” on p. 543. That same K sheet also bears a 1994 annotation label of mine that incorrectly states “Lectotype of *Psammisia guianensis* Klotzsch” (see below) and which I later (2007) annotated as “=*Psammisia coarctata* (R. & P. ex G.Don) A.C.Sm.” [Unfortunately, in my treatment of the Ericaceae in the *Fl. Ecuador*, I compounded Smith’s original (1932:400) mistake (i.e., recognizing the K sheet of *Schomburgk 670/974* as the type of *P. guianensis* Klotzsch) by following his 1931 annotation and 1932 treatment (Luteyn 1996:205). Since the B sheet (F neg. 4691) had been destroyed during WWII and I assumed that Smith’s K “isotype” was a duplicate of the B sheet, I therein also incorrectly lectotypified *P. guianensis* with that K sheet. It was also in my *Fl. Ecuador* treatment that I called attention to the fact that my newly lectotypified K sheet of *P. guianensis* was a **double-numbered** collection. I did not realize then that *Schomburgk 670/974* and *Schomburgk 974* were two distinct collections. Therefore, Smith was wrong when he equated the collection *Rich. Schomburgk 974* at B with the collection *Schomburgk 670/974* at K. To this day, I do not know of the existence of any other solitary-numbered herbarium specimen of *Rich. Schomburgk 974*—not at K or anywhere else, only the sheet at B that was destroyed during WWII and is now represented only in the photo F neg. 4691.]

In summary, there currently exist two syntypes for *Psammisia guianensis*, both with fragments from two different B sheets of *Rich. Schomburgk 974* (sheets with a single number), viz., a sheet at F (=Field Museum VTypes Project no. V0077265F, F image!) consisting of the photo F neg. 4691 of the B sheet (ex Herb. Kunth) mounted together with fragments from that sheet, and a sheet at NY (NY 951655, image!) consisting of fragments from a different B sheet (not from the Herb. Kunth) that Smith annotated in 1931 as “TYPE” as seen in the NY photo ACS neg. 147. As a result of the very lengthy argument given above, I am herein designating as lectoneotype of *P. guianensis* the NY fragments from the B holotype of *Rich. Schomburgk 974*—**not** to be equated with (*Rob. ser. 2*) *Schomburgk 670/974* at K **or** (*Rob. ser. 2*) *Schomburgk 670* at BM and P.

To complete this picture, however, there is a sheet of *Psammisia guianensis* at BM of the **solitary-numbered** collection *Schomburgk 670* (BM 582309, BM image!). It has an apparently original, inked field-label that reads collection number “670” and a printed label “Schomburgk 670, Roraima, Brit. Guiana, Coll. 1842–3.” At the bottom of that sheet there is an annotation in pencil by an unknown hand (not A.C. Smith’s) that reads “*Psammisia guyanensis* Kl.” In 2000 I also determined that sheet as *P. guianensis*. There is a similar sheet at P (P 4479814, MNHN image!) with an original label in the lower left-hand corner that reads the solitary number “Schomburgk 670, Roraima, Brit. Guiana, Coll. 1842–3”—the same as on the BM sheet; in its lower right-hand corner there is a printed Herb. Mus. Paris label that identifies the plant as a “*Psammisia*” and at its bottom reads “Collect. donnée au Mus. en 1846 par M. Schomburgk recueillie durant ses voyages dans la Guiane anglaise et les contrées voisines.” [From which Schomburgk brother the donation came is uncertain, but it was probably Robert Schomburgk.] The P sheet was determined as “*Psammisia guyanensis* Kl.” by Smith in 1931 and similarly by Sleumer in 1959. I have not annotated that sheet, only seeing it online—it is definitely *P. guianensis*. Interestingly, Smith did not mention any collection of “*Schomburgk 670*” with a single number in his 1932 monograph. Therefore, in the final analysis the collection with the solitary number “*Schomburgk 670*” seen only at BM and P, and the collection with the double-numbered “*Schomburgk 670/974*” seen only at K, are duplicates of the same general collection of *P. guianensis* herein synonymized under *P. coarctata* and should be cited as (*Rob. ser. 2*) *Schomburgk 670*—they are not types of any kind.

2) With regards to Klotzsch's manuscript name "Th. formosa Kl. nov. spec. Mss." (Klotzsch in Rich. Schomburgk 1848), he validly published *Psammisia formosa* (Klotzsch 1851:46) when he realized that it represented a species in a distinct genus not *Thibaudia*. In the second line of Klotzsch's protologue he gave as a synonym his manuscript name "(Thibaudia formosa Kl. in Rich. Schomburgk Versuch einer Fauna und Flora von British-Guiana p. 1088.)" Klotzsch cited as type of his new *P. formosa* "In declivitate montium Roraimae in Guiana angl. legit cl. Rich. Schomburgk. (u. 1040.)" [Remember, Meisner (1863:127) already noted that *Schomburgk 1040* was a mixed collection of *P. guianensis* and *P. formosa*. Currently, the only representations of Rich. Schomburgk 1040p.p. (known to me) that represent *T. formosa* are the two photos of the B type represented in the Macbride photo F neg. 4628 and the NY photo ACS neg. 133, the actual herbarium specimen of which was destroyed during WWIL.] Both photos show a herbarium specimen of *P. formosa* that bears two labels: an original handwritten label that reads "1040 *Psammisia formosa* Kl. (*Thibaudia formosa* Kl.)," a locality given as "Guiana angl.," the collector as "Rich. Schomburgk.," and the collection date as "Nov. 1842"—basically the same information as given in Klotzsch's protologue, although in the protologue there is no date, and in a hand that appears to me to be Klotzsch's when compared with his known hand on a specimen sent to me from B-Willd. by R. Vogt; and a second handwritten annotation label of "Hörold" [sic] stating his new valid combination "*Thibaudia formosa* (Kl.) Hörold (Subg. *Eurygania* Kl.)" with the date "III. 1908." That specimen also has in the lower right corner on the original sheet the handwritten annotation "HG." Therefore, I believe the B specimen (Rich. Schomburgk 1040p.p.) shown in F neg. 4628 to have been the actual type of Klotzsch's (1851:46) *P. formosa* and most likely the basis of his *nom. nud.* "Th. formosa Kl. nov. spec. Mss." (Klotzsch in Rich. Schomburgk 1848:1088). Other than the annotation label of Hoerold in 1908, the B type sheet shows no other annotation labels. [Note: Both Klotzsch and Hoerold studied only the specimens at B.]

On the other hand, the NY photo ACS neg. 133 shows that the original B type sheet used by Macbride when he took photo F neg. 4628 had been remounted by the time Smith saw and photographed it, because Smith's photo ACS neg. 133 shows an overall larger herbarium sheet upon which the original sheet was mounted along with the addition of a packet in the upper left-hand corner and the inked herbarium stamp "Mus. bot. Berol." in the lower right-hand corner. Smith's photo also shows the addition of a single flower mounted on the right-hand side of the specimen and Smith's ruler (for photographic purposes), plus his own 1931 handwritten annotation label "*Thibaudia formosa* Kl. TYPE"—all indicating to me that Smith saw that specimen after Macbride took his photo.

Hoerold (1909a:274), in his monograph "Systematische Gliederung und geographische Verbreitung der amerikanischen Thibaudieen," validly published the new combination "**Th. formosa** (Kl.) Hörold = *Psammisia* f. Kl. in Linnaea l.c. p. 46.—Guiana" referring back to Klotzsch's 1851 validly published name in *Psammisia* but probably excluding "Th. formosa Kl. nov. spec. Mss." (Klotzsch in Rich. Schomburgk 1848) and linking his new combination to the B type of Rich. Schomburgk 1040p.p. Smith's (1932:420) monographic treatment of the genus *Thibaudia* cited the species as "11. *Thibaudia formosa* Klotzsch; Schomb. Versuch Fauna & Fl. Br. Guian. 1088. 1848" followed by the two synonyms: "*Psammisia formosa* Klotzsch, Linnaea 24:46. 1851" and "*Chupalon formosum* Kuntze, Rev. Gen. Pl. 2:383. 1891." [If Smith was therein validating "*T. formosa* Kl. *nom. nud.*" (Klotzsch in Schomburgk 1848), the entry should have been cited as *T. formosa* (Klotzsch) ex A.C.Sm.] But, for whatever reason Smith failed to cite Hoerold's (1909a:274) earlier validly published combination *T. formosa* (Klotzsch) Hoerold as the correct name for the species! Smith cited "TYPE LOCALITY: Slopes of Mount Roraima, British Guiana. Type collected by Schomburgk (no. 1040)" and two lines later "Distribution: Pacaraima Mountains, altitude 1,000 to 1,500 meters. British Guiana: Slopes of Mount Roraima, *Schomburgk 1040* (B, type)" indicating that he did see the B type. But why Smith in 1932 did not cite Hoerold's published combination (of 1909a) or the presence of Hoerold's annotation label (of 1908) we will never know. In whatever case, the correct and currently accepted name must be *T. formosa* (Klotzsch) Hoerold. Therefore, I am herein designating as neotype of *T. formosa* the photo F neg. 4628 of the B holotype of Rich. Schomburgk 1040p.p., because it is widely distributed and shows very good detail when compared to the NY photo ACS neg. 133 and there are no known extant duplicates or fragments. The formalities of its typification follow:

Thibaudia formosa (Klotzsch) Hoerold, Bot. Jahrb. Syst. 42:274. 1909. *Psammisia formosa* Klotzsch, Linnaea 24:46. 1851, non “*Thibaudia formosa*” Klotzsch (1848) *nom. nud.* *Chupalon formosum* Kuntze, Rev. gen. pl. 2:383. 1891. TYPE: “In declivitate montium Roraimae in Guiana angl. legit cl. Rich. Schomburgk. (u. 1040.)” [Nov. 1842, *Rich. Schomburgk* 1040p.p.] [HOLOTYPE: B, destroyed during WWII; NEOTYPE, here designated: the photo of the B holotype represented by F neg. 4628.]

3) Finally, with regards to *Thibaudia nutans* (Klotzsch) Mansf., in Klotzsch’s 1851 monograph he did not mention his earlier *nomen* “*Th. nutans* Kl. *nov. spec. Mss.*” (Klotzsch in *Rich. Schomburgk* 1848). It was, however, listed as the new combination “*Ceratostema nutans* [sic]” by F. Niedenzu (1890:224; another *nomen nudum*) in his monograph “Über den anatomischen Bau der Laubblätter der Arbutoideae und Vaccinioideae in Beziehung zu ihrer systematischen Gruppierung und geographischen Verbreitung.” Hoerold (1909a:277) again cited Niedenzu’s invalid combination “**C. nutans** (Kl.) Niedenzu in *Engl. Bot. Jahrb.* XI (1890) p. 207 = *Thibaudia* n. Kl.—Guiana.” in his *Ceratostema* uncertain species category. Finally, after recognizing that both Niedenzu’s and Hoerold’s names were invalid, R. Mansfeld (1925:438) validly published the combination *T. nutans* (Klotzsch) Mansf. when he properly described and cited two collections (syntypes) in the herbarium at Berlin: “Brit. Guiana: Roraima, zwischen Sandsteinfelsen, 1600 Fuß (R. SCHOMBURGK n. 873!—anno 1842)” and “Venezuela: Rio Cuquenán, Strauch in der Restinga bei Schaweila Mota, Blüten purpurn (E. ULE n. 8720!—fl. Februar 1910).” Despite acknowledging that Klotzsch’s (1848) name was a “*nomen*,” Mansfeld nevertheless attributed the epithet to Klotzsch. Later, Smith (1932:424) effectively lectotypified *T. nutans* (Klotzsch) Mansf. when he stated “TYPE LOCALITY: Mount Roraima, British Guiana, altitude 1,600 meters. Type collected by Schomburgk (no. 873)” followed three lines later with the distribution of specimens that included [*Schomburgk*] “873 (B, type), 567/873 (K), ...” Thus Smith inadvertently cited the B specimen of *Rich. Schomburgk* 873 as the “holotype” according to his way of citing types (see above), whereas this time the double-numbered K sheet of *Schomburgk* 567/873 [i.e., (*Rob. ser.* 2) *Schomburgk* 567/873] was just another collection and not a type.

The photo F neg. 4648 (=F0BN004648, image!) of the B holotype sheet of *Thibaudia nutans* (*Rich. Schomburgk* 873) clearly shows that it came from the “Herbarium Generale”; it also had an original handwritten label that read “873 *Thibaudia nutans* Kl. Guiana angl. 1600” with collector and date as “Rich. Schomburgk Oct 1842.” [That original handwritten label also appears to me to be in Klotzsch’s hand.] The label also verified that the solitary-numbered collection 873 belonged to Richard Schomburgk (see also van Dam 2002:118). Smith annotated the sheet in 1931 as “*Thibaudia nutans* Kl. TYPE,” otherwise the sheet did not bear any other annotations. The NY photo ACS neg. 133 of the same B type sheet, however, shows both the addition of Smith’s 1931 handwritten annotation label “*Thibaudia formosa* Kl. TYPE” (indicating again that Smith’s European trip followed that of Macbride’s) and the addition of the generic name “*Ceratostema*” immediately above the *Rich. Schomburgk* 873 label in pencil by an unidentified person directly onto the sheet.

On the other hand, when we look more closely at the so-called [*Schomburgk*] “567/873 (K)” sheet of *Thibaudia nutans* at K (K 537119) mentioned by Smith in 1932 as a general collection of *T. nutans* (i.e., not a type), we see that it actually bears an old printed annotation-type label that reads “British Guiana, Schomburgk, 184” with a handwritten “3” thus setting the year of collection as “1843.” That same printed annotation-type label also bears the handwritten collection number and determination “567/873 B *Thibaudia* sp. n.” (note the final “B”)—using the double-numbering system of Robert Schomburgk (noted above), wherein the first number “567” refers to the collection (*Rob. ser.* 2) *Schomburgk* 567 and which he (Robert) thereby equated as the same species with the second part of the number “873 B” that referred to a different collection of his brother Richard, i.e., *Rich. Schomburgk* 873 (now seen as the holotype at B). That same K sheet identified with the double-numbered collection “*Schomburgk* 567/873 B” [and not the solitary number “*Schomburgk* 873” (= *Rich. Schomburgk* 873)] was annotated in 1931 by Smith as “*Thibaudia nutans* Kl. (873 is type coll.),” although in his 1932 publication he did not include the final “B” in the collection number nor did he cite it as part of the type collection. It may, therefore, be argued that by his 1931 annotation label Smith considered the K specimen “567/873” to be part of the type collection, but by the time of the publication of his monograph in 1932 he understood the Schomburgk brothers numbering system and the significance of the final “B” and, therefore, did not cite it as part of the type collection. According to van Dam (2002:118), there is another specimen of “*Schomburgk* 567/873 B” at BM, but if so it cannot be located at this time (*vide* Jovita Yesilyurt pers. comm., Nov.

2018). [There is at BM (BM 13412976, BM image!) a single-numbered sheet of [Rob.] *Schomburgk 567* “Coll. 1842–1843” that was determined by Smith in 1931 simply as “*Thibaudia nutans* Kl.” without any further comments.]

Although Smith mentioned two other *E. Ule* collections of *Thibaudia nutans* amongst those he saw at B in 1931 (i.e., *Ule 8719* and *Ule br. 40*), he did not mention at all the (syntype) *E. Ule 8720*—for whatever reason he must not have seen the B syntype and it was subsequently destroyed during WWII. In any event, I do not know of any other duplicate herbarium specimens (i.e., syntypes) of *Rich. Schomburgk 873* or of *E. Ule 8720*. Therefore, I am herein designating as neotype of *T. nutans* the Macbride photo F neg. 4648 of the B holotype of *Rich. Schomburgk 873* that was lost during WWII. The formalities of its typification follow:

Thibaudia nutans (Klotzsch) Mansf., 438. 1925, non “*Thibaudia nutans*” Klotzsch (1848) *nom. nud.*, non *Ceratostema nutans* (Klotzsch) Niedenzu (1890) *nom. nud.*, non *Ceratostema nutans* (Klotzsch) Niedenzu (in Hoerold 1909a based on Niedenzu’s invalid combination). SYNTYPES: “Brit. Guiana: Roraima, zwischen Sandsteinfelsen, 1600 Fuß (R. SCHOMBURGK n. 873!—anno 1842)” and “Venezuela: Rio Cuquenán, Strauch in der Restinga bei Schaweila Mota, Blüten purpurn (E. ULE n. 8720!—fl. Februar 1910)” (both syntypes at B destroyed during WWII). LECTOTYPE: “Mount Roraima, British Guiana, altitude 1,600 meters. Type collected by Schomburgk (no. 873): B, designated by Smith (1932:400), destroyed during WWII. NEOTYPE, here designated: the photo of the B type of *Rich. Schomburgk 873* that was destroyed during WWII but is represented by F neg. 4648 (=FOBN004648, image!).

