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I am submitting herewith a dissertation written by Kenneth Dale McFarland entitled "Revision of *Brachythecium* [Musci] for Mexico, Central America, South America, Antarctica, and Circum-subantarctic Islands." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Botany.

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David K. Smith, Major Professor

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and recommend its acceptance:

Accepted for the Council:

Vice Provost
and Dean of The Graduate School

REVISION OF *BRACHYTHECIUM* [MUSCI] FOR MEXICO, CENTRAL AMERICA, SOUTH AMERICA, ANTARCTICA, AND CIRCUM-SUBANTARCTIC ISLANDS

A Dissertation

Presented for the

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Degree

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Kenneth Dale McFarland

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ABSTRACT

A nomenclatural and taxonomical study of *Brachythecium* (Bryophyta: Musci) reported for Latin America (Central America, South America, West Indies) and Subantarctica areas is presented, including treatment of 116 legitimate specific epithets, 13 legitimate infraspecific epithets, and 19 illegitimate names.

The study includes a history of the genus, natural and artificial keys to taxa for all of Latin America and a phytogeographical discussion. Descriptions, distribution maps, and illustrations are given for each recognized taxon. In the chapter on type studies, the typification of each legitimate specific or infraspecific epithet and description of its type are presented along with a list of synonyms disposing of each legitimate and illegitimate name. Discussion of phenotypic variation of taxonomically important characters, ecology, and phytogeography is included.

The study resulted in: (1) recognition of 28 taxa for the defined area, of which 21 are considered to be indigenous and seven that exhibit distributions within and outside the area; (2) exclusion of four taxa previously reported for the defined area; (3) relegation of nine taxa as *nom. obsc.* for the lack of type specimens; (4) synonymized three taxa with taxa of other genera; (5) description of three new sections, *Albicans* Nyholm *ex* McFarland, *Stereopoma* McFarland, and *Subplicata* McFarland; (6) description of two new species, *B. cirriphylloides* McFarland and *B. guatemalense* McFarland; and (7) proposal of one new combination *Kingbergia immersum* (Thér.) McFarland.

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CHAPTER I

INTRODUCTION

Historical Overview of *Brachythecium*

The genus *Brachythecium* is part of the Class Musci, Subclass Bryidae, Order Hypnales, Suborder Hypnineae, Superfamily Brachythecianae, and Family Brachytheciaceae (Buck and Vitt, 1986, pp. 33-34). The family and genus are represented in the bryoflora of all the major landmasses and found in a diversity of habitats. The family consists of approximately 35 genera (Vitt, 1984, p. 747), of which *Brachythecium* has the largest number of specific and infraspecific names described (approximately 820), of which, approximately 270 are presently recognized. Traditionally, both gametophytic and sporophytic characters have been used to separate the various taxa; yet, difficulties in identification and understanding relationships among taxa have limited the number of comprehensive regional treatments of species. Several taxa are recognized as cosmopolitan although world-wide evaluation of the genus has not been undertaken.

In a modern sense, *Brachythecium* consists of plants with pleurocarpous habit; leaves with smooth laminal cells and little differentiation between those of stems and branches, strong single costae, differentiated alar cells, generally long acumina, no paraphyllia, exserted sporophytes, suberect to horizontal capsules, and most importantly, conic opercula (*Brach* = Gr. short: *theca* = Gr. capsule). This typological concept of the genus has evolved over a long

period of history first summarized by Dillenius, the "Grandfather of Bryology," (*Historia Muscorum*, 1741; Margadant 1968, p. i).

Dillenius adopted the general taxonomic concepts of his predecessors, adding new gross gametophytic and sporophytic characteristics to describe 20 genera and 600 polynomial taxa for the group he called Musci. His concept of the Musci included every low-growing plant other than a flowering plants, ferns, or fungi. In the modern sense, he included Hepaticae, Lichens, Algae, *Lycopodium*, *Isoetes*, and a flowering plant *Subularis* (Margadant, 1968, p. i). He also attempted to homologize the organs of the bryophytes with those of the higher plants (Schuster, 1966, p. 127). With Dillenius' genus *Hypnum*, he described 72 species of pleurocarpous "mosses," which included four taxa that later were accepted as belonging in *Brachythecium*.

Later, Linnaeus, in his "Species Plantarum" (1753), introduced his binary system of nomenclature. He limited Musci to 10 genera, which, with the exception of *Lycopodium* and a few Hepaticae, is more similar to modern concepts. He also followed the same sexual system of Dillenius and recognized many of the same species Dillenius had described (Margadant, 1968, p. i). Linnaeus, however, limited *Hypnum* to 40 species including three later to be transferred to *Brachythecium*.

Hedwig, the "modern" father of bryology, with the publication of his "Species Muscorum" in 1801, was the first author to use a microscope for examining mosses. He discovered the male and female sex organs, and his description of the sexual life cycle of the mosses is for the most part as we understand it today (Margadant, 1968, p. ii). Hedwig

excluded *Lycopodium* and the Hepaticae from the Musci and proposed several new genera. He split the Dillenius and Linnaean concept of *Hypnum* into three genera based on peristome characters. These three genera, *Leskea, Neckera,* and *Hypnum*, contained all the diplolepidous pleurocarpous mosses known at that time and are all still recognized today. Hedwig distinguished *Hypnum*, the largest of the three genera, by the presence of a well-developed basal membrane and cilia of the inner peristome teeth. Of the 136 species which Hedwig recognized in *Hypnum*, six are presently considered to be *Brachythecium*. Four of these date from Dillenius and three were treated by Linnaeus (1753). Hedwig segregated *Leskea* from the other two genera based on its lack of cilia on the inner peristome. Two of the 36 species he recognized in *Leskea* are now considered to be in *Brachythecium*. More recently, Grout (1928, p. 27) and Robinson (1962, p. 104) transferred these two species to *Chamberlainia* Grout.

Hedwig is important not only for the advances he made in bryology but because his "Species Muscorum" became recognized as the starting point for the nomenclature of all Musci except the Sphagnaceae (ICBN 13.1b).

In the first half of the nineteenth century, following Hedwig's work, many regional bryophyte floras and several comprehensive treatments of all the mosses known at that time were published. At least twenty different publications described brachytheciaceous species. Some of the more celebrated works are Schwaegrichen's (1811-1842) "Species Muscorum supplementum," Bridel's (1806-1817) "Muscologiae Recentiorum supplementum seu species muscorum" and (1826-1827)

"Bryologia Universa," Müller's (1851) "Synopsis Muscorum Frondosorum," and Montagne's (1956) "Sylloge Generum Specierumque Cryptogamarum." About this same time, several new genera were proposed as segregates of *Hypnum*; however, with the exception of the genus *Pleuropus* (now rejected as a later homonym; = *Palamocladium* C. Müll.) established by Griffith (1842, p. 473), there were no segregates of brachytheciaceous species until the classical work "Bryologia Europaea" of Bruch, Schimper and Gumbel (issued from 1836-1855 *fide* Barnhart, 1944, p. 97).

Schimper described *Brachythecium* in 1853 (*fide* Barnhart, 1944, p. 104) in volume 6 of "Bryologia Europaea." He segregated it from *Hypnum* based on differences of the shape of the leaf cells and shape of the operculum. The name *Brachythecium* was derived from the short thick capsule which is the distinguishing sporophytic character of the genus. Schimper compiled, described, and illustrated 20 *Brachythecium* species for Europe. Most of the species had been previously described as *Hypnum*; a few were published as new.

In the post-Schimper era, 1853-1879, the concept of *Brachythecium* was not universally accepted. New brachytheciaceous species described by Mitten (1869), Lesquereux (1868), and Sullivant (1864) for North America, Latin America and Asia were retained in the pre-Schimper concept of *Hypnum*, while Hampe (1866), Lindberg (1872), and Müller (1874) recognized *Brachythecium* as a subgeneric group of *Hypnum*. However, DeNotaris (1869), Juratzka (1865), Lorentz (1868), Milde (1869), and Molendo (1966), who described several European and a few Asian brachytheciaceous species, recognized *Brachythecium* as a distinct genus.

Jaeger (1870-1880) and Kindberg (1888, 1889, 1891) both produced compenda of all the published moss species known for the world and organized them under generic concepts recognized at that time. In doing so, they transferred most of the names of brachytheciaceous species previously published as *Hypnum* or other genera into *Brachythecium*. From this point, *Brachythecium* became universally accepted in the literature, and conceptualization at the supergeneric and infrageneric level developed.