Psammisia leucostoma Benth. ex Meisn., Martius. Fl. bras. 7:127. 1863. “*Thibaudia* (*Psammisia*) *leucostoma*” Benth. in Spruce Pl. exsicc. n. 2465 *nom. nud.* *Chupalon leucostomum* (Benth. ex Meisn.) Kuntze, Revis. gen. pl. 2:384. 1891, **syn. nov.** TYPE: BRAZIL. AMAZONAS: Caatingas nr. Panuré, along Rio Vaupes, Oct 1852 (fl), *Spruce 2465* [LECTOTYPE, first-step designated by Smith (1932:400) and second-step here designated: K-Herbarium Benthamianum 1854 (K 370393, K image!); ISOLECTOTYPES: BM (BM 582203, image!), BR (BR 6997472 n.v., image!), CGE, E (E 326978, image!), F frags. (F 77267, image!), G (G 352120, image!) G (G 352121, image!), G (F neg. 26653, specimen n.v.), GH (GH 15242, image!), GOET (GOET 4111, image!), K-Herbarium Hookerianum 1867 (K 370394, K image!), NY (NY 10311, image!), OXF, P (P 647704 and P 647705, images!).

The first formal placement of *Psammisia leucostoma* was made by Meisner (1863:127) in *Fl. brasil.*, where it was based on “*Thibaudia* (*Psammisia*) *leucostoma* Benth. in Spruce Pl. exsicc. n. 2465,” that name being a *nomen nudum*. Meisner validly published the name therein citing the type as *Spruce 2465*, but he did not cite a herbarium of deposit. In 1931 Smith annotated the sheet of *Spruce 2465* in the K-Herb. Benth. as “*Psammisia guyanensis* Kl. (type coll. of *P. leucostoma* Benth. **Type**)” (i.e., “holotype” *fide* Smith’s way of citing types?). In 1932 Smith annotated the sheet of *Spruce 2465* in the K-Herb. Hook. as “*Psammisia guyanensis* Kl. (type of *P. leucostoma* Benth. coll.)” (i.e., “isotype” *fide* Smith’s way of citing types?). It was not until his publication in 1932 (Smith 1932:400) that he effectively lectotypified the species with the distribution statement “Brazil. Amazonas: Panuré, Rio Uaupes, *Spruce 2465* (G, K, type of *P. leucostoma*, Y),” although in that statement he did not specifically designate which sheet at K was his holotype. In 2007 I personally annotated both sheets at K—the Herb. Benth. sheet as “HOLOTYPE OF *Psammisia leucostoma* Bentham =*Psammisia coarctata* (R. & P. ex G.Don) A.C.Sm.” and the K-Herb. Hook. sheet similarly but as “ISOTYPE.” I am herein making a second-step lectotypification of *P. leucostoma* by designating the very complete sheet K-Herb. Benth. (K 370393) as lectotype in order to maintain Smith’s type annotation of 1931 and thus nomenclatural stability.

Psammisia ulei Hoerold, Verh. Bot. Ver. Brand. 50:92. 1909, **syn. nov.** TYPE: PERU. LORETO: Cerro de Escalero, 1200 m, Nov 1902 (fl), *E. Ule 6340* [HOLOTYPE: B, destroyed during WWII; NEOTYPE, here designated: the photo of the B holotype represented by F neg. 4702 (=FOBN004702, image!).

In the protologue of *Psammisia ulei*, Hoerold (1909b:92) cited “(E. Ule n. 6340—Herb. Berol.)” as the only specimen for his new species. The photo F neg. 4702 of the holotype at B shows a sheet slightly cropped at the top with Hoerold’s annotation label of “III. 08.” stating “*Psammisia Ulei* Hörold n. sp.” Thus I would say that Hoerold was specific enough for me to cite the specimen at B as the holotype. The NY photo ACS neg. 155 shows the addition of two flowers presumably from the packet—one a bud and one a mature corolla—and Smith’s 1931 annotation label stating “*Psammisia guyanensis* Kl. (type of *P. Ulei* Hoer.)” The B specimen was destroyed during WWII and there are no known duplicates. Therefore, the Macbride photo F neg. 4702 of *P. ulei* is herein designated as the neotype.

Psammisia engleriana Hoerold, Bot. Jahrb. Syst. 42:304. 1909. TYPE: PERU. HUÁNUCO: Huamalies, S of Monzón, 1600–1900 m, Aug 1903

(fl), *Weberbauer 3510* [HOLOTYPE: B, destroyed during WWII, but represented in photo by F neg. 4687 (=F0BN004687, image!); LECTOTYPE, designated by Luteyn et al. (2008a), MOL (MOL 3590); ISOLECTOTYPES: F frags. ex B holotype (F 77264, image!), NY frags. ex B holotype (NY 842475, image!).]

In the protologue of *Psammisia engleriana*, Hoerold (1909a:304) cited “(Weberbauer n. 3510.—Herb. Berol.)” as the only specimen for his new species. The photo F neg. 4687 of the holotype at B also shows Hoerold’s annotation label of “III. 08.” stating “*Psammisia Engleriana* Hörold n. sp.” Thus I would say that Hoerold was specific enough for me to cite that specimen at B as the holotype. The NY photo ACS neg. 144 of *Weberbauer 3510* (B) shows the addition of Smith’s 1931 annotation label stating “*Psammisia coarctata* (R.&P.) A.C.Sm. (type of *P. engleriana* Hoer.)” The B specimen was destroyed during WWII; fortunately there are syntypes—a duplicate specimen and fragments as noted above. I (Luteyn et al. 2008a) designated the full duplicate sheet found at MOL as the lectotype and the F and NY fragments (both from the B holotype) as isolectotypes.

Psammisia urbaniana Hoerold, Bot. Jahrb. Syst. 42:307. 1909. TYPE: PERU. PUNO: below Tambo Cachichachi, on road from Sandia towards Chunchumayo, 1800 m, Jun 1902 (fl), *Weberbauer 1159* [HOLOTYPE: B, destroyed during WWII, but represented in photo by F neg. 4704 (=F0BN004704, image!); LECTOTYPE, designated by Luteyn et al. (2008a): NY frags. ex B holotype (NY 842476, image!).]

In the protologue of *Psammisia urbaniana*, Hoerold (1909a:307) cited “(Weberbauer n. 1159.—Herb. Berol.)” as the only specimen for his new species; no other duplicates nor herbaria were cited and I did not find a duplicate at MOL. The photo F neg. 4704 of the holotype at B shows a herbarium sheet cropped at the top and bottom (there deleting most of Hoerold’s annotation label), a full flowering specimen with one mature fruit, and Hoerold’s annotation label of “III. 08.” stating “*Psammisia Urbaniana* Hörold n. sp.” Thus I would say that Hoerold was specific enough for me to cite that specimen at B as the holotype. The NY photo ACS neg. 156 of *Weberbauer 1159* (B) shows the entire B sheet including Hoerold’s annotation label with the addition of Smith’s 1931 annotation label stating “*Psammisia coarctata* (R. & P.) A.C.Sm. (type of *P. urbaniana* Hoer.)” Smith’s photo also shows that the one mature fruit shown on the Macbride photo F neg. 4704 has been lost or may be in the packet. The B specimen was destroyed during WWII; therefore, I (Luteyn et al. 2008a) designated the NY fragments from the B holotype as the lectotype.

Psammisia weberbaueri Hoerold, Bot. Jahrb. Syst. 42:307. 1909. TYPE: PERU. JUNÍN: Tarma, 1800 m, Jan 1903 (fl), *Weberbauer 2151* [HOLOTYPE: B, destroyed during WWII, but represented in photo by F neg. 4705 (=F0BN004705, image!); LECTOTYPE, designated by Luteyn et al. (2008a): MOL (MOL 3591); ISOLECTOTYPES: MOL (MOL 3592), NY frags. ex B holotype (NY 842477, image!).]

In the protologue of *Psammisia weberbaueri*, Hoerold (1909a:307) cited “(Weberbauer n. 2151.—Herb. Berol.)” as the only specimen for his new species. The photo F neg. 4705 of the holotype at B shows a cropped sheet at the top deleting the upper half of Hoerold’s annotation label and bottom deleting the lower half of Weberbauer’s printed label, and Hoerold’s annotation label of “III. 08.” stating “*Psammisia Weberbaueri* Hörold n. sp.” Thus I would say that Hoerold was specific enough for me to cite that specimen at B as the holotype. The NY photo ACS neg. 157 of *Weberbauer 2151* (B) shows the entire B herbarium sheet including complete labels with the addition of Smith’s 1931 annotation label stating “*Psammisia coarctata* (R. & P.) A.C.Sm. (type of *P. weberbaueri* Hoer.)” The B specimen was destroyed during WWII; fortunately there are syntypes—two duplicate sheets at MOL and fragments as noted above. I (Luteyn et al. 2008a) designated the full (i.e., best) duplicate sheet found at MOL as the lectotype and the other MOL duplicate along with the NY fragments as isolectotypes.

Psammisia elegans Rusby, Descr. S. Amer. Pl. 78. 1920. **syn. nov.** TYPE: COLOMBIA. MAGDALENA: Santa Marta Mountains, Las Nubes, ca. 1400 m, 2 Dec 1898 (fl), *H.H. Smith 1554* [LECTOTYPE, first-step designated by Rusby (1920:78) and second-step designated by Smith (1932:397): NY (NY 10307, image!; photo, NY neg. 9753); ISOLECTOTYPES: CM (CM 1652, image!; photo, NY neg. 10889), F (F 77263, image!), G (G 352118, image! and G 352119 seen only as digital image!), GH (GH 15234, image!), K (K 370395, K image!), MICH (MICH 1210211, image!), MO (MO 38353, image!), MPU (MPU 22728, seen only as digital image!), P (P 647702, image!), PH (PH 15084, image!), US (US 113511, image!).]

In the protologue of *Psammisia elegans*, Rusby failed to cite any herbarium or collection duplicates, although he most likely saw all of the duplicate sheets (syntypes) of the H.H. Smith collection as that collection went to NY where Rusby studied. Smith (1932:397) cited specifically “H. H. Smith 1554 (F, N.Y, type),” which was his way of saying the “holotype” was deposited at NY (“Y” was the acronym used by Smith at that time)—he therein

effectively lectotypified the name based upon the NY sheet.

Psammisia roseiflora Sleumer, Feddes repert. spec. nov. regni veg. 45:17. 1938, **syn. nov.** TYPE: Ecuador. PASTAZA: Pacayacu, 200 m, 30 Jul 1937 (fl), *Schultz-Rhnhof* 2428 (HOLOTYPE: B, destroyed during WWII). NEOTYPE, designated by Luteyn 1996, NY (NY 10317, image!): Ecuador. Napo: Estación Biológica Jatun Sacha, along Río Napo, 8 km E of Misahuallí, 450 m, 22–24 Feb 1988 (fl), *Palacios* 2438; ISONEOTYPES: MO, QCNE (QCNE 30241, image!).

The holotype of *Psammisia roseiflora* was destroyed during WWII and to my knowledge there are no other duplicate collections nor photos of *Schultz-Rhnhof* 2428; therefore, I (Luteyn 1996) designated a neotype.

Psammisia flexicaulis Sleumer, Feddes repert. spec. nov. regni veg. 45:17. 1938, **syn. nov.** TYPE: Ecuador. PASTAZA: Canelos, 350 m, 16 Feb 1937 (fl), *Schultz-Rhnhof* 2217 (HOLOTYPE: B, destroyed during WWII).

The holotype of *Psammisia flexicaulis* was destroyed during WWII and to my knowledge there are no other duplicate collections nor photos of *Schultz-Rhnhof* 2217. According to the *Code* (Art. 9.16, Turland et al. 2018) a “neotype may [emphasis mine] be selected to preserve the usage established by the previous typification,” but I do not see the need to designate a neotype in this case following the implied intention of Recommendation 9B since the protologue is rather broad in its circumscription and the morphological variation that characterized Sleumer’s *P. flexicaulis* is minimal to non-existent in my opinion.

Psammisia coarctata is part of a species “complex” that ranges from Guyana and adjacent Brazil in north-eastern South America, then westwards in an arc along the Coastal Cordillera of Venezuela into the Andes of Mérida, southwestwards into Colombia and then south along the eastern slopes of the Andes into northern Bolivia. The species has a very broad elevation range, 200–2300 m, which also contributes to the morphological variation attributed to the many names herein synonymized, although that morphological variation is minimal in my opinion as noted below—*Psammisia leucostoma* and *P. ulei* were distinguished from *P. guianensis* by more slender or robust habit and narrower/wider leaves according to Smith (1932) and were subsequently synonymized by him; Hoerold’s names *P. engleriana*, *P. urbaniana*, and *P. weberbaueri* were distinguished from *P. coarctata* by “very minor points” according to Smith (1932) with which I also agree; *P. elegans* was based on only one collection known to Smith, it was related to *P. recurvata* Britton (1921) according to Smith, but “from which it differs markedly by the thinner leaves, which are more rounded at the base, and by the distinct filaments. The calyx lobes are commonly reduced in number” (Smith 1932:397). None of these characters (or combinations thereof) are unique nor characteristic to *P. elegans*, but are also commonly found in *P. coarctata* under which I am herewith synonymizing all of this species. Finally, with regards to Sleumer’s (1938) names *P. roseiflora* and *P. flexicaulis*, their differences are also a matter of more slender habit and/or minor variations in size and length of calyces and rachises, but which fall well within an overall variable *P. coarctata*. It is interesting to note that Smith (1932:400) recognized that “This species [*P. guianensis*] has a very wide and unusual distribution for a member of the tribe, but it is observable in many cases that species inhabiting the eastern slopes of the Andes have a far wider distribution than those of the western ranges. In the latter case the mountains are sharply dissected, and often a narrow valley is sufficiently deep to prohibit the spread of a species. On the other hand, the mountains of the eastern Andes are less rugged, and the streams are larger and interconnected by virtue of the Amazon. Possibly this geographic fact accounts for the wide distribution of such species as the present one and *Satyria panurensis*, whereas the species of northwestern Colombia, for example, where the mountains are sharply dissected, are greatly restricted in range.” I wholly agree with this observation of a broader distributional range for species of *Vaccinieae* that occur on the eastern slopes of the Andes—exemplified especially by *P. guianensis* and *S. panurensis* (Benth. ex Meisn.) Benth. & Hook.f.—and I also described this distribution in Maguire et al. (1978).

The oldest name for the plants in the Peru-Bolivia region of this extensive range is *Psammisia coarctata* (1834) with its type from Peru. Plants from the northern and western Venezuela and Colombia part of this range that I have also studied (but not in great detail; see below) may ultimately also belong to this complex—they are currently recognized under the species names *P. macrophylla* (Kunth) Klotzsch, *P. lanceolata* Hoerold, *P. falcata* (Kunth) Klotzsch, *P. salmonea* Sleumer, *P. cuatreacasii* A.C.Sm., and *P. longicaulis* A.C.Sm. If that northern group holds as another *Psammisia* species “complex,” then the oldest name for that group is *P.*

macrophylla (1819) with its type from Colombia. The synonyms listed above for *Psammisia coarctata* represent my concept of that species at this time. It must be noted, however, that the oldest name with priority for this extremely complicated and geographically broadly distributed group that includes *P. coarctata* (1834) with its relatives in the more southern part of the range and *P. macrophylla* (1819) with its relatives in the more northern part of the range, if they are combined, would become *P. macrophylla*. Despite the fact that *P. cyathifera* (= *P. falcata* 1819) was designated as the type (i.e., lectotype) of the genus *Psammisia* by Smith (1932:384), I would still select *P. macrophylla* over *P. falcata* as the oldest name with priority for this species complex (even though these two species were published by Kunth at the same time) mainly because there are very few collections from a restricted area of Colombia which have the “falcate” leaves—the only distinctive character given for *P. falcata*, but rather doubtful to me, whereas there is an abundance of collections from a broad range with similar large leaves; therefore to me “macrophylla” is more appropriate if a name eventually needs to be chosen. Herbarium specimens of *P. coarctata* from Peru and Bolivia are well represented. A further morphological relationship with *P. urichiana* is also likely (but see below).

Psammisia costeroides (Sleumer) Luteyn, **comb. nov.** *Macleania costeroides* Sleumer, Bot. Jahrb. Syst. 71:401. 1941. TYPE: ECUADOR. NAPO: Canelos, ca. 350 m, 19 Jan 1937 (fl), *Schultze-Rhnhof 2126* (HOLOTYPE: B, destroyed).

As implied in my treatment of Ericaceae for *Flora of Ecuador* (*Fl. Ecuador*, Luteyn 1996), however, and also based on a recent re-evaluation of the protologue, I now feel strongly that *Macleania costeroides* Sleumer is a globose-flowered *Psammisia*. This was already hinted at by Sleumer (1941:402) when he basically said that the corolla type of his new *M. costeroides* was already known in *Psammisia*! Comparison of the two protologues shows the species descriptions to be quite similar, but some details are lacking. The protologue of *M. costeroides* even notes that its corolla is yellowish (“lutescens” *fide* label), an extremely rare color in neotropical Vaccinieae and, by coincidence, nearly the same corolla color as stated in the protologue of *P. amazonica* (i.e., “anaranjado,” and “amarilla” *fide* labels). When placed in *Psammisia*, *M. costeroides* is almost certainly related to *P. amazonica*. I am refraining from combining the two species, however, because after closer examination of more herbarium material that has accumulated since I described *P. amazonica* in 1987, I feel that there may be a complex of species in this alliance and not just *P. amazonica* and *M. costeroides*. Sleumer’s protologue says “Unicum” and I know of no duplicates or photos of the type. Despite the fact that there is no extant type, no type photographs, nor any other collections in the past 70+ years with the determination of *M. costeroides*, **but** because I now feel strongly that it is certainly better placed in *Psammisia* (albeit still as a species of uncertain status), I am going to make the new combination in *Psammisia* to at least place this species in its proper context. I am well aware that some may find the arguments for this new combination to be weak, especially in view of the fact that the two genera are (seemingly) arbitrarily delimited. I do believe, however, when trying to identify plant collections in this complex of related species based on the currently available keys and herbarium collections that it is almost certain that the concept of *Psammisia* needs to be employed. An inexperienced person (i.e., with regard to Vaccinieae) will be misled if searching for an identity in the generic concept of *Macleania* and then a species determination will not be found; whereas, if a determination is sought within the concept of *Psammisia*, then a satisfying end will be found and the species relationships will be realized.

Psammisia falcata (Kunth in H.B.K.) Klotzsch, Linnaea 24:44. 1851. *Thibaudia falcata* Kunth in H.B.K., Nov. gen. sp. 3:269. 1819. TYPE: COLOMBIA. NARIÑO: “Crescit in frigidis juxta urbem Amalguer,” 3200 m, Nov (fl), *Bonpland s.n.* [LECTOTYPE, first-step designated by Smith (1932:402) and second-step **here designated**: P-Bonpl. (P 670973, image!); ISOLECTOTYPE: P (P 135142, image!)].

Kunth (1819:269) described his new species *Thibaudia falcata* with Bonpland (s.n.) as its collector—the location of the type has long been assumed to be the sheet in the Humboldt and Bonpland herbarium (P-Bonpl.). In 1932 Smith mentioned the type locality of *Psammisia falcata* as “Amalguer, Colombia, altitude about 3,200 meters. Type collected by Humboldt and Bonpland.” He did not mention the location of any herbarium specimen. The sheet in the Humboldt and Bonpland herbarium (P-Bonpl.) (P 670973) that is annotated with the standard red TYPE label has attached in the lower right-hand corner a small, original label with an inked, handwritten “*Thibaudia falcata*” and a penciled number “3.” This sheet does not bear any annotation label of

Smith or Sleumer (presumably neither of them saw this specimen), but it does have my label from 1978 stating “*Thibaudia falcata* H.B.K. =*Psammisia falcata* (H.B.K.) Klotzsch.” The information given on Global Plants for that specimen lists it as “Holotype” and says that the sheet was “Verified by Kunth, K.S.” The handwriting on the original label does appear to match that of Kunth when compared to those given in Burdet (1979), and in a manner similar to Kunth’s replacement labels as noted by and figured in (Fig. 9C–F) Stauffer et al. (2012). The syntype sheet in the P general herbarium (P 135142) has the label with printed Herb. MUS. PARIS at the top and “Herbier de l’Amérique équatoriale, donné par M. A. BONPLAND.” at the bottom (i.e., a sheet from Bonpland’s own personal herbarium). It also bears two different handwritten determinations “*Thibaudia falcata* H.B.K.” on the top line and below that “*Psammisia falcata* Klotzsch.” In 1931 Smith annotated that sheet as “*Psammisia falcata* (HBK.) Kl.” without any mention of it representing a type. Then in 1959 Sleumer annotated the same sheet as an “ISOTYPE.” In 1978 I annotated the sheet as “ISOTYPE: (?)” and it does appear to me to be a duplicate of the holotype in P-Bonpl.

I am quite certain that the two sheets of *Psammisia falcata* mentioned above in P-Bonpl. and P are original material and should be considered syntypes, but I have not had the opportunity to annotate them as such. In any event, I herein designate as a second-step lectotype (as per ICN, Art. 9.17 Ex. 12) the sheet in P-Bonpl. (P 670973, image!), which is a specimen from the original material in the Humboldt and Bonpland herbarium. That sheet was never annotated as a type by anyone, while the duplicate (or syntype) sheet in the general herbarium (P) has Sleumer’s annotation “Isotype” from 1959 (even though he did not designate the sheet in the P-Bonpl. as “holotype”; nor did Smith). Thus, I am the first to state unequivocally that the sheet in P-Bonpl. (P 670973) is the holotype (herein a second-step lectotype).

Psammisia cyathifera (Benth.) Klotzsch, *Linnaea* 24:43. 1851. *Thibaudia cyathifera* Benth., *Pl. hartw.* 222. 1846. TYPE: COLOMBIA. CUNDINAMARCA: “In montibus prope Tena, prov. Bogota cl. Hartweg,” s.d., *Hartweg 1216** [LECTOTYPE, here designated: K-Herbarium Benthamianum 1854 (K 370390, K image!; photo, NY neg. 13022); ISOLECTOTYPE: BREM (photo NY neg. 9461; the original herbarium specimen at BREM is apparently lost)].

In Bentham’s *Plantae hartwegianae* (1846:222) he published [*Hartweg*]“1216. THIBAUDIA *macrophylla*, Humb. et Kunth.—Dun. in DC. *Prod.* 7. p. 562.—Frutex 8–10. pedalis, juxta flumina Palace et Rio Blanco, prov. Popayan.” That collection citation (i.e., *Hartweg 1216*) was immediately followed on the next lines (pp. 222–223) with the collection citation “* THIBAUDIA *cyathifera*, sp. n.” (i.e., the commonly cited *Hartweg 1216**), giving the type locality as “In montibus prope Tena, prov. Bogota,” and with the discussion “Affinis *T. macrophyllae* et cum illa sectionem v. forte genus proprium efformat, ...”—no herbarium of deposit was mentioned for either of these collections, although it has always been assumed that Theodor Hartweg’s specimens were sent to George Bentham at Kew for identification and thus his types are there. Later Klotzsch (1851:43) transferred *T. cyathifera* to the genus *Psammisia* citing “1. *P. cyathifera* Klotzsch. (*Thibaudia cyathifera* Benth. *Plantae Hartweg.* p.222.) In montibus prope Tena, prov. Bogota cl. Hartweg”—again no specific collection number nor herbarium of deposit was given. In the intervening years no other authors have discussed this species except to refer back to Bentham (1846) or Klotzsch (1851). In 1932 Smith only mentioned *T. cyathifera* in two places in his monograph—the first instance on p. 384 when he effectively lectotypified the genus *Psammisia* (as noted above) and then again on p. 401 where he cited both “*Thibaudia cyathifera* Benth. *Pl. Hartw.* 222. 1846” and “*Psammisia cyathifera* Klotzsch, *Linnaea* 24:43. 1851” as synonyms of *P. falcata*. He made no further comments at all about *T. cyathifera*, not even giving the type locality, collection number, nor herbarium where a specimen was deposited as was his usual custom. Thus although Smith lectotypified the genus *Psammisia* based on *T. cyathifera* Benth., no one has as yet actually lectotypified the species *T. cyathifera* Benth.!

There is a single herbarium sheet of *Hartweg 1216* (**without** asterisk) at BM (BM 28436, BM image!) without a label, but which has on the upper edge of its back surface the inked handwritten annotation “Columbia, in Prov. Popayan _ Hartweg, No. 1216.” On the front of the sheet in the lower right-hand corner are the penciled handwritten annotations “Hartweg 1216” and “*Psammisia macrophylla*, Kl. in Linn. xxiv. 45.” and below that “*Thibaudia macrophylla* Kth. _ Benth. *Pl. Hartw.*, p. 222.” That BM sheet also bears a 1931 annotation label of Smith that states “*Psammisia falcata* (HBK.) Kl.” and at its bottom my own annotation label “!Luteyn 1994”

agreeing with Smith's determination. Above Smith's label is another Luteyn annotation label from 2006 that reads "[Hartweg 1216]" and "*Psammisia macrophylla* (Kunth in H.B.K.) Klotzsch."

There are three herbarium sheets of *Hartweg 1216* (all **without** asterisk) at K—all three were originally identified on their labels or directly on the sheet itself as "*Psammisia macrophylla*." Two of those three K sheets include the inked annotation of "Benth. Pl. Hartw. 222" and all three were annotated as "*Psammisia macrophylla* (HBK.) Kl." by Smith in 1931 and again by Luteyn in 2006. One of those sheets (K 370389) has its locality given as "Popayan"; a second sheet (K 379392) has its locality as "Columbia"; and the third sheet (K 370391) the locality as "Near the rivers, Rio Blanco & Palace, Prov. of Popayan." A fourth sheet (K 370390) is without any collection number at all, but it does bear on the sheet itself the inked handwritten determinations of "*Thibaudia cyathifera* Benth M. Hartw. 222" and immediately below that in the same inked hand "*Psammisia cyathifera* Kl Linnaea 24. 43." The handwriting appears to be Bentham's when compared to that given in Steinberg (1977:12). That same K sheet also bears an attached penciled handwritten label (seemingly not in Bentham's hand) that reads "*Thibaudia*, a shrub 8–12 ft. high. Mountains of Tena in the province of Bogota"—almost the exact information as given in Bentham's protologue for *Hartweg 1216**. It is the only herbarium sheet that I know of that has the specific epithet *Thibaudia cyathifera* Benth. or *Psammisia cyathifera* Kl. written on it **and** it comes from Bentham's own herbarium. In 1931 Smith annotated that K-Herb. Benth. sheet (K 370390) as "*Psammisia falcata* (HBK.) Kl. (Type of *Ps. cyathifera* (Benth.) Kl.)" In his monograph Smith (1932:399) cited his determinations of the collection "*Hartweg 1216* (B, K, Y)" as *P. macrophylla* and gave as its locality "Popayán and vicinity." He did not mention anywhere else in his monograph the collection *Hartweg 1216** (**with** asterisk). Again, although that K sheet (K 370390) is without a visible collection number, Smith did annotate it as "*Psammisia falcata* (HBK.) Kl. (Type of *Ps. cyathifera* (Benth.) Kl.)" in 1931. Later in 1995 and again in 2007, I annotated that same K sheet following Smith's 1931 lead as "HOLOTYPE of *Thibaudia cyathifera* Benth. =*Psammisia cyathifera* (Benth.) Klotzsch, =*Psammisia falcata* (H.B.K.) Klotzsch, =*Psammisia macrophylla* (Kunth) Klotzsch." There are no other annotations on that K sheet, which Smith and I have both assumed to be the *Hartweg 1216** collection sent to Bentham at Kew and described by him as *T. cyathifera* Benth.

There is a herbarium sheet of *Hartweg 1216** at BREM (NY neg. 9461 at NY), which **does** show the asterisk. Its official institutional label is printed at the top as Herb. Mus. Brem. Pl. Hartwegianae No. ___" (with a space for the collection number) and at the bottom "Aus dem Nachlasse von Theodor Hartweg angekauft von naturwiss. Vereine; August 1871." The label itself (in an unknown inked handwriting) states "In montibus prope Tena, prov. Bogota" and "*Thibaudia cyathifera* Benth." and below that "*Psammisia* Kl." There is a second smaller handwritten label above the institutional printed label, in a different inked unknown hand that states "*Thibaudia* a shrub 8–12 ft. Mountains of Tena"—nearly the exact same information and in the same unknown hand as on the penciled label of the K unnumbered sheet mentioned above, although the BREM label is in ink not pencil. In 1977 I annotated the BREM sheet as "ISOTYPE OF: *Thibaudia cyathifera* Bentham =*Psammisia falcata* (H.B.K.) Klotzsch." There are no other annotations on the BREM sheet. Unfortunately, it now seems that the BREM herbarium sheet of *P. cyathifera* (*Hartweg 1216**), the only known specimen with the asterisk number, has been lost in the mail or simply cannot be located *fide* M. Grein (pers. comm., June 2018), although it is represented in photo by NY neg. 9461.

Why Smith designated the unnumbered K sheet of *Thibaudia cyathifera* as the type of the genus is uncertain, although it seems that it was the only sheet he saw and cited bearing that name. I have seen only one sheet of *Hartweg 1216** bearing the asterisk—the sheet at BREM—since the sheet at K has no asterisk. In 1995 and again in 2007, I annotated the K sheet as "HOLOTYPE" of *T. cyathifera* Benth following Smith's lead. Therefore, I am herein lectotypifying for the first time *T. cyathifera* on the basis of K-Herb. Benth. (K 370390), because the specimen of *Hartweg 1216** at BREM cannot be located at this time and I prefer to lectotypify with an actual herbarium specimen over against a photo of a herbarium specimen. [If, however, the BREM sheet can be located, the lectotypification herein cited should be overturned, in my opinion, in favor of the BREM sheet].

Psammisia falcata is endemic to Colombia and known from only a few collections. It is part of the *P. macrophylla* "complex" that is in much need of study (see below).

Psammisia fissilis A.C.Sm., Contr. U.S. Natl. Herb. 29:372. 1950. TYPE: ECUADOR. LOJA: between Tambo, Cachiyacu, La Entrada, and Nudo de Sabanillas, 2500–3500 m, 7 Oct 1943 (fl), *Steyermark 54408* [HOLOTYPE: F (F 55489F, image!; photos, F neg. 52544 and NY neg. 9617); ISOTYPES: A (A 15238, image!), US frag. (US 113512, US image!)]. **Fig. 2A–B.**

Psammisia fissilis is fairly common in southern Ecuador in premontane to montane wet forest at 1600–3500 m altitude. It is only known from two collections in northern Peru (Amazonas: Chachapoyas-Mendoza rd., *vander Werff et al. 15060*, NY, and San Martín: Almirante, Rioja, Aug 1938 (fl), *Sandeman s.n.*, K); it is unknown from Bolivia. Steyermark noted that in the type the calyx was vermilion-red with whitish lobes and the corolla vermilion-red in the lower two-thirds and rose-colored or white distally. From its only close ally, the Peruvian *P. coarctata*, *P. fissilis* differs principally in its large calyx hypanthium, which splits irregularly and deeply into 3–4 lobes these themselves sometimes bifid (see Fig. 2A), a character also found in Colombian *P. macrocalyx*, but that species differs obviously in foliage, position of pedicellary bracteoles, its deeply lobed corolla, etc.