Work on the pleurocarpous mosses from the time of "Bryologia Europaea" until the 1890s mostly followed the principles of Schimper's classification (Grout, 1897, p. 132). In the 1890s three major publications were produced which re-examined the Musci for Europe and North America and established family status and infrageneric hierarchy for *Brachythecium*. The first of these was Limpricht's (1895-1896) "Die Laubmoose Deutschlands Osterreichs and der Schweiz" where he presented a detailed description of *Brachythecium* for Europe and placed the species into six infrageneric groups. Grout (1897, p. 132), planning to parallel Limpricht's work for the North America Musci, published his "A Revision of the North America Isotheciaceae and Brachytheciaceae" in 1897. In this work he described all known North American *Brachythecium* taxa and divided them into six infrageneric groups, of which four were the same as Limpricht's. He also introduced the family name Brachytheciaceae which was validated with a description by Brotherus (1909, p. 1128). Until this time *Brachythecium* has been considered a part of the Hypnaceae.

Concurrently, Kindberg (1896) published his "European and North American Mosses," which included descriptions of all the *Brachythecium* species he recognized from both continents. He organized the *Brachythecium* species into six infrageneric groups, of which four were the same as those of Limpricht and Grout. Kindberg's work has had little impact on later concepts of *Brachythecium* and in the bryological community his overall work has not been well received because of the taxonomic problems he created (Grout, 1897, p. 131; Crum and Steere, 1977, pp. 1-3).

The most significant accounting of the systematics and phytogeography of all mosses known at any time is found in both the 1909 and 1925 editions of Engler and Prantl's "Die Natürlichen Pflanzenfamilien," compiled by V. F. Brotherus. Brotherus adopted much of Fleischer's (1915-1922) phylogenetic classification including placement of the Brachytheciaceae in the order Hynobryales, characterized by: leaves mostly symmetrical, sporogonium pleurocarpous, capsule upright, peristome double, inner peristome mostly with a keeled basal membrane, processes and articulate cilia, calyptra cucullate. This arrangement of the Hypnobryales placed the Brachytheciaceae between the Amblystegiaceae and the Entodontaceae. Brotherus's distinctions were: Entodontaceae, costa short and double or lacking, capsule erect and symmetrical, cilia of inner peristome rudimentary or lacking; Brachytheciaceae, costa strong and extending to the middle of the leaf or beyond, capsule ovoid, short, thick and unsymmetric, usually little contracted under the mouth when dry; Amblystegiaceae, costa strong and extending to the middle of the leaf or beyond, sometimes short and

double, capsule longer, arcuate-cylindric as a rule, usually more constricted under the mouth when dry (Grout, 1928). This phylogenetic familial arrangement has been adopted in more recent works (Bartram, 1949a; Podpera, 1954; Nyholm, 1969; Lawton, 1971; Crum, 1973; Crum et al., 1973; Smith, 1978; Crum and Anderson, 1981; Ireland, 1982).

Grout (1928), in his "Moss Flora of North America," added additional information to *Brachythecium* for North America and recognized a new genus, *Chamberlainia*, which he distinguished from *Brachythecium* by its erect-symmetric and cylindrical capsules and the lack of cilia on the inner peristome.

Takaki (1955a, 1955b, 1956) heavily revised the Brachytheciaceae in his "Research on the Brachytheciaceae of Japan and its adjacent areas" by describing several new species for the area and designating a new section in *Brachythecium*.

In 1962, Robinson presented a new concept for *Brachythecium* in his "Generic Revision of North America Brachytheciaceae." Robinson emended Grout's genus *Chamberlainia* to include sections *Salebrosa* Broth., *Acuminata* Grout, and *Velutina* De Not., previously included within *Brachythecium*. He further emended *Brachythecium* to include sections *Rutabula* Limpr., *Cirriphyllopsis* (Broth.) Takaki, and *Reflexa* Limpr., thus effectively splitting the original concept of *Brachythecium* into two genera. Until that time, neither genus had been typified; therefore, Robinson lectotypified *Chamberlainia* with *C. acuminata* (Hedw.) Grout and *Brachythecium* with *B. rivulare* B.S.G. which he interpreted to represent the extreme ends of the variation for *Brachythecium*. However, his concept has not been followed in more

recent taxonomic treatments (Breen, 1963, p. 71; Nyholm, 1969, p. 526; Lawton, 1971, p. 288; Crum, 1973, p. 287; Crum et al., 1973, p. 112; Flowers, 1973, p. 420; Chopra, 1975, p. 461; Gangulee, 1978, p. 1701; Smith, 1978, p. 589; Conard, 1979, p. 193; Crum and Anderson, 1981, p. 1029; Ireland, 1982, p. 3611; Reese, 1984, p. 210). In addition, Robinson (1965, and pers. comm.) has rejected his own original concepts of *Chamberlainia*. Therefore *Brachythecium* has been typified with a species which is not representative of the genus as it is used today. (Further discussion concerning this issue is found on page 45 of the typification of *Brachythecium*.)

More recently, McFarland (unpublished manuscript) revised the Brachytheciaceae for Mexico. This was the first taxonomic revision and redescription of the taxa for the family reported from that area. *Chamberlainia* was not recognized as a distinct genus in his revision.

The first judicious phylogenetic scheme for the origin of Brachytheciaceae was proposed by Loeske (1907, pp. 21-22) in his "Zur Systematik der europäischen Brachythecieae." His scheme suggested that all of the genera of the Brachytheciaceae originated from the Leskeaceae through *Leskea* and *Pseudoleskea*. Loeske's scheme was greatly influenced by suggestions made by Max Fleischer, with whom he collaborated. During this time Fleischer (1915-1922) was preparing his "Musci von Buitenzorg." Interestingly, Fleischer (1922, Vol. v. p. 1541) abandoned his earlier thoughts and Loeske's (*op. cit.*) suggestions about the Brachytheciaceae originating from the Leskeaceae through *Lescuraea* and favored derivation from the Cryphaeaceae through *Alsieae*. Later, in his revision of the Brachytheciaceae of North America, Robinson (1962, p.

74) differed with Fleischer (*op. cit.*) and proposed that the Brachytheciaceae had a stronger relationship with the Thuidiaceae, Leskeaceae, and Amblystegiaceae, an idea similar to Loeske's proposal. Yet, he suggested that the natural relationships of the pleurocarpous diplolepideae were obscured by parallel evolution and that final resolution on the origin of the Brachytheciaceae would have to await a revision of the entire pleurocarpous complex.

More recently, analytical approaches to the classification of the Musci have been presented. Vitt (1984, p. 715) in his "Classification of the Bryopsida" suggested that the Brachytheciaceae was closely related to the Amblystegiaceae and Plagiotheciaceae. This has been followed by Buck and Vitt (1986) in their "Suggestions for a New Familial Classification of Pleurocarpous Mosses" where they propose a close relationship between Regmatodontaceae, Myriniaceae, and Brachytheciaceae. Even though these two schemes are not parallel in their proposed phylogenies and are thus inconclusive, they, along with Loeske's and Robinson's scheme, deviate significantly from Fleischer's conclusions of the relationship of *Brachythecium* to the Cryphaeaceae (Table 1).

Profile of *Brachythecium* in Latin America

The family Brachytheciaceae is well represented in Latin America. Of the 36 genera recognized in the family in the world (Buck 1981, p. 362; Vitt, 1984, p. 747) 21 genera are attributed to this area (Brotherus, 1925; Fleischer, 1923; Van der Wijk et al., 1959-1969; McFarland, unpublished manuscript).

TABLE 1. A comparison of familial relationships to the *Brachythecium* within the classification schemes of the Musci proposed by Loeske, Fleischer, Robinson, Vitt, and Buck and Vitt.

Loeske 1907	Robinson 1962	Vitt 1984	Buck and Vitt 1986
Musci*		Bryopsida*	Bryopsida*
Bryales**		Bryidae**	
Hypnobryales***		Bryales***	Hypnales***
Leskeineae****		Leucodontineae****	Hypnineae**** Leskeacanae*****
[Leskeaceae]#----------[Leskeaceae]---------- ----------[Thuidiaceae]			------- Brachytheciacanae***** [Regmatodontaceae]
		Hypnineae****	
----------[Amblystegiaceae]----------[Amblystegiaceae]----------			
Brachytheciaceae	**Brachytheciaceae**	**Brachytheciaceae**	**Brachytheciaceae**
		----------	[Myriniaceae]
Hypnineae****			Hypnacanae*****
----------[Plagiotheceae]----------			
Fleischer 1915-22			
Isobryales***			Leucodontales***
Leucodonyineae****		Leucodontineae****	Leucodontineae**** Cryphaeacanae*****
[Cryphaeaceae]----------			

*Class, **Subclass, ***Order, ****Suborder, *****Superfamily.