Psammisia globosa A.C.Sm., Contr. U.S. Natl. Herb. 28:388, pl. 9. 1932. TYPE: PERU: 1835, *Mathews 2077p.p.* [HOLOTYPE: K-Herbarium Hookerianum 1867 (K 806959, image!; photo, ACS neg. 106); ISOTYPES: K-Herbarium Hookerianum 1867 (K 806960, image!), NY frags. ex K holotype (NY 888314, image!), OXF (photo, NY neg. 12613)].

The protologue of *Psammisia globosa* was based on two herbarium sheets at K—the holotype (K 806959) and an isotype (K 806960). In 1931 Smith annotated the holotype sheet as “*Psammisia globosa* A.C. Sm. TYPE”; I annotated the same K sheet as “HOLOTYPE” in 2007. In the protologue, Smith described the corollas as 3–4 mm long, although all of the flowers of the K holotype sheet (with one flower attached to a stem and numerous others loose in the packet) are in bud only! The K isotype sheet shows no flowers at all (a few naked pedicels remain on the stem), but it was annotated by Smith in 1931 as “*Psammisia globosa* A.C.Sm. (doubtless part of *Mathews 2077*, TYPE COLL.)” with which I concur, so I annotated the same K sheet as “ISOTYPE” in 2007.

The OXF isotype of *Psammisia globosa*, which Smith did not see, is a mixed collection showing leaves with pinnate venation and small, globose corolla buds that are attached to stems similar to those on the K syntype sheets—this is the *P. globosa* element. The other elements consist of mature corollas ca. 20–25 mm long that are separate from stem and leaves (i.e., not attached)—these long-corollas match corollas of *P. coarctata*. That same OXF sheet bears an original label in “W.J. Hooker’s writing” that states “2077 I have a notion this is *Cavendishia* of Lindl. in Bot. Mag. near *Ceratostema* & *Thibaudia*—& ____ ____ in Ruiz & Pavon.” [I cannot make out the two missing words, but obviously Hooker was also confused by the mixture of elements!] Interestingly, *Mathews 2078*, the next number in Mathews’ collecting sequence is the type number for *Cavendishia nobilis* Lindl. (lectotype, CGE) and it, too, is a mixed collection of both *C. nobilis* and *P. coarctata* elements (see Luteyn 1983 and in the detailed discussion below). So it is not unreasonable to think that the OXF isotype sheet of *P. globosa* (*Mathews 2077*) has the same long-corolla *P. coarctata* elements as does the *Mathews 2078* collection mentioned above.

Psammisia globosa apparently ranges from northern to central Peru at 1340–1700 m based on the type plus the four collections mentioned below; it is unknown from Bolivia. The only other herbarium sheets identified as *P. globosa* are *Killip & Smith 24868* (NY, US) and *Macbride 5754* (F, NY), both from Peru: Prov. Junin (Hda. Schunke, 1400–1700 m) and two collections of *B. Wallnöfer 12-030188* and *15-14988* (Peru: Prov. Huánuco: Sira mountains, 1340–1400 m, both NY). These four collections all have leaves that are elongate-lanceolate, pinnate, and symmetrical at the base similar to the type of *P. globosa*, but, unfortunately, none have mature corollas, although all buds have the general appearance of those species of *Psammisia* with “globose” mature corollas. Smith (1941:441) compared his new *P. panamensis* to *P. globosa*, stating “the two being essentially identical in foliage.” He contrasted *P. panamensis*, however, by characterizing it with “a substantially larger calyx with conspicuous lobes, a larger and conical (rather than subglobose) corolla, and obviously larger stamens with less conspicuous and essentially unspurred connectives.” The leaves of *P. globosa* do appear virtually identical to those of *P. panamensis*, currently known only in Panama from Prov. Veraguas to the Prov. Darién near the Colombian border. However, also seemingly in this alliance based on foliar characters are *P. sclerantha* A.C.Sm. (1952) endemic to Ecuador-N Peru border area and *P. sophiae* Pedraza (Pedraza-Peñalosa



FIG. 2. Species of *Psammisia* in Bolivia and Peru. **A**, *P. fissilis*, inflorescence with flowers showing irregularly fused calyx lobes and short corolla throat. **B**, *P. fissilis*, inflorescence with mature fruits (green in color) each with calyx limb and lobes of a distinctly lighter color (pale green to whitish green) and forming an erect corona on top of the ovary. **C**, *P. ulbrichiana*, inflorescence with flowers showing elongate throat. **D**, *P. ulbrichiana*, inflorescence with mature fruits (green in color but also speckled with brown) showing no corona just the exposed top of the ovary and tips of calyx lobes (Photos: James L. Luteyn).

2015b) endemic to Colombia. A relationship between *P. sophiae* and *P. panamensis* was also noted by Pedraza (2015b) based on molecular evidence. The Peru sheets of *P. sclerantha*—D.N. Smith 6787 from Junín, Satipo Prov., 1300 m (x2, NY image!) and C. Diaz *et al.* 8052 from Amazonas, Prov. Bagua 70–800 m (NY image!)—have somewhat broader leaves. *Psammisia globosa*, as well as the other species mentioned above, are obviously in great need of collection and study. Its current morphological relationships seem to be with those *Psammisia* species with “globose” corollas, which may be keyed and compared in Luteyn (1987). [Note: The collector of the NY isotype sheet of *P. globosa* given on “Global Plants” is incorrectly cited as A. Matthews 1335—a misspelling of the name and a mistake for the date 1835 not a collection number.]

From a historical perspective, the Mathews mixed-collection numbers 2077 and 2078 offer a somewhat

complicated story that I feel needs explanation. John Lindley (1836) described *Cavendishia nobilis* as the sole species in his new genus *Cavendishia* based on a Mathews collection from “Casapi” (locality *vide* K sheet) in northern Peru—he did not mention a collection number for the new species. In 1931 Smith (1932:508) effectively lectotypified “*Mathews 2078* in part (K, type)” based on a fully fertile sheet of *Cavendishia* in the K-Herb. Benth. (K 534831, image!; photo, NY neg. 10425), annotating that sheet as “*Cavendishia nobilis* Lindl. TYPE, also type of genus.” Also in 1931 Smith annotated a second (sterile) sheet of *Mathews 2078p.p.* in the K-Herb. Hook. (K 534832, image!) as “*Cavendishia nobilis* Lindl. TYPE?” In his 1932 monograph, Smith wrote of Lindley’s type description “The description of the flower by Lindley is that of a flower of *Psammisia coarctata*, which was collected by Mathews under the same number. As this is the type species of *Cavendishia*, the matter is of some importance. The specimen at Kew is without flowers [i.e., the second sheet Smith annotated in 1931] and it is a matter of doubt to me whether or not Lindley saw the flowers which belonged to the plant”—thus implying that Smith did not actually see (or remember) the fertile sheet he annotated in 1931 as the “*Cavendishia nobilis* Lindl. TYPE, also type of genus”—I cannot explain why he said this. However, unbeknown to and unseen by Smith in 1931, there was another herbarium sheet of *Mathews 2078* in the Lindley Herbarium at Cambridge (CGE)—a sheet that consisted of mixed plant elements from two different species of two different genera! I now know that the sheet at CGE was the original material used by Lindley in his protologue of *C. nobilis*, because not only is the CGE sheet a mixed collection of *Cavendishia* and *Psammisia* elements, but also because Lindley’s description itself contained portions referable to two different plant species, i.e., what are now recognized as *P. coarctata* as well as *C. nobilis*. This situation presented a problem in typification, which I resolved by designating as lectotype that *Cavendishia* portion of the mounted herbarium specimen at CGE along with that part of Lindley’s protologue referable to *C. nobilis* (detailed in Luteyn 1983). That decision also maintained the current as well as long-established usage *vide* Art. 9.11 and 9.14 of the ICN (Turland et al. 2018). The K sheet and the other duplicates of this number (all syntypes) become isolectotypes. Based on all the collections of *Mathews 2078* that are now available to me (see below), that collection number is seen to be a mixed collection consisting of elements from *P. coarctata* and *C. nobilis*. Obviously, this was one of the reasons for the historical confusion in the determinations of the Mathews’ collection numbers 2077 and 2078 in several herbaria, including the CGE sheet. That also made it more understandable why Lindley’s original description contained portions referable to what is now recognized as *P. coarctata* as well as his new *C. nobilis*. Most of that confusion arose and continued until recently (Luteyn 1983), because no monographer before me had seen the actual type in the Lindley Herbarium nor all of the duplicates distributed under *Mathews 2078* and 2077.

For thoroughness, all eight of the collections of *Mathews 2078p.p.* known to me are enumerated as follows:

- 1) the lectotype sheet of *Cavendishia nobilis* at CGE (NY 3354463, NY image! includes photo, NY neg. s.n.) showing a fertile twig of *C. nobilis* with a close-up pencil drawing of the flower and stamens from a *Psammisia* and annotated by Luteyn in 1975 as “Holotype of *Cavendishia nobilis* Lindley” (see Luteyn 1983, fig. 1A–B);
- 2) an isolectotype sheet of *C. nobilis* at K-Herb. Benth. (K 534831, image!; photo, NY neg. 10425) annotated by Smith in 1931 as “TYPE, also type of genus” (see Luteyn 1983, fig. 1C);
- 3) an isolectotype sheet of a sterile *C. nobilis* at K-Herb. Hook. (K 534832, image!; photo, ACS neg. 112) annotated by Smith in 1931 as “*Cavendishia nobilis* Lindl. TYPE?”;
- 4) an isolectotype sheet of *C. nobilis* at W (F neg. 31964, F image!) that is totally *C. nobilis* (see Luteyn 1983:fig. 1D);
- 5) an isolectotype sheet of *C. nobilis* at NY (NY 3354462, NY image!) consisting of fragments from the W isolectotype;
- 6) a sheet of *Mathews 2078p.p.* at K-Herb. Hook. consisting of all *P. coarctata* elements and which was determined as such by an unknown person based on a handwritten note attached to that sheet comparing the specimen to Ruiz and Pavón’s 1805: pl. 385 (photo NY neg. s.n., mounted at NY and given barcode NY 3354468, NY image!);
- 7) a sheet of *Mathews 2078p.p.* from E consisting of all *P. coarctata* elements and which was annotated as such by an unknown hand (photo NY s.n., mounted at NY and given barcode NY 3354469, NY image!); and

- 8) a sheet of *Mathews 2078p.p.* from OXF consisting of all *P. coarctata* elements, but annotated (incorrectly) by an unknown hand as *P. macrophylla*.

Psammisia graebneriana Hoerold, Bot. Jahrb. Syst. 42:304. 1909. TYPE: "ECUADOR: in silvis secus flumen Pilaton, 800–1000 m; in valle Nanegal (Sodiro n. 92/14 u. 92/3^b. blühend Sept. 1900—Herb. Berol.)." LECTOTYPE: "Rio Pilaton, Province of Pichincha, Ecuador, altitude 800 to 1,000 meters. Type collected by Sodiro (no. 92/14)," Sep (fl) 1900, designated by A.C. Smith (1932:389): B, destroyed during WWII, but represented in photo by ACS neg. 145 attached to NY neolecotype sheet, image!; neolecotype, designated by Luteyn (1996): NY frags. ex B lectotype (NY 11011, image!). SYNTYPES: Ecuador. Pichincha: in Nanegal valley, Rio Pilatón, 800–1000 m, Mar (fl) 1900, *Sodiro 92/3b* (B, destroyed but represented in photo by F neg. 4689 =F BN004689, image!), F frags. ex B syntype (Field Museum VTypes Project no. V0075463F, F image!; sheet incorrectly listed as *Sodiro 92/36* on F website). **Fig. 1C.**

In the protologue of *Psammisia graebneriana*, Hoerold (1909a:304) cited two Sodiro collections (i.e., syntypes) at B. Both syntypes had Hoerold annotation labels of "III. 08." attached to them, both stating "*Psammisia Graebneriana* Hörold n. sp." No other duplicates or herbaria were cited and none are known other than fragments from the syntypes found at F and NY. Smith (1932:389) lectotypified the species based on the *Sodiro 92/14* sheet. The NY photo ACS neg. 145 of the B lectotype shows the addition of Smith's 1931 annotation label stating "*Psammisia Graebneriana* Hoer. TYPE." The B specimens (i.e., syntypes) were both destroyed during WWII; therefore, a new lectotype (neolecotype) was designated by Luteyn (1996) based on the fragments from the B lectotype at NY (NY 11011).

Psammisia lehmannii Hoerold, Bot. Jahrb. Syst. 42:305. 1909, **syn. nov.** TYPE: COLOMBIA. "POPAYAN" [CAUCA]: Páramo de Guanacas, 2700–3000 m, Feb–Apr (fl), *Lehmann 4961* [HOLOTYPE: B, destroyed during WWII, but represented by photos F neg. 4694 (=F0BN004694F, image!) and ACS neg. 149; LECTOTYPE, **here designated**: F (=F0075464F, image! photo, F neg. 59540); ISOLECTOTYPES: G, GH (GH 15244, image!), K (K 534900, image!), NY frags. ex B holotype (NY 842474, image!).]

In the protologue of *Psammisia lehmannii*, Hoerold (1909a:305) cited "(Lehmann n. 4961—Herb. Berol.!) as the only specimen for his new species; no other duplicates were mentioned. The photo F neg. 4694 of the holotype at B shows Hoerold's annotation label of "III. 08." stating "*Psammisia Lehmannii* Hörold n. sp." Thus I would say that Hoerold was specific enough for me to cite that specimen at B as the holotype. The NY photo ACS neg. 149 of the *Lehmann 4961* sheet at B shows the addition of Smith's 1931 annotation label stating "*Psammisia Lehmannii* Hoer. TYPE." The B holotype was destroyed during WWII; therefore, the syntype at F is herein chosen as lectotype because it is a full sheet and bears a complete and detailed label exactly like that of the B holotype.

Psammisia graebneriana ranges from extreme western Venezuela (one collection) through Colombia where it is scattered to central Peru where it is known from only one collection in (Dpto. Huánuco: *M. Weigend et al. 5451*, NY image!); it is unknown from Bolivia. There is total overlap between *P. graebneriana* and its new synonym *P. lehmannii*—their leaves varying from narrow to broadly lanceolate and pinnate to plinerved, corollas varying from conical to conical/urceolate (see Fig. 1C), and racemes varying from short to long. [**Note:** The morphological characteristics of the *Weigend et al. 5451* collection—the only collection from Peru—have been used in the key below.]

Psammisia grandiflora Hoerold, Bot. Jahrb. Syst. 42:305. 1909. TYPE: "Columbien: Provinz Antioquia, [La Ceja], 2200 m; Triana n. 37. Febr. [fl] 1852—Herb. Berol.!) [HOLOTYPE: destroyed during WWII, but represented by photos F neg. 4690 (=F0BN004690, image!) and ACS neg. 146; **NEOTYPE, here designated**: Colombia. Antioquia: Urrao-Caicedo road, 14–18 km NE of Urrao, 7 Apr 1979 (fl), J.L. Luteyn & M. Lebrón-Luteyn 7249, NY (NY 2436706, NY image!); **ISOLECTOTYPES**: CAS, COL, HUA, MO (MO 1285873)].

In the protologue of *Psammisia grandiflora*, Hoerold (1909a:305) cited only the one collection of *Triana 37* at "(... Herb. Berol.!) for his new species; no other duplicates were mentioned. The photo F neg. 4690 of the holotype at B has been severely cropped and shows only the fertile upper portion of the specimen bearing three leaves and one large flower bud. Fortunately, the NY photo ACS neg. 146 of the same B holotype shows the entire specimen with a very lengthy sterile stem and including the addition of a mature flower with three stamen (from the packet) on the left-hand side of the sheet, Smith's ruler (for photographic purposes) on the right-hand side of the sheet, Hoerold's annotation label of "III. 08." stating "*Psammisia grandiflora* Hörold n.

sp.,” and Smith’s own 1931 annotation label stating “*Psammisia grandiflora* Hoer. TYPE” above Hoerold’s on the left-hand side of the sheet. In the lower left-hand corner the official printed Museum botanicum Berolinense label is seen. Thus I would say that Hoerold was specific enough in his statements for me to cite that specimen at B as the holotype. Unfortunately, the B specimen was destroyed during WWII and to my knowledge there are no other duplicate collections or photos in any other herbarium. Therefore, I am herein designating as neotype of *P. grandiflora* the Luteyn & Lebrón-Luteyn 7249 sheet at NY, which is basically a topotype and matches in its morphology the protologue and photo of the B holotype.