#[ ] proposed related family(ies) to Brachytheciaceae.

The 136 *Brachythecium* taxa reported from Latin America make it the largest genus in the family from this area. By comparison, the next largest genus is *Rhynchostegium* with 90 reported species followed by *Eurhynchium* with 30. The other 27 genera each have less than 10 taxa reported.

The genus *Brachythecium* is distinguished from the other 19 genera as follows (Brotherus, 1925; Fleischer, 1923; McFarland, unpublished manuscript): *Brachythecium*: stem leaves concave ± plicate or plicate near leaf insertion; branch leaves erect and slightly imbricate; alar cells differentiated; capsule inclined to horizontal and asymmetric to nearly erect and symmetric; peristome double, processes wide and as long as the exostome from a well-developed basal membrane, cilia well-developed; operculum conic; *Scleropodium* B.S.G.: leaves appressed imbricate, catkin-like; leaves very concave; *Catagoniopsis* Broth. and *Stenocarpidiopsis* Fleisch *ex* Broth.: leaves complanate, alar cells not differentiated; *Homalothecium* B.S.G.: leaves appressed with deep longitudinal plicae; *Lepyrodontopsis* Broth. (=*Lepyrodontopsidaceae* Buck, *sensu* Buck, 1981, p. 560); leaves ecostate, cilia rudimentary, operculum rostrate; *Homotheciella* (Card.) Broth.; *Homalothecium* B.S.G., *Palamocladium* C. Müll.; *Sciuroleskea* Hampe *ex* Broth. (=*Plagiotheciaceae sensu* Buck and Ireland, 1985, p. 89): capsules erect and symmetrical; peristome double, the segments shorter than exostome; operculum conic to rostrate; *Mandoniella* Herz. *Eriodon* Mont. and *Rozea* Besch.: basal membrane ± low, cilia rudimentary or absent, operculum rostrate; *Flabellidium* Herz., *Scorpiurium* Schimp., *Cirriphyllum* Grout, *Oxyrrhynchium* (B.S.G.) Warnst., *Rhynchostegium* B.S.G., *Rhynchostegiella*

(B.S.G.) Limpr., *Eurhynchiella* Fleisch., *Eurhynchium* B.S.G. *Bryhnia* Kaur., *Kindbergia* Ochyra.: operculum long rostrate; *Chamberlainia* Grout: capsules erect symmetrical, cilia lacking.

Chamberlainia is a segregate of *Brachythecium*; however, as discussed later in the systematic profile of *Brachythecium*, page 45, it has not been generally accepted by the bryological community. In my revision of the Brachytheciaceae for Mexico (McFarland, unpublished manuscript), I excluded *Chamberlainia* Grout, *sensu* Robinson as part of the *Brachythecium* because splitting the genus obscures the natural relationships among the species as I perceive them in this region. And, since *Brachythecium sensu stricto* has not been thoroughly investigated for most of the world, a generic split seems premature at this time.

There have been numerous publications reporting the findings of botanical collecting expeditions to Latin America and from resident collectors within Latin America over the past 144 years. The first published report of *Brachythecium* taxa from Latin America was by Hooker and Wilson (1844) who reported on their voyage of the H. M. Discovery Ships "Erebus" and "Terror" into the Southern Circumpolar Region. They described two new species, *Hypnum paradoxum* Hook. *f. et* Wils. [=*B. paradoxum* (Hook. *f. et* Wils.) Jaeg.], and *Hypnum subpilosum* Hook. *f. et* Wils. [=*B. subpilosum* (Hook. *f. et* Wils.) Jaeg.] from Cape Horn, Chile. Over the next 143 years an additional 103 legitimate specific epithets and 13 legitimate infraspecific epithets of Latin American *Brachythecium* were described in 47 separate publications by 18 European and North American authorities. In addition, four circumpolar, five temperate Northern Hemisphere and two North American taxa of this genus have been

reported from the region. The most recent *Brachythecium* described are *B. majusculum* Newton (1974) from South Georgia Island, and *B. zanonii* Buck (in press) from Hispaniola.

The majority of the published reports of *Brachythecium* taxa for Latin America are checklists of taxa collected on expeditions, or reports of the specimens collected by authors or specific collectors. Many of these reports have proposed new *Brachythecium* taxa, but are very limited in importance since they are regional floras which add more to putative distributional information of the species than to taxonomy.

A major problem that has perplexed both systematists and biogeographers studying the mosses of Latin America (*Brachythecium* included) has been the redundancy in naming of new species. This redundancy has created an unusually large number of names representing geographically obscuring the systematics and biogeography of them. Several circumstances have contributed to this situation. Great amounts of time and distance have been involved in exploration of Latin America. Numerous publications (some very obscure) have appeared with few or no references to previous published reports, indicating lack of recognition or collaboration with earlier authorities. Also, this large, diversified, "exotic" landmass was considered a botanical frontier for both "field naturalists" (explorers and collectors) and "closet naturalists" (professionals at museums or other institutions). These "field" and "closet" naturalists had a "new species obsession" that they justified by the assumption that plants collected from each new area represented new and undescribed species, hence numerous geographical taxa were described (Barber, 1980, pp. 40, 59). A final factor has been

the influence of the German bryologist Dr. Carl Müller (1818-1899), one of the more prolific bryologists of the 19th century. His numerous publications, describing mosses from all over the globe, greatly contributed to the large number of geographic taxa. Within Latin America, he described 42% of the legitimate epithets of *Brachythecium*.

In the literature on mosses of Latin America, very limited comparative taxonomic evaluations and synonymic judgments were made, and except for Mitten (1869), no attempt to evaluate the *Brachythecium* taxa within the whole region has been undertaken. Mitten's "Musci Austro-Americani" (1869) was the first compilation of the species known from Latin America at the time. It contained descriptions, taxonomic and synonymic judgments, and is a useful resource on the early history of bryological exploration of Latin America. For *Brachythecium*, however, it has limited taxonomic value because of its age, and especially since the majority of the *Brachythecium* taxa were described subsequently.

Through the 1900s several regionalized floristic treatments within Latin America have been published, but no comprehensive treatment of the mosses of Latin America has appeared since Mitten (1869). These regionalized floras include limited taxonomic interpretation of the reported *Brachythecium* taxa. Herzog's (1916) "Die Bryophyten meiner zweiter Reise durch Bolivia" was the first major compilation of bryophytes for a regionalized area. For *Brachythecium*, it is taxonomically limited because it lacks keys, synonymic judgments, has a limited number of illustrations, and only supplies descriptions for new species. Bartram's (1949a) "Mosses of Guatemala" has been the most useful contemporary work for *Brachythecium* because it contains keys,

descriptions, limited illustration, and synonymic judgments. Crum's (1951) "The Appalachian-Ozarkian Element in the Moss Flora of Mexico with a Check-list of all known Mexican Mosses" is only a checklist with distributional information of all the mosses reported for Mexico and reports 24 *Brachythecium* taxa. Crum and Steere (1951) "The Mosses of Puerto Rico and the Virgin Islands," included limited keys to genera and species within families, descriptions and synonymic judgments. They simplified the taxonomy of *Brachythecium* by recognizing *B. stereopoma* as the only species from this area.

Robinson's (1967) "Bryophytes of Columbia," presented a superficial key to the *Brachythecium* taxa he had identified from Colombia. His interpretations increased the number of species of *Brachythecium* previously reported from that area. Although Robinson referred to several species comparisons, he made no conclusive taxonomic judgments. Newton's (1979) "A Taxonomic Assessment of *Brachythecium* on South Georgia" gave a detailed taxonomic evaluation of the *Brachythecium* taxa for the area and reported the first chromosome numbers for the genus in Latin America. However, no keys, illustrations, or descriptions are included. Seki's (1974) "A Moss Flora of Provincia de Aisén Chile" (1974) was a checklist of reported taxa from this area. It included some synonymic judgments on the *Brachythecium* taxa reported, but lacked keys, descriptions and illustrations.

The "Mexican Moss Manual" by Sharp and Crum (unpubl.) includes a comprehensive taxonomic treatment of *Brachythecium* for Mexico by McFarland. He treated 33 taxa previously reported from Mexico and reported three additional taxa new to Mexico. This treatment recognized

14 taxa and included synonymic judgments, keys, descriptions and illustrations.