Psammisia grandiflora is endemic to the Cordillera Central in Colombia (departments of Antioquia, Caldas, Risaralda, Quindío, and Tolima) and is known from around 15 collections.

Psammisia hookeriana Klotzsch, *Linnaea* 24:46. 1851. *Thibaudia pichinchensis* Benth. var. *β glaber* Hook., *Bot. Mag.* 73, tab. 4344. [1Dec]1847. TYPE: COLOMBIA: Specimen grown at Syon, in Sep 1847, from seed collected by Purdie (s.n.) and sent to WJ. Hooker at Kew [HOLOTYPE: K-Herbarium Hookerianum 1876 (K 534905, image!; photo, NY neg. 10534); ISOTYPE: BM (BM 582256p.p., upper branch, image!)].

Klotzsch (1851:46) recognized Hooker’s (1847: sub tab. 4344) new variety *Thibaudia pichinchensis* var. *β glaber* as a mistaken identity, and therefore, renamed Hooker’s plant as *Psammisia hookeriana* in Hooker’s honor. Hooker (1860) subsequently also acknowledged his mistake in his discussion of *P. penduliflora* (see discussion below under *P. penduliflora*) and accepted *P. hookeriana* Klotzsch. Hooker (1847: sub tab. 4344) had stated in the protologue that “Our plant is raised from seeds sent from the elevated mountains of Columbia by our Collector, Mr. Purdie, and it flowered first in the Greenhouse at Syon, in September, 1847. It approaches, however, so closely to the specimens of *T. Pichinchensis* of Mr. Bentham, collected by Hartweg on the west side of Pichincha, and still more to the description of the latter author, that I am disposed to pronounce it a glabrous variety of that species.” The holotype is an actual plant specimen mounted in the lower left-hand side of the herbarium sheet at K (K 534905)—another example of *P. hookeriana* horticultural material, also collected by Purdie (s.n.), is mounted in the upper right-hand side of that same K sheet (but given barcode K 534906).

The isotype sheet of *Thibaudia pichinchensis* Benth. at BM (Hartweg 1217, BM 582256p.p.), which itself is a synonym of *T. floribunda* Kunth in H.B.K., has two separate twigs mounted on it—the lower twig was annotated by Smith in 1931 as “*Thibaudia floribunda* HBK. (type coll. of *Th. pichinchensis*).” At the same time Smith annotated the upper twig as “*Psammisia hookeriana* Kl. (probably a Purdie coll., type coll. of *Thibaudia pichinchensis glaber* Hook. for which *Ps. hookeriana* is the current name),” i.e., Smith considered that upper branch of the BM isotype specimen of *T. pichinchensis* [var. *pichinchensis*] as a different taxon altogether—a probable “isotype” of *T. pichinchensis* var. *glaber* Hook. (= *P. hookeriana* Klotzsch). There is no label mentioning Purdie connected with that upper branch, nor any indication that the specimen was grown at Syon; thus, I’m not sure why Smith annotated the upper portion (branch) of the BM sheet in this manner, although it is most likely that that upper branch was glabrous, so Smith associated it with the glabrous variety of Hook. Until I myself study that BM sheet more closely, it is my opinion that Smith’s determination of that upper branch should be maintained (see Luteyn 2018).

Psammisia towarensis Klotzsch, *Linnaea* 24:44. 1851. *Macleania towarensis* (Klotzsch) Hoerold, *Bot. Jahrb. Syst.* 42:269. 1909. TYPE: VENEZUELA. ARAGUA: Colonia Tovar, Jul–Aug (fl), Moritz 772 [HOLOTYPE: B, destroyed during WWII; LECTOTYPE, **here designated**: BM (BM 582276, BM image!); ISOLECTOTYPE: HBG (HBG 515420, image!)].

In the protologue of *Psammisia towarensis*, Klotzsch (1851:45) cited the type as “In locis subtemperatis ad rivulos Coloniae Tovar in Columbia legit cl. Moritz. (n.772).” In the next species entry (also p. 45) he cited the collection Moritz 479 from “in regione alpina prope Meridam ...” as representing a recent collection identified by him in his new combination *P. macrophylla* (Kunth in H.B.K.) Klotzsch (**not** the Kunth type).

The Macbride photo F neg. 4701 (=FOBN004701) distributed as the Berlin type photo of *Psammisia towarensis* shows a herbarium sheet with a sterile twig of *Psammisia* that bears a few old rachises and many leaves (perhaps there may have been flowers in one of the packets). The sterile twig was placed through the slit of a small handwritten label (as was commonly done in those days) that gives the collection number as “479” but without any collector’s name. That label also bears the identification “*Thibaudia Quereme* ? H.B.K.” and

although hard to read it seems to state “mont. El Purgatorio. Prov. Cuman. Fl. Aug. ros. cocc. . . .,” a probable reference to the political division “Provincia Cumanensis” that was also often used by Humboldt, but which is in eastern Venezuela in the current state of Sucre, far from either the Colonia Tovar or the town of Tovar—Colonia Tovar was already at that time considered in the Provincia Caracas (*vide* F. Stauffer, pers. comm.). The herbarium sheet itself also bears two additional handwritten labels at the very bottom of the sheet that are distinct from the small one that surrounds the sterile twig—the smaller of those two labels bears the annotation “*Psammisia tovarensis* Kl.” with the locality as “Columbia” and the collection given as *Moritz 772*, whereas the larger of the two labels bears the annotation “*Thibaudia macrophylla* H.B.Kunth” with a locality that includes “ad rivul. Colon. Tovar, loc. subtemper.” (similar to the locality given in Klotzsch’s protologue) and the collector as *Moritz 772*.

Macbride took his photo F neg. 4701 of the B specimen sometime between 1929–1931 when Smith had not yet seen and annotated it; we know this because the NY photo ACS neg. 153 taken in 1931 shows that the B sheet (of F neg. 4701) had been re-mounted with some labels and leaves slightly moved from their original positions—for example, the “479” small label had been removed from its original position surrounding the sterile twig and placed in a separate position immediately to the right, thus no longer surrounding the sterile twig but definitely associated with it; also two flowers probably from a packet had been mounted on the sheet; and also a third packet originally located in the lower left-hand side of the sheet where it was originally loose (i.e., not attached) had been mounted in the upper right-hand corner of the sheet. The NY photo ACS neg. 153 also shows the addition of Smith’s 1931 annotation label that stated “*Psammisia Hookeriana* Kl. (type of *Ps. tovarensis* Kl.)” on the right-hand central portion of the sheet.

In 1932, in the citation of specimens seen for *Psammisia hookeriana*, Smith (1932:405–6) listed as two of the specimens he saw at B from the Venezuelan state of Merida “*Moritz 479*” and “Colonia Tovar, *Moritz 772* (B, type of *P. tovarensis*).” [**Note:** According to Steyermark (1981), Moritz’s collection locality Tovar is often confused in the literature—the actual Moritz locality of “Colonia Tovar” is located in the Coastal Cordillera of Aragua state (Venezuela) ca. 40 km by air west of Caracas; whereas the Andean town of “Tovar” is located in far western Venezuela in the state of Mérida ca. 650 km by air west of Caracas.]

Although it is a bit confusing, I herein suggest that the B sheet represented in Macbride’s photo F neg. 4701 and NY photo ACS neg. 153 was definitely a mixed collection with regards to both the labels and plant specimens, but that the most prominent part of that sheet, i.e., the sterile-twig, belongs with the small [*Moritz*] “479” label displayed in the two photos and is the “*Moritz 479*” collection cited by Smith in his 1932 monograph. I also suggest that the two larger “*Moritz 772*” labels at the bottom of that same herbarium sheet belong with fragments of *Moritz 772* within one or both of the packets most closely mounted to those labels, although neither Macbride nor Smith mentioned fragments within packets (nor is there any way of knowing that at this time), and that these two specific labels and packets were the basis for Smith’s 1931 annotation label “*Psammisia Hookeriana* Kl. (type of *Ps. tovarensis* Kl.)” attached to that herbarium sheet **and** his subsequent citation of “Colonia Tovar, *Moritz 772* (B, type of *P. tovarensis*)” in his monograph. The wording on that 1931 annotation label was Smith’s specific way in saying that that specimen was the “holotype” of *P. tovarensis* (see above); so there must have been fragments in one of the packets. It is also possible that there were other (unmixed) sheets at B of both *Moritz 772* and *Moritz 479* that were annotated by Smith in 1931, but if so these were not photographed by either Macbride or Smith nor cited by Smith in 1932 before the specimens were subsequently destroyed in 1945. To me, the Macbride photo F neg. 4701 should not have distributed as the implied type of *P. tovarensis* when it was not clearly identified which of the mixed labels and fragments of the actual plants of *Moritz 772* or *Moritz 479* were being shown in the photograph. Neither was Smith clear in his 1931 annotation and photo of the same B sheet nor in his 1932 monograph as to the correct identification of the type specimen.

Fortunately, there are two extant herbarium sheets correctly identified as *Psammisia hookeriana* with the indisputable collection number of *Moritz 479* at HBG (HBG 515421 and HBG 515422) **and** two other extant herbarium sheets (syntypes) correctly identified as *P. tovarensis* with the indisputable collection number of *Moritz 772* at BM (BM 582276, BM image!) and HBG (HBG 515420, image!). The *P. tovarensis* sheet at BM has a

1931 Smith annotation label that states “*Psammisia hookeriana* Kl. (type coll. of *P. towarensis*)”—although he did not cite it in his 1932 monograph—and my own 2006 annotation label stating “Lectotype of: *Psammisia towarensis* Klotzsch = *Psammisia hookeriana* Klotzsch.” The HBG sheet of *P. towarensis* does not have Smith’s annotation; however, in 2006 I annotated it as *P. macrophylla*, unfortunately failing to then recognize it as a type of *P. towarensis*. Therefore, I am herein designating as lectotype of *P. towarensis* the BM sheet (BM 582276) that I annotated as such in 2006, because it is a complete and unambiguous sheet of *Moritz 772* with mature flowers and **not** a mixed collection with regards to labels or fragments as was the B sheet.

Psammisia sclerophylla Planch. & Linden, Fl. Serres Jard. Eur. 8:205, pl. 825. 1853, **syn. nov.** TYPE: VENEZUELA. MÉRIDA: 7000–8500 ft, Funck & Schlim s.n. Synonym cited “*Psammisia sclerophylla*, PL. et LIND. Fl. Columb. ined.” LECTOTYPE, **here designated**: the plate 825 of the protologue.

In the protologue of *Psammisia sclerophylla*, Planchon (1853:205) mentioned only that the plant was collected by Funck and Schlim in Mérida, Venezuela, at an altitude of between 7000–8500 feet. Although Funck and Schlim collected together during the years October 1845 to about May 1846, no date of collection or collection number was given in the protologue. Planchon (1853) also presented an excellent color illustration in the plate 825, which along with the general description of the plant and the geographical location allows me to identify his plant as *P. hookeriana*. Planchon also mentioned that his new plant was growing in Linden’s nursery. With regards to the Venezuelan-Colombian collections of Linden, Funck, and Schlim, “The living plants were at first brought back to Luxemburg; later to Linden’s nurseries at Brussels and Gent” (*TL-2* vol. 3:42–43, Stafleu & Cowan 1981). Since Funck returned to Europe with possible living plants or seeds in 1847, the earliest Planchon’s plant could have flowered in Linden’s nursery was 1848–1850. Planchon may have actually seen the cultivated plant or a specimen from it when he was assistant to W.J. Hooker at Kew in 1844–49 or when he was at Ghent (1849–1851), at Nancy (1851–1853), or at Montpellier (1853–1888) where some of his types are located (*TL-2* vol. 4:284–285, Stafleu & Cowan 1983), and where “Linden would have sought Planchon’s critical opinion prior to any decision to publish ...” (Nevling 1970:227). No herbarium specimen has ever been mentioned or located.

There is a specimen at MPU (MPU 12378, image!), however, listed with the “Collector’s name” as L. Schlim that was identified and annotated by A.J.M. Faure in 2008 as “isotype” of *Psammisia sclerophylla* Planch. et Linden, the identification of which is in my opinion incorrect. How she came to that determination (and why not holotype?) is unknown to me as there is nothing on the sheet at MPU that would link it to *P. sclerophylla*. That sheet has two original Linden company printed labels (i.e., “ETABLISSEMENT ...”) with the subtitle “Voyage de L. Schlim”—neither label has any mention of Funck’s name as is given in the protologue or a collection number. They have a printed general location of “N^{lle} Grenade, prov. de” but with the printed N^{lle} Grenade scratched out and over it an inked handwritten “Venezuela” and “Merida,” a printed date of “1849,” and at the bottom the word “unique” handwritten in ink. The top label has an old determination of “Cerander” handwritten in ink, while a penciled determination of “*Psammisia sclerophylla*” has been added more recent; the second label (below the first) has the determination of “Thibaudia” handwritten in ink and gives an altitude of “9000.” In my opinion, all of the inked handwriting on both labels appears to be the same and compares favorably with that of Planchon as illustrated in Steinberg (1977:14). If the handwriting on the labels is that of Planchon, that would be the only evidence in my opinion by which Faure could have connected the specimen at MPU with Planchon (although he also resided there) and so determined it to be an “isotype.” The lone collector’s name on the labels, “L. Schim” without any collection number, is evidence enough in my opinion to negate the sheet as a type. Therefore, in my opinion, there is no evidence by means of label or other annotation information on the herbarium specimen at MPU (or any other specimen that I have seen), or anywhere in the protologue that would allow the name *P. sclerophylla* to be associated with any specimen at MPU, if there was indeed a herbarium specimen at all. Nevertheless, it is a moot point, since all the determinations on the MPU labels are incorrect—the specimen is that of *Macleania rupestris* (Kunth in H.B.K.) A.C.Sm. and not a *Psammisia*.

Hoerold (1909a:271) listed *Psammisia sclerophylla* in his uncertain species category. In 1932 Smith

(1932:406) stated “This species may be synonymous with either *P. penduliflora* or *P. hookeriana*, but from the oblong leaves and pilose branchlets and pedicels shown in the plate I conclude that it is neither.” I disagree with Smith and feel that the plate in the protologue is a good representation of *Psammisia hookeriana* as currently circumscribed. Therefore, I am herein designating as lectotype of *P. sclerophylla* the plate 825 of the protologue, because there is no known type herbarium specimen.

Psammisia sarcantha Decne., Rev. Hort. sér. IV, Tome 3:181, fig. 10. [15 May]1854. TYPE: “Nouvelle-Grenade,” [Venezuela or Colombia]: 2000 m, Linden s.n. (“ou par ses collecteurs”). LECTOTYPE, **here designated**: fig. 10 of the protologue.

In the protologue of *Psammisia sarcantha*, Decaisne (1854b:181) stated that the species he was therein describing was based on a cultivated plant originally collected by M. Linden or his collectors, was probably first grown in Brussels, and bore similarities with characters of the genus *Psammisia*; however, no actual specimen was cited in the protologue.

Hoerold (1909a) was confused with regards to this species. Without making any new combination, he excluded *Thibaudia sarcantha* Hook. from the genus *Thibaudia* (p. 274) and moved it into *Psammisia* (p. 271) as *P. sarcantha*; but there he listed it in his uncertain species category and gave the citation as “**P. sarcantha** Bot. Mag. t. 5450. Decne. in Rev. Hort. Sér. IV. III (1854) p. 181.—Columbien.” No wonder he was confused and uncertain, his citation was a mixture of citations from W.J. Hooker’s (*T. sarcantha* Hook., Bot. Mag. 90: tab 5450. 1864) and Decaisne’s (*P. sarcantha* Decne., Rev. Hort. sér. IV, Tome 3:181, fig. 10. 1854)! Smith (1932:404) placed both *P. sarcantha* Decne. (1854) and *T. sarcantha* Hook. (1864) as synonyms of *P. hookeriana* Klotzsch without further comments.