Presently, *Brachythecium* in Latin America is understood only from regional studies, but overall is not well understood or defined. Thus, this study has been undertaken to nomenclaturally and taxonomically evaluate the *Brachythecium* taxa described or reported from Latin America and to develop keys, descriptions and illustrations for the taxa recognized.

CHAPTER II

MATERIALS AND METHODS

The literature required for this study was compiled from the resources of the following libraries: Farlow Herbarium Library of Harvard University, Lloyd Library (Cincinnati), U. S. Department of Agricultural Library (Beltsville), New York Botanical Garden Library (Bronx), Missouri Botanical Gardens Library (St. Louis), Smithsonian Institution Library (Washington D.C.), libraries of The University of Tennessee at Knoxville, and the private library of Dr. A. J. Sharp, University of Tennessee at Knoxville.

The circum 4500 specimens examined (see Appendix) consisted of dried specimens from the author's herbarium and the following herbaria: AAU, B, BA, BR, BM, C, CANM, COL, EPH, F, FH, FI, FLAS, G, GB, GE, GL, GOET, H (including H-BR and H-SOL), HBG, JE, L, LAF, M, MEX, MICH, MO, MPU, NY, OXF, PC, R, RO, S, TENN, U, UBC, UPS, US, VT, and WU (abbreviations, Iwatsuki et al., 1976). In cases where there are one or more duplicates of a specimen in an herbarium, the number of specimens present is indicated within parentheses ( ) following the herbarium abbreviation [e.g., *Pringle 10454*, S(4)].

All specimens were examined macro- and microscopically using either an AO Microstar compound microscope or AO Stereo Star Zoom dissecting microscope. Microscopic measurements were made using calibrated ocular micrometers in each of these scopes. Seta measurements of the sporophyte were made using calipers. Photomicrographs were made using a Nikon Optiphot microscope with a Microflex UFX-II photomicrographic

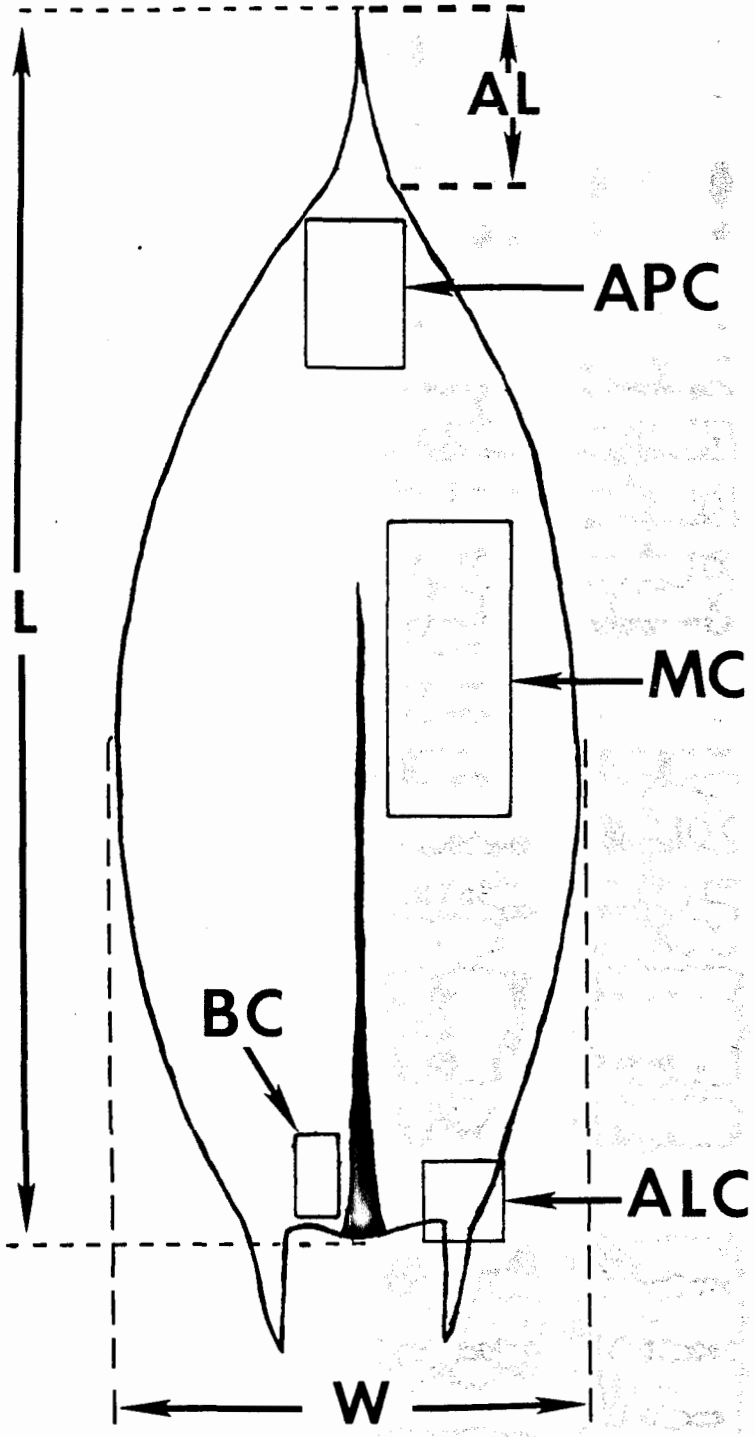
camera attachment, and hand drawings were made using a drawing tube on a Wild 513 microscope. To facilitate the examination of cellular detail for measurements, plant materials were mounted on glass microscope slides with Hoyer's solution (Anderson, 1954) to clear the cells of coloration. Plant materials and microscope slides were prepared by: wetting the plant material in hot water, wicking-off the surface tension water, mounting the plant material in Hoyer's solution, and then heating the slide at 45° C for 24 hours before making measurements. Sporophyte structures were measured after wetting in hot water, wicking-off excess water, and mounting on a glass microscope slide without a cover slip. Spore measurements were made after extracting spores from wetted capsules, mounting spores on a glass microscope slide in Hoyer's solution with a cover slip, and heating the slide at 45° C for 24 hours.

Information used in the taxonomical and type descriptions was derived from observations of morphological characters, sexuality, and the following measurable characters recorded from the specimens examined: stem leaf length and width, costa length (recorded as a percentage of the leaf length), median leaf cell length and width, apical cell length and width, basal cell length and width, alar cell length and width, apex length where appropriate, branch leaf length and width, seta length, capsule length and width, operculum length and width, and spore diameter.

In the taxonomical descriptions, to quantify the range and mean sizes of all measured characters, 25 measurements were made for each character of the gametophyte and sporophyte. The selection of the 25 measured structures of the gametophyte were employed for the following

protocol. Five specimens, preferably with sporophytes, representing the amplitude in size and distributional range were chosen. From each specimen many leaves representing the range in size were mounted on a glass microscope slide with Hoyer's solution. Among these leaves, five separate leaves were selected for measurements. From each leaf a single measurement of each character was made from the regions illustrated in **Figure 1.** Cellular measurements included the cell walls and were generally taken from the first cell in focus, but size extremes were also included. In taxa with abruptly formed apices, the length of apices was measured from the constriction of the leaf where apices originated to the tip. The protocol used for selecting sporophytes for measurement was as follows: five sporophytes from each of the five specimens measured for gametophytic characters were used, or when required sporophytes were selected from other representative specimens. Setae were measured from the bottom of the perichaetia to the base of the capsule. Capsule measurements were made as follows: length from the base of urn to the mouth; width from side to side at the widest portion of the urn. The operculum was measured as follows: length--from attachment to urn to tip; width diameter at mouth. Spore measurements were recorded as follows: five spores from one capsule of five different specimens, or the maximum available from specimens when a limited number of sporophytes present.

The measurements used in descriptions of "type" specimens follow the same protocol as discussed above with the following exceptions. Measurements were taken from the single designated "type" specimen, from which only ten replicates of each measurement were made. When



L=length; W=width; AL=apex length; APC=apical cells; MC=median cells; ALC=alar cells; and BC=basal cells.

FIGURE 1. Leaf dimensions and measured cells location

structures were limited in number, especially the sporophytes, as many measurements were recorded as possible.

All numerical measurements were entered into a conversion and statistical basic language program, written by the author, for analysis on a Radio Shack TRS-80 Model III computer. The analysis generated high and low values plus arithmetic means for each measured character. These mean values are reported in the taxonomical descriptions and type studies with the length value followed by the width, except for seta and apex measurements which are given in length only, and spore measurements given in diameter. All values are given to nearest