I am herein designating as lectotype of *Psammisia sarcantha* Decne. the “fig. 10” of Decaisne’s protologue—it is an excellent color illustration of *P. hookeriana* with leaves plinerved and corolla red with white throat and lobes (these with tips reddish).

Thibaudia sarcantha Hook., Bot. Mag. 90: tab 5450. [1 Jun]1864. TYPE: “New Granada,” [Venezuela or Colombia]. Synonyms cited “*Psammisia sarcantha* Batem. in litt.” and “*Psammisia sclerophylla* Planch. et Linden, Fl. des Serres, v. 8. p. 205. t. 825 ?” [1853]. LECTOTYPE, **here designated**: K-Herbarium Hookerianum 1867 (K 534908, image!; photo, NY neg. 10533).

William J. Hooker’s plate 5450 of *Thibaudia sarcantha* was based on material “we believe imported from New Granada, cultivated by Mr. Bateman, and exhibited at one of the late spring meetings of the Royal Horticultural Society at Kensington Gardens by that gentleman, whence the specimens were sent to be figured”—no actual specimen was cited. The plate itself was credited to “W. Fitch, del. et lith.” [Walter Hood Fitch (1817–1892), botanical illustrator who worked in color lithography including 2700 illustrations for Curtis’s Botanical Magazine]. Plate 5450 is an excellent illustration of *Psammisia hookeriana*. By Hooker’s (abbrev.: Hook.) inclusion of a question mark (“?”) at the end of his citation of the synonym “*Psammisia sclerophylla* Planch. et Linden, Fl. des Serres, v. 8. p. 205. t. 825 ?” in the protologue, he is showing his doubts about the identity of that plant with his current new species. Furthermore, the last sentence of Hooker’s protologue reads that *P. sclerophylla* (of Planchon and Linden, t. 825) “very much resembles our plant, but the branches are there erect, and the corymbs only drooping.” [Both fig. 10 of *P. sarcantha* Decne. and also t. 825 of *P. sclerophylla* Planch. & Linden show branches erect and corymbs drooping; whereas, Hooker’s tab. 5450 of his *T. sarcantha* has its branches pendant and corymbs drooping.]

It is curious that W.J. Hooker, in his 1864 protologue of *Thibaudia sarcantha*, made no mention of Decaisne’s *Psammisia sarcantha* published ten years earlier in 1854—one would think that he had seen the literature as well as Decaisne’s fig. 10. For this reason, I think it is possible that Hooker described a plant from the same cultivated material that Decaisne saw ten years earlier when he (Decaisne) described and illustrated *P. sarcantha* based on cultivated material also supplied by Linden from “Nouvelle-Grenade” (Decaisne 1854:181). Hooker’s plate is not exactly the same as that of Decaisne, but they are very similar and certainly close enough to be the same species—they do have slightly different coloration of the corolla but both are still well within the range of *P. hookeriana*. [For Hoerold’s (1909a) and Smith’s (1932) thoughts, see above.]

Both Sleumer (1935:291) and I (Luteyn 2018) suspect that W.J. Hooker made a similar type of “re-naming mistake” in 1864 with *Thibaudia sarcantha* as J.D. Hooker (abbrev.: Hook.f.) seemingly did in 1878 when he

(J.D. Hooker) re-named a cultivated plant grown by Messrs. Veitch of Exeter, England from seeds collected by W. Lobb in Peru, then sent to J.D. Hooker at Kew as *Eurygia* (*Thibaudia*) *ovata* Hook.f. (Bot. Mag. 104: pl. 6393, 1 Nov 1878) 30 years after it had been named *Vaccinium leucostomum* Lindl. (Gardn. Chron. 1848:7, fig., 1 Jan 1848)—that plant also grown by Messrs. Veitch of Exeter, England from seeds collected by W. Lobb in Peru.

The only herbarium specimen bearing the name *Thibaudia sarcantha* that I know of is the K-Herb. Hook. sheet (K 534908), which has a tiny label attached in the lower right corner that reads “From Mr. Fitch IV/64” — certainly signifying that it came from the material cultivated by “Mr. Bateman” and used in the lithograph by Fitch, as cited in the protologue. That same K sheet was annotated by Smith in 1931 as “*Psammisia hookeriana* Kl. (is this not the type of *Thibaudia sarcantha* Hook. Bot. Mag. 90: t. 5450?)” and again with one of my own annotation labels (of “Jan. 1980” and “!Luteyn 2006”) stating “*Psammisia hookeriana* Klotzsch (not type of *Psammisia sarcantha* Decaisne).” Therefore, I am herein designating as lectotype of *T. sarcantha* the K-Herb. Hook. (K 534908) sheet for the reasons given above.

Thibaudia jessicae Hook.f., Bot. Mag. 91: tab. 5547 [1 Dec]1865. *Psammisia jessicae* (Hook.f.) Hoerold, Bot. Jahrb. Syst. 42:270. 1909. TYPE: VENEZUELA: “The mountains of Caraccas [sic],” [HOLOTYPE: K-Herbarium Hookerianum 1867 (K 534907, image!; photo, NY neg. 10535)].

According to J.D. Hooker (1865:sub tab. 5547) James Bateman cultivated the plants used for the illustration of his new species *Thibaudia jessicae*, which were “procured from Mr. Linden’s celebrated establishment at Brussels” and was named for “The Honourable Mrs. John Bateman.” The plate 5547 based on these cultivated plants is an excellent rendition of *Psammisia hookeriana* even to the possession of anther spurs—it was credited to “W. Fitch, del. et lith.” (i.e., Walter Hood Fitch; see above). The only herbarium specimen bearing the name *T. jessicae* that I know of is in the K-Herb. Hook. (K 534907). It has a seemingly original, small, handwritten label attached at the bottom of the herbarium sheet that is difficult to decipher in its entirety, but includes the words “*T. macrophylla*,” “... Bateman,” and “... Fitch ... 1865,”—all words mentioned in the protologue and to me signifying that it came from the material cultivated by “Mr. Bateman” and used in the lithograph by Fitch. It is also my opinion that the handwriting on that label is that of J.D. Hooker, when compared with those in Burdet (1979).

In 1931 Smith annotated the K sheet as “*Psammisia hookeriana* Kl. (type of *Thibaudia jessicae* Hook.f.)” I came to the same conclusion in 2006 and annotated it as “HOLOTYPE OF: *Thibaudia jessicae* Hook.f. =*Psammisia hookeriana* Klotzsch.” The type locality given in the protologue for *P. jessicae*, “The mountains of Caracas,” probably fell within the “Provincia Caracas” during the mid-1800s, which falls within the Coastal Cordillera of northern Venezuela and the general distributional range of *P. hookeriana*.

Psammisia hookeriana is a common species of open and mesic montane regions and is endemic within the Coastal Cordillera of northern Venezuela from the state of Lara in the West to the state of Sucre (Península de Paria) in the East. It is normally found at relatively “lower” altitudes than *P. macrophylla* with which species it is often confused. *Psammisia macrophylla* consists of a “complex” of species that is found in western Venezuela (state of Mérida) and then West throughout Colombia to its southernmost department of Nariño. *Psammisia penduliflora* ranges throughout the Cordillera de los Andes in Venezuela (state of Falcón) west into eastern and central Colombia (to the department of Cundinamarca). The range of *P. hookeriana* seemingly does not overlap with those ranges of *P. macrophylla* and *P. penduliflora*.

Psammisia lanceolata Hoerold, Bot. Jahrb. Syst. 42:309. 1909. TYPE: COLOMBIA. CUNDINAMARCA: Bogotá, Pasca, 2500–2900 m, Sep 1855 (f), *Triana* 4333/19 [HOLOTYPE: B, destroyed during WWII, but represented in photo by F neg. 4693 (=F0BN004693, image!) and ACS neg.148; LECTOTYPE, here designated: NY frags. ex B holotype (NY 951654, image!).]

In the protologue of *Psammisia lanceolata*, Hoerold (1909a:309) cited “... (*Triana* n. 4333/19.—Herb. Berol.!)” as the only specimen for his new species; no other specimens were cited and none are known. Thus I would say that Hoerold was specific enough for me to cite that specimen at B as the holotype. The photo F neg. 4693 of the holotype at B shows Hoerold’s annotation label of “III. 08.” stating “*Psammisia lanceolata* Hörold n. sp.” The NY photo ACS neg. 148 of *Triana* 4333/19 (B) shows the addition of Smith’s 1931 annotation label stating “*Psammisia*

lanceolata Hoer. TYPE” and Smith’s ruler immediately above Hoerold’s annotation label. The B specimen was destroyed during WWII and, therefore, I have designated the B holotype fragments at NY as the lectotype. [Note: The plant specimens of *Psammisia lanceolata* imaged on Global Plants and therein listed as “Original material ...” are actually collections of Mutis and are **not** types.]

Psammisia lanceolata is endemic to Colombia and probably ought to be included within *P. falcata*, which is the older name for the two; however I must resist this move until more field work is undertaken in central Colombia. In my opinion these two species are also probably part of the *P. macrophylla* “complex,” but see below.

Psammisia macrophylla (Kunth in H.B.K.) Klotzsch, *Linnaea* 24:45. 1851. *Thibaudia macrophylla* Kunth in H.B.K., *Nov. gen. sp.* 3:270. 1819. TYPE: [COLOMBIA. CAUCA:] “Crescit prope Pindamon et Palace, alt. 1000 hex. (Andibus Popayanensium.) Floret Decembri.” *Humboldt & Bonpland s.n.* [HOLOTYPE: P-Bonpl. (P 670974, image!; photo, F neg. 38228, F image!).]

The holotype specimen of *Psammisia macrophylla* in P-Bonpl. (P 670974) looks similar to *P. coarctata* including its obscure calyx lobes and buds. Although *P. macrophylla* itself has not been critically studied by me, I did annotate the type specimen in P-Bonpl. as *P. macrophylla* in 1978. *Psammisia macrophylla* occurs in northern and western Venezuela (state of Mérida) and west into all three cordilleras of Colombia south to its department of Nariño. It is probably a “complex” of species that includes *P. falcata*, *P. lanceolata*, *P. cuatrecasasi*, and maybe even *P. coarctata* (see discussion above) thus forming a (more northern) *Psammisia* species “complex.” I suspect an eventual combination of all these species, but until critical studies of the *P. macrophylla* “complex” in Colombia/Venezuela are undertaken I cannot with confidence unite them at this time.

Psammisia macrophylla is unknown in Bolivia, although I did incorrectly annotate a Bolivian collection of *Bang 1516* (at MICH) as this species; elsewhere *Bang 1516* has been correctly determined by me as *P. urichiana*. Only one specimen determined as *P. macrophylla* has been collected in northern Peru (Amazonas: *Mathews 2078p.p.*, OXF) and that determination was made by an unknown hand. Like the specimen of *Bang 1516* from Bolivia, I consider the *Mathews 2078p.p.* determination at OXF to be a mistaken identity and that it should be re-annotated as *P. coarctata* (see above discussion under *P. globosa*).

Psammisia penduliflora (Dunal) Klotzsch, *Linnaea* 24:43. 1851. *Thibaudia penduliflora* Dunal in D.C., *Prodr.* 7:562. 1839. *Chupalon penduliflorum* (Dunal) Kuntze, *Rev. gen. pl.* 2:383. 1891. TYPE: VENEZUELA. DTTO. FEDERAL: Caracas, *Vargas 190* “(v. s. in h. DC. comm. à ci. inv.)” [HOLOTYPE: G-DC (G 322670, image!; photo, F neg. 7029, F image!); ISOTYPE: L (L 7299, image!), MPU (MPU 12313, seen only as image!).]

“*Thibaudia Schlimmiana*” Linden, *Établ. Linden, prix-courant* 6:4. 1851, nom. nud.

In 1851 Linden published “*Thibaudia Schlimmiana*” (listed as “*Thibaudia Schlimii*” in Linden’s *Cat. no. 12:44. 1857*) along with “*Th. Ocanensis*” and “*Th. tetragona*” as new species in his horticultural sales “*Catalogue no. 6*” (p. 4. 1851). These three plants were all collected by “Schlim” in the Andes of Colombia around Pamplona and Ocaña and are simply listed as names of new plant introductions. Linden did not give any descriptions of the plants, nor did he mention any particular collections in his list of new species of *Thibaudia* that he was then offering for sale. [Linden was selling “*T. Schlimmiana*” for 30–50 francs out of his nursery in Luxembourg.] None of Linden’s three names was mentioned again outside of his own sales catalogues until Hoerold (1909a:272) mentioned all three in his *Thibaudia* uncertain species category. Smith (1932:438) mentioned all three within his *Thibaudia* “doubtful species” with the comment “Descriptions of this “species” [“*T. ocanensis*”] and of the two others mentioned in the same publication are not available to me. Probably they are simply listed and are to be considered *nomina nuda*.” I have recently been able to obtain a copy of Linden’s very rare 1851 catalogue (see Acknowledgments below) and can now say that Smith was correct—none of three names were validly published, they were “simply listed” and are thus *nomina nuda* following Art. 38 Ex. 1, Rec. 50B of the *Code* (Turland et al. 2018; see also footnote below). In fact, it is still unknown if any of Linden’s three names belongs to the genus *Thibaudia*. In this current paper, “*Thibaudia Schlimmiana* Linden” is placed here under *P. penduliflora* only because of the annotation on the MPU herbarium sheet mentioned below. In truth, all three names are still of uncertain placement and there is no intent to publish them here!

The name “*Thibaudia Schlimmiana* Linden” was resurrected in 2008 when A.J.M. Faure annotated two herbarium sheets at MPU as probable “syntypes” for “*Thibaudia schlimiana* Linden.” Both sheets bear the Linden company’s printed label “ETABLISSEMENT ...” and each label the handwritten determination “*Cerander schlimmianus* Planch.” Faure annotated as “Type probable (à vérifier)” one of the sheets (MPU 12376, image!) with subtitle “Voyage de *L. Schlim*.” It also had the label data “N^{lle} Grenade,” Prov. de “Trujillo,” ... “8000 pieds,” s.d., *Schlim* 283 and at the bottom in an inked hand the word “unique.” Faure also annotated as “Type probable” the second sheet (MPU 12377, image!) with subtitle “Voyage de *Funck et Schlim*” [incorrectly listed on Global Plants as “*Schlim* 933”; it had label data as Venezuela, Merida, 6000 ft., Feb 1846, *Funck & Schlim* 933; *Funck & Schlim* 933 is the type of *Macleania crenulata* B.Fedtsch. & Basil., see below]. The two MPU herbarium sheets are the only two specimens known to me to have ever been annotated with the name “*Thibaudia Schlimmiana* Linden” (a *nom. nud.*) and there is nothing more on either sheet to demonstrate that they were seen by Linden or Planchon, or were ever used as the basis for Linden’s name. Therefore, outside of historical interest as to the identifications and origins of the names written on the labels of these two collections at MPU, they should be seen merely as incorrectly annotated sheets of *Psammisia penduliflora* (Dunal) Klotzsch.

[NOTE: In the great *Prodromus* of A.P. de Candolle (1823–1873) Dunal (1838:565) published the name “*T. ? cerander*” [= *Thibaudia cerander* Dunal, ≡ *Satyria cerander* (Dunal) A.C.Sm., Bull. Torrey Bot. Club 60:120. 1933. Type: French Guiana, *Leblond* (?) (holotype, P-Herb. Jussieu no. 7575)]. In his discussion he (Dunal) cited “*Cerander* Rich. in herb. Jussieu.” and “(v.s. in herb. Jussieu.)” signifying that he saw an unpublished generic (manuscript) name of Rich (presumably O. Rich) on a herbarium specimen in Jussieu’s herbarium. I have seen the P-Herb. Jussieu no. 7575 sheet on microfiche with the annotation label stating “*Thibaudia ? Cerander* Dun.” (in Dunal’s hand ?). I still do not know the origin of Rich’s generic name “*Cerander*” but it was never published. To my knowledge the name “*Cerander*” appears only five times, four as determinations on herbarium sheets (see above)—on *Schlim* 283 (MPU 12376) as “*Cerander schlimmianus* Planch.”; on *Funck & Schlim* 933 (MPU 12377) as “*Cerander schlimmianus*, Pl.”; on *Schlim* s.n. (MPU 12378, image!) as simply “*Cerander*”; and on P-Herb. Jussieu no. 7575 as “*Thibaudia ? Cerander* Dun.”—and then one more time in Dunal’s protologue of *T. ? cerander* where it is cited as a manuscript name “*Cerander* Rich. in herb. Jussieu.”]

Further, with regards to the *Schlim* 283 collection at MPU mentioned above, there is a herbarium sheet of *Psammisia penduliflora* at P with the collection number *Linden* 283 (P 4479824, P image!). It does not have the original Linden “ETABLISSEMENT” printed label as the *Schlim* 283 sheet at MPU, but instead has a printed label of the HERB. MUS. PARIS (at the top) on which is also printed “République de Venezuela—hautes Andes de Truxillo et de Merida. Alt. 4,000–14,500 pieds. M. Linden 1842” (at the bottom). At the bottom of the label in an inked hand is also the collection number “n. 283.” The *P. penduliflora* sheet of *Linden* 283 at P appears equal (i.e., to have been taken from the same plant) to the “Unicate” sheet of *Schlim* 283 at MPU (discussed above). Perhaps that “unicate” MPU sheet with the original Linden “ETABLISSEMENT” printed label may have been split into two with the duplicate sent to P without an original label, so P had to make its own label and in the process copied collection data from the original label, but in so doing gave credit for the collection to Linden. [Note: I cannot find a *Linden* 283 sheet at K, BR, or anywhere else, although Linden was in Venezuela in 1842 and he has collection numbers from that time within the range from 247 into the 1600s. But what are the chances of a *Schlim* 283 and a *Linden* 283 from the same area of Venezuela being the same species?] In 1931 Smith annotated the P sheet as “*Psammisia penduliflora* (Dun.) Kl.” with which I concur based on the online image. In any event it is my opinion that the P sheet of *Linden* 283 is a duplicate of the MPU sheet of *Schlim* 283, that the P sheet is incorrectly labeled as a Linden collection, and that the P sheet should be cited as *Schlim* 283 (not *Linden* 283)! As validation of my opinion is the fact that after searching the K online website for Linden, Funck, and Schlim collections, I found that all of Linden’s collections from Venezuela in 1842 ranging from around number 247 to around no. 1664 used printed labels of the smaller size format (discussed above in the introductory paragraphs) and all printed with his name and his collection number only as “J. Linden. Jan.—April. 1842. ... Caracas. S. America.” or as “J. Linden. 1842–3. ... New Granada. S. Amer.” [Linden did have

another parallel numbering series with regards to his Veracruz (Mexico) collections from 1838–1839 with numbers in the ca. 247–1164 range thus overlapping with his 1842–1843 Venezuela/Colombia numbers range. Thus another example of confusion in Linden's collection numbers, and again to emphasize the importance for care in citing his collections including also geographical location.]

Psammisia planchoniana Decne., Rev. Hort. sér. IV, 3:182. [15 May]1854, **syn. nov.** TYPE: "Nouvelle-Grenade" [Venezuela or Colombia]: ca. 2000 m, Linden s.n. ("ou par ses collecteurs").

In the tenth issue of the third volume of the Rev. Hort., on the second page of the discussion of his new *Psammisia sarcantha* (p. 181, fig. 10), Decaisne (1854c) introduced another new species he called "Psammisia, Planchoniana" after stating that the two new species he had in his hand belonged to the same genus as *P. sclerophylla*. His new species originated from the high mountains of "Nouvelle-Grenade" and was based on living material received from "M. Linden" (or his collectors), although no actual description, collection (collector, number), date, or place of deposit was mentioned. He dedicated the plant to "M. Planchon." In his diagnosis Decaisne (1854c) compared and contrasted the leaf size and venation and floral differences between his new "Psammisia, Planchoniana" and *P. penduliflora* that he figured and discussed in an earlier issue of the Rev. Hort. (Decaisne 1854a), although ultimately he felt his new "Psammisia, Planchoniana" was particularly close to the figure 10 of *P. sarcantha* (Decaisne 1854b, which to me = *P. hookeriana*). Decaisne (1854a) also illustrated, described, and discussed the relationships of *P. penduliflora* because he received a plant from Linden under the name *Thibaudia bracteata*, and recognizing that the identification was incorrect, he was bringing that correction to the attention of local horticulturists and taxonomists.

Hoerold (1909a:271) merely listed *Psammisia planchoniana* ("Columbien") in his *Psammisia* uncertain species category without further comment, although there he incorrectly gave page 74 for the original journal citation (instead of p. 182). Smith (1932:403) placed "*Psammisia planchoniana* Decaisne" in the synonymy of *P. penduliflora* apparently basing his decision upon his reference to Decaisne's discussion and illustration of *P. penduliflora* (Decaisne 1854a) as I have done. Considering that the stated morphological differences between *P. planchoniana* and *P. penduliflora* mentioned by Decaisne are now seen to be minor and well within the range of morphological variation of *P. penduliflora*, as well as the author's own doubts and comparisons, it is most likely that *P. planchoniana* is a synonym of *P. penduliflora*; therefore, I am placing it therein despite the fact that there is no actual type specimen or illustration. The only other mention of the taxon *P. planchoniana* that I know of is found in an anatomical study by Vesque (1885) that includes Ericaceae, but where the name is only mentioned in passing.

Psammisia longicolla Hook.f., Bot. Mag. 91, tab. 5526. [1 Aug]1865, **syn. nov.** TYPE: *Bateman s.n.*, cultivated; LECTOTYPE, **here designated**: K-Herbarium Hookerianum 1867 (K 370420; photo, NY neg. 10526).

Psammisia longicolla was based on a living plant from South America "precise locality is not known" given to J.D. Hooker by James Bateman. The color illustration of tab. 5526 is an exact rendition of *P. penduliflora* to which species Hooker compared his new species; he also said that the new species differed by its smooth (not "furfuraceo-scabrous") flowers and elongated and contracted (not short) corolla—both characters of which fall well within the variation that we now see in *P. penduliflora*. No actual herbarium specimen is mentioned, but there is a sheet in the K-Herb. Hook. that seems to be the specimen made from that living plant. The label on that K sheet provides a determination of "Psammisia aff. *P. penduliflora* Kl.," on the next line are the words "To fig.!" and "Bateman?," and below that the name of the illustrator "Mr. W. Fitch 5/65" (all in ink)—certainly signifying that the specimen came from the material cultivated by Bateman and was sent to W.H. Fitch for his lithograph, as cited in the protologue. Immediately above the label and pencilled directly onto the herbarium sheet is written "*P. longicolla* Hk. Bot. Mag. 5526." It is my opinion that the handwriting on that label and on the herbarium sheet immediately above the label is that of J.D. Hooker when compared with those in Burdet (1979). [Note: The "Archive team" at Kew gave me a somewhat contrary opinion about the handwriting being that of J.D. Hooker by stating "We've been scratching our heads and I'm afraid that the collective opinion is that we do not generally think this is J.D. Hooker's handwriting. The slight problem with Hooker is that his handwriting is notoriously varied depending upon his age and the nature of the correspondence."] Smith annotated

the K sheet in 1931 as simply "*Psammisia penduliflora* (Dun.) Kl." In his monograph Smith (1932:406) listed *P. longicolla* as a "doubtful species" stating that "No plant the precise equal of the plate and description of this species has been seen by me. It may be allied to *P. ulbrichiana*, which species does not have the bractlets at the summit of the pedicel, as portrayed in *P. longicolla*. The abruptly contracted corolla also suggests *P. ulbrichiana*, which quite possibly should be supplanted by the earlier name." I annotated the same K sheet in 1978 as "? Holotype of: *Psammisia longicolla* Hook.f. \equiv *P. penduliflora* (Dun.) Kl." Therefore, after reconsidering the plate 5526, a photograph of the K specimen (NY neg. 10526), and concluding that the handwriting on the labels is that of J.D. Hooker, I am herein designating as lectotype of *P. longicolla* that herbarium sheet (K 370420).

Macleania kalbreyeri Mansf., Notizbl. Bot. Gart. Berlin-Dahlem 9:435. 1925. TYPE: COLOMBIA. NORTE DE SANTANDER: Ocaña, 5–6000 ft, 22 Nov 1877 (fl), W. Kalbreyer 286 [HOLOTYPE: B, destroyed during WWII, but represented in photo by F neg. 4710 (=F0BN004710, image!); ISOTYPE: K (K 534909, image!); LECTOTYPE, **here designated**: K (K 534909, image!).

In the protologue of *Macleania kalbreyeri*, Mansfeld (1925:436) cited "(W. KALBREYER n. 286! - fl. 22. XI. 1877; Typus, in Herb. Berol.)" as the only specimen for his new species. Thus I would say that Mansfeld was specific enough for me to cite that specimen at B as the holotype. Mansfeld compared his new *Macleania* species with *M. towarensis* Hoerold [= *Psammisia hookeriana*], the inconsequential differences being in leaf venation. The photo F neg. 4710 of the holotype at B does not show any annotation labels, although the photo has been significantly cropped; no photo by A.C. Smith is known. The K isotype was annotated by Smith in 1931 as "*Psammisia penduliflora* (Dun.) Kl. (type coll. of *Macleania Kalbreyeri* Mansf.)" and in 2006 I annotated the same sheet as "LECTOTYPE OF: *Macleania kalbreyeri* Mansfeld \equiv *Psammisia penduliflora* (Dunal) Klotzsch." Therefore, I am herein officially designating as lectotype of *Macleania kalbreyeri* the K isotype sheet (K 534909), since the B holotype was destroyed during WWII and the K isotype is the only other known sheet of *Kalbreyer 286*.

Macleania crenulata B. Fedtsch. & Basil., Bot. Mater. Gerb. Glavn. Bot. Sada SSSR [Not. Syst. Herb. Hort. Bot. USSR] 6:24. 1926. TYPE: VENEZUELA. MERIDA: Valle, 5000–6000 ft, Feb or Sep 1846 (fl), Funck & Schlim 933 [LECTOTYPE, **herein designated**: BR (BR 6997151, image!); ISOLECTOTYPES: B (destroyed during WWII but represented in photo by B neg. 998, now lost), BM (BM 582247, BM image!), LE (LE 4434, seen only as LE image!), MPU (MPU 12377, image!), P (P04479829, P image!).

In the protologue of *Macleania crenulata*, the authors Fedtschenko and Basilevskaja (1926:24) cited "Funck and Schlim No. 933!" and I presume the exclamation mark signified that they saw a specimen. Their protologue gives no additional information as to country, exact locality, date of collection, or place of deposit of the type. Smith (1932:384) placed *M. crenulata* amongst his *Macleania* "doubtful species," not having seen any specimens. In 1938 Sleumer annotated the BR specimen of *Funck & Schlim 933* as "*Macleania crenulata* Fedtschenko et Basilevskaja Typus!" Later Sleumer (1941:402) placed *M. crenulata* (*Funck & Schlim 933*) as a new synonym of *Psammisia penduliflora*, stating that the connectives were barely visibly thickened.

A photo of the B specimen of *Funck & Schlim 933* (B neg. 998) also cited by Sleumer (1941:402) and seen by me in L in ca. 1978 cannot be located at this time (*vide* P.J.M. Maas and R. Vogt, pers. comm., June 2018). The BR sheet of *Funck & Schlim 933* (BR 6997151) has the Linden company printed "ETABLISSEMENT ..." label with subtitle "Voyage de *Funck et Schlim*," a locality of "N^{lle} Grenade, prov. de" is scratched out and above it handwritten in ink "Venezuela" and province of "Merida Valle 5000 pieds"; there is a printed date of "184" but nothing more specific than the handwritten month of September; the collection number and determination are handwritten as "933" and "*P. penduliflora*," respectively. The MPU sheet of *Funck & Schlim 933* (MPU 12377) has the same Linden printed label with locality "N^{lle} Grenade, prov. de" (but without province) and year "184" (but without exact year); the collection number and determination were handwritten in ink as "933" and "*Cerander schlimmianus*, Pl.," respectively. The P sheet of *Funck & Schlim 933* (P04479829) has the same Linden printed label as that of MPU, but with the printed locality "Venezuela, prov. de," a locality of "Merida—6000—" handwritten in ink, the printed year of "184" but with the month of February and year "6" (i.e., Feb. 1846) handwritten in ink, and no original determination. It was annotated, however, by Smith in 1931 as "*Psammisia penduliflora* (Dun.) Kl." with which I concur based on the online image. The BM sheet has a totally different label of a small-size format with printed "Funcke [sic]" and the printed date "18 [sic]" followed

by a “6” written by hand (i.e., 1846). The digital image of the LE sheet (kindly sent to me by Dr. Valeria Shvanova and Tatyana Shulkina, LE) shows a herbarium specimen stamped at the top “Hortus Botanicus Imperialis Petropolitanus”; at the bottom right-hand side there is label of a small-size format with printed “Funcke [sic]” as collector (the same type label as that of the BM syntype) and “Venezuela, &c. Coll. 1842–3” as the locality and date of the collection; the notation “& Schlim” has been added by hand after the name Funck and the date has been crossed out and a “6” added by hand to read “1846.” In the lower left-hand corner of the sheet is a 1984 annotation label of Sleumer stating “*Psammisia penduliflora* (Dunal) Klotzsch [sic] (*Macleania crenulata* Fedtsch. & Basil., *Isotypus*, *Schlim* 933, cf *Sleum.*, *Bot. Jahrb.* 71:402. 1941)” and above that a standard printed “Isotypus” label. There is no question that the mounted plant is *P. penduliflora*, but there is no annotation anywhere on the sheet by Fedtschenko and Basilevskaja. All of the sheets of *Funck & Schlim* 933 that I have seen and mentioned above appear as they may be duplicates from the same plant; the LE and P sheets have the best (mature) flowers.

According to Tropicos the “holotype” of *Macleania crenulata* (*Funck & Schlim* 933) is at LE, and in the past I have considered LE sheets of other new species of Ericaceae described by Fedtschenko and Basilevskaja (1926) to have been holotypes. However, the image of the current “type” sheet at LE does **not** show any annotation at all by Fedtschenko or Basilevskaja that would indicate they saw the LE sheet, only that of Sleumer in 1984 stating “Isotype.” Upon a personal visit to BR in March 2007, I annotated the BR specimen as “Lectotype of: *Macleania crenulata* Fedtsch. & Basil. [= *Psammisia penduliflora* (Dun.) Kl.],” because it has the original Linden company printed label of *Funck & Schlim* 933 with the most complete information and BR is the original place of deposit for Funck and Schlim collections. Therefore, to diminish the possibility of any confusion I am herein confirming and designating the BR syntype as lectotype.

Thibaudia sanmartensis Sleumer, *Notizbl. Bot. Gart. Berlin-Dahlem* 12:137. 1934. TYPE: COLOMBIA. MAGDALENA: Sierra Nevada de Santa Marta, Playoncito to Chinchicuá, 1800 m, 6 Apr 1928 (fl), A. Schultze 1509 [HOLOTYPE: B, destroyed during WWII; LECTOTYPE, **here designated**: US (frag. ex B holotype, US 113554, image!)].

Sleumer (1934:137) specifically stated that the type of his new *Thibaudia sanmartensis* was at B (“Typus in Herb. Berol.”) and he did not mention any duplicates. He also stated that it did not seem to be related to any other previously known species of *Thibaudia*. Sleumer (1941:402) later synonymized *T. sanmartensis* under *Psammisia penduliflora* without further comment.

Psammisia penduliflora is endemic to western Venezuela and eastern Colombia, where it is common in montane cloud forest. Excellent likenesses of living *P. penduliflora* even to the constricted corolla throat and the slight greenish color may be seen in Decaisne (1854a) and Hooker (1860).

Psammisia ulbrichiana Hoerold, *Bot. Jahrb. Syst.* 42:306. 1909. TYPE: ECUADOR. PICHINCHA: Volcán Pululahua, *Sodiro* 92/4 [HOLOTYPE: B, destroyed during WWII, but represented in photo by F neg. 4703 (=F BN004703, image!); NEOTYPE, **here designated**: the photo of the B holotype represented by F neg. 4703]. **Fig. 2C–D.**

In the protologue of *Psammisia ulbrichiana*, Hoerold (1909a:306) cited “(SODIRO n. 92/4.—Herb. Berol.!)” as the only specimen for his new species. The photo F neg. 4703 of the holotype at B shows Hoerold’s annotation label of “III. 08.” stating “*Psammisia Ulbrichiana* Hörold n. sp.” Thus I would say that Hoerold was specific enough for me to cite that specimen at B as the holotype. The NY photo ACS neg. 154 of *Sodiro* 92/4 (B) shows the addition of two flower buds (presumably from the packet) and Smith’s 1931 annotation label stating “*Psammisia Ulbrichiana* Hoer. TYPE.” Therefore, I am herein designating as neotype of *P. ulbrichiana* the photo F neg. 4703, since the B specimen was destroyed during WWII and no other duplicates are known.

Although widespread in the Andes of northwestern South America, only one collection of *Psammisia ulbrichiana* is known from each of southern Peru and Bolivia, viz., Peru. Cusco: *Pennell* 14028 (F, NY) and Bolivia. La Paz: *A. Arujo et al.* 71 (LPB, MO n.v.).

Psammisia ulbrichiana is morphologically similar to *P. coarctata* both having in common pedicels that are long to extremely long (20–70 mm long), inflorescences that are corymb-like (i.e., flat-topped due to elongated pedicels) bearing 8–20 flowers, similar rachis lengths and thicknesses (rachises can be short and stout to very

elongate and of a stout/medium diam.), and similar overall corolla lengths and coloration. Although the morphological differences between *P. ulbrichiana* and *P. coarctata* as seen in the key below appear minimal at first glance, in combination they do seem to define two species. Other more subtle features more easily seen in living material include the following:

Psammisia ulbrichiana has an overall coarse appearance with thickly-coriaceous leaves, nerves that are prominently impressed, and in Peruvian collections the lamina surfaces are often of different shades of green (of brown when dry); at anthesis the calyx limb (including the lobes) is conspicuous and of the same (dark green) color as the calyx tube (i.e., inferior ovary), while during fruit maturation the calyx limb essentially disappears and the lobes (turning brownish) seem to shrink and form a thin rim around the then almost totally exposed top of the ovary, which is often brownish in color and often bears brownish speckles or warts (see Fig. 2D), thus the limb/lobes do not form a corona over the top of the berry; its corollas are usually constricted in the middle or lower one-third so that the (distal) throat is proportionally long (see Fig. 2C); staminal spurs are obscure or lacking; the mature berry itself is large (up to 21 mm diam.), green to green speckled with brown or brownish warty, and with a texture that is hard like a stone.

On the other hand, *Psammisia coarctata* has an overall less coarse appearance with its leaves less thick-coriaceous (sometimes almost membranaceous), flattish, the nerves are usually fewer in number (3–5) and less prominent, and both lamina surfaces are of similar color (when fresh and dry); at anthesis the calyx limb (including the lobes) is conspicuously thinner in texture, a lighter green (almost whitish-green) than the calyx tube, and is spreading-campanulate in shape as a corona; its corolla is constricted near the top (distally) so the throat is short (see Fig. 1A); staminal spurs are obvious/prominent; as the berry matures the calyx limb/lobes remain as a conspicuous corona more-or-less hiding the top of the ovary; the mature berry itself is smaller than *P. ulbrichiana* (no more than 10–15 mm diam.), totally green (except for the corona which is a lighter shade), firm but not warty brown, and maintains the calyx limb/lobes as a conspicuous corona (similar to that in the fruit of *P. fissilis* shown in Fig. 2B) The “*P. roseiflora*” form is a bit more tender, with thinner leaves and fewer, often only 3(–5), prominent veins.

Psammisia ulbrichiana is also phenetically similar to *P. aberrans* A.C.Sm. (1946), but more work needs to be done to determine the exact relationships. Further observations must especially note variation in the leaf shape, rachis length, and corolla shape and color (see illustrations in Luteyn 1996). An interesting observation has been noted by Ballington et al. (1993) that the seeds of *P. ulbrichiana* (in specimens from Ecuador) are covered with a gelatinous sheath when wetted.

Psammisia urichiana (Britton) A.C.Sm., Contr. U.S. Natl. Herb. 28:393. 1932. *Cavendishia urichiana* Britton, Bull. Torrey Bot. Club 48:336. 1921. TYPE: TRINIDAD: heights of Aripo, 16 Mar 1921 (fl), Britton & Freeman 2364 [LECTOTYPE, designated by Smith (1932:394): NY (NY 9935, image!; photo, NY neg. 10028); ISOLECTOTYPES: GH (GH 14754, image!), K (K 534921, seen only as image!), NY (NY 9936, image!; photo, NY neg. 10028a), US (US 118503, image!)]. **Fig. 1B.**

Psammisia pauciflora Griseb. ex A.C.Sm., Contr. U.S. Natl. Herb. 28:394. 1932, **syn. nov.** “*Psammisia pauciflora*” Griseb., Lechl. Berb. amer. aust. 58. 1857, *nom. nud.* TYPE: Peru. PUNO: San Gován, Jul 1854 (fl), Lechler 2386 [HOLOTYPE: K-Herbarium Hookerianum 1867 (K 534914, image!; photo, ACS neg. 107); ISOTYPES: BR (BR 6996826, seen only as image!), GOET (GOET 4112, image!), K (K 534916 and K 534915, mounted on same sheet, image!), L frags. (L 7297, image!), P (P 647708 image! and photo, F neg. 38277!; P 647707, image!), S (S 8-11315, image!; photo, NY neg. 9681)].

Psammisia pauciflora was first published by Grisebach as a *nomen nudum* in an appendix at the end of Lechler’s (1857) monograph of *Berberis*. Later Smith (1932:394) validly published *P. pauciflora* saying that “the name given by Grisebach is fitting and has been used in this treatment.” The only specimen he cited was the “Type in the herbarium of the Royal Botanic Gardens, Kew, collected at San Gován, Peru, by Lechler (no. 2386).” Smith distinguished *P. pauciflora* as “a coherent species, forming with *P. urichiana* and *P. elliptica* a distinct group within the genus”—I have herein synonymized all three.

Psammisia elliptica (Rusby) A.C.Sm., Contr. U.S. Natl. Herb. 28:395. 1932. *Maclleania elliptica* Rusby, Bull. New York Bot. Gard. 8:111. 1912, *nom. illeg. non Hoerold* (1909a:301). TYPE: BOLIVIA. LA PAZ: Río Pelichuco, 1200 m, 27 Apr 1902 (fl), R.S. Williams 2487 [HOLOTYPE: NY (NY 10308, image!; photo, NY neg. 9754); ISOTYPES: BM (BM 28455, image!), K (K 534917, image!)].

H.H. Rusby (1912:111) described his *Macleania elliptica* not realizing that it was a later homonym (nom. illeg.) of an earlier name (Hoerold 1909a:301). Then in 1932, for whatever reason, Smith failed to mention either Hoerold's (1909a) earlier name or that Rusby's (1912) name was illegitimate when he (Smith) validly published *P. elliptica* (Rusby) A.C.Sm. based on Rusby's name and type at NY.

Psammisia coccinea Sleumer, Feddes repert. spec. nov. regni veg. 41:120. 1936, **syn. nov.** TYPE: ECUADOR. PICHINCHA: San Carlos de los Colorados, 150 m, 18 Sep 1935 (fl), *Schultze-Rhonhof 1915* [HOLOTYPE: B, destroyed during WWII; LECTOTYPE consisting of two sheets, designated by Luteyn (1996): K sheet 1 of 2 (K 534913, image! and photo, NY neg. 10611) and sheet 2 of 2 (K 534912, image! and photo, NY neg. 10612)].

Sleumer (1936:120) described *Psammisia coccinea* based on a solitary collection of *Schultze-Rhonhof 1915* and stated (p. 121) that the "Typus in Herb. Berol." Sleumer went on to state that his species was closely related to "*Ps. pauciflora* Griseb." and that it differed from that species by its larger flowers, larger leaves, and glabrous filaments ("sie unterscheidet sich von ihr durch wesentlich größere Blüten, größere Blätter und kahle Filamente")—characters now seen to be insignificant. There are no other known duplicates nor photographs of the B holotype, which was destroyed during WWII; therefore, in 1996 I (Luteyn 1996:207) designated as lectotype a collection consisting of two sheets at K (sheet 1 of 2 is fertile, whereas sheet 2 of 2 is sterile and consists of three leaves only).

Psammisia recurvata Britton, Bull. Torrey Bot. Club 48:335. 1921, **syn. nov.** TYPE: TRINIDAD: near summit Mount Tocuche, 3–5 Apr 1920 (im fr), Britton et al. 1294 [HOLOTYPE: NY (NY 10316, image!; photo, NY neg. 10026); ISOTYPES: GH (GH 15230, image!), K (K 534920, image!), US (US 113523, image!)].

In a note attached to the NY holotype of *Psammisia recurvata*, B.L. Burt (Kew X/1937) postulated that *P. recurvata* may be "indistinguishable" from *P. urichiana* (based on his knowledge of plants from Trinidad and by comparing the types). However, he never formally synonymized the two, which I am herein doing as I agree with Burt.

Psammisia breweri Steyerl. & Maguire, Bol. Soc. Venez. Ci. Nat. 22:377, fig. 20. 1976, **syn. nov.** TYPE: VENEZUELA. BOLIVAR: Meseta del Jaua, Cerro Sarisariñama, 4°41'40"N, 64°13'20"W, 1000 m, 12–15 Feb 1974 (fl), *Steyermark et al. 109076* [HOLOTYPE: VEN (VEN 97130, image!; photo, NY neg. 10550)].

Psammisia urichiana is a geographically widespread and habitat-diverse species—Colombia, Venezuela, Guyana, Trinidad, Ecuador, Peru, Bolivia; tropical moist, wet rainforest, premontane wet rainforest, lower montane rainforest, to montane rainforest, at 150–2150 m altitude. It is characterized by leaves large, (3–)5-pinnerved, short and ± abruptly acuminate apically; racemes short (<1 cm) with up to 15 flowers; pedicels 10–15 mm long; calyx ca. 5–6 mm long overall, the limb and apiculate lobes 3–4 mm long, membranaceous and broadly spreading-campanulate to rotate-campanulate, remaining erect and forming a corona on top of the ovary as the fruit matures (when fresh this corona is usually a lighter shade of green than the rest of the calyx, while in dried herbarium specimens it appears as a lighter color); corolla texture very thin when dry (papyraceous), often translucent, often ballooning when dry, 20–35 mm long; stamen proportionally very short with regards to corolla length (at most ca. 1/4 corolla length); staminal filaments essentially distinct, pilose distally (or not), the connectives broader than the filaments, all conspicuously spurred at apex or alternately less prominent (when the anthers are all spurred, the alternate ones may also be "humped" thus there is some connective and spur dimorphism); and staminal tubules ± connate basally.

Macbride (1959:98) was the first person to note similarities between the species within this group when he stated that *P. pauciflora* was "Nearly *M. elliptica* Rusby, 395, of Bolivia."

Based on the available types and recent collections, I believe that *Psammisia elliptica* from Bolivia, *P. pauciflora* from Peru, *P. coccinea* from Ecuador, and *P. urichiana* and *P. recurvata* from Trinidad are conspecific. *Psammisia urichiana* is the oldest legitimate name within this group. There also seems to be a more distant relationship with *P. pacifica* A.C.Sm. (1946) from Colombia and *P. ramiflora* Klotzsch (1851) from Costa Rica and Panama, but these two species are distinct in having connate anther filaments. This relationship should be looked into more closely, however. *Psammisia urichiana* is also morphologically similar to *P. coarctata* and some of the populations in northern Peru are hard to distinguish. But usually the ± truncate calyx limb with

apiculate lobes of *P. urichiana* (vs. conspicuously lobed calyx) are enough to distinguish the two. *Psammisia urichiana* is fairly common throughout Peru, but is only known from 13 collections in Bolivia.

KEY TO THE SPECIES OF *PSAMMISIA* IN BOLIVIA AND PERU

The following key to the seven species of *Psammisia* currently recognized in Peru and Bolivia, herein provided for the first time, also brings us closer to a complete and usable key to the entire genus when it is used together with those keys already provided for Ecuador (Luteyn 1996), the Guayana Highland (Luteyn 1998), and Mesoamerica (Luteyn et al. 2008b). However, there is still no up-to-date taxonomic revision of or key to all species of the genus *Psammisia* that can be used for overall floristic research, reliable taxonomic identification, or future direction. Our lack of studies of the species found in Colombia especially—still poorly collected and incompletely known—currently represents the largest vacuum in our overall knowledge of the genus. With regards to the genus *Psammisia* specifically, it would also be extremely helpful if future collectors would verify their plant collections with close-up photographs of flowers showing their overall shape (number and position of corolla constrictions, for example) and color patterns, preserving in 70% EtOH (**not** formaldehyde) mature floral and fruiting material, and making notes whether the mature fruits are colored or green, thin-skinned or thick-coriaceous, and if the inner pulp is fleshy and juicy or dryish—characters that are not often noted on labels and that do not dry true to life (see also Pedraza-Peñalosa 2015c).

1. Corolla subglobose, broadly urceolate, or cylindrical-urceolate to cylindrical-subglobose, up to 14 mm long.
 2. Leaves small, elliptic, (3–)6–10 cm long, plinerved _____ **Psammisia amazonica**
 2. Leaves usually larger, variously-shaped, pinnate-nerved.
 3. Leaves linear-lanceolate, to 35 cm long, lateral nerves 5–8 per side _____ **Psammisia globosa**
 3. Leaves elliptic, lateral nerves 2–3 per side (leaves rarely plinerved on the same plant) _____ **Psammisia graebneriana**
1. Corolla tubular, cylindrical or cylindrical-urceolate, usually longer than 14 mm.
 4. Calyx lobes 4–8 mm long, often irregularly fused into 3–4, these often bifid _____ **Psammisia fissilis**
 4. Calyx lobes not exceeding 4 mm in length, usually 5 although the limb sometimes irregularly split.
 5. Leaves chartaceous to soft coriaceous; pedicels 10–14 mm long; calyx lobes lacking or 5 but then apiculate and less than 0.4 mm long; corolla 25–40 mm long; stamens 8–10 mm long, about ¼ length of corolla; fruit with corona present _____ **Psammisia urichiana**
 5. Leaves stiff or thick coriaceous; pedicels 20–60(–71) mm long; calyx lobes prominent, 3–5 in number, 1–3 mm long; corolla 18–38 mm long; stamens 9–15 mm long, about half corolla length; fruit with or without corona.
 6. Stems with epidermis often exfoliating, the twigs and mature stems usually terete to subterete, not flattened; leaves 3(–5)-plinerved, somewhat flat, coriaceous to membranaceous, usually with inner pair secondary nerves arising opposite each other, the tertiary veinlets less prominent; calyx lobes 3–5, often irregularly dissected and in a state of fusion, 1–3 mm long, the limb and lobes of a distinctly lighter color (pale green to whitish green) than calyx tube, and during fruit maturation remaining as an erect corona on top of the ovary; corolla throat short, not more than 1/4 the corolla length; stamen connectives conspicuously spurred, sometimes long-spurred, often alternately spurred; mature berry small, less than 10 mm diam., green, never speckled with brown _____ **Psammisia coarctata**
 6. Stems with epidermis not exfoliating, the twigs and mature stems often flattened; leaves 5–7(–9)-plinerved, often bullate or tertiary nerves prominently impressed above, thick-coriaceous, with inner pair of secondary nerves arising alternate to each other; calyx lobes 5, regularly dissected, 2–3 mm long, the limb and lobes of equal color as calyx tube, not forming a corona, the top of the ovary exposed; corolla throat long, 1/2–2/3 the corolla length; stamen connectives inconspicuously spurred to spurs absent; mature berry large, at least 13 mm diam., green to green speckled with brown _____ **Psammisia ulbrichiana**

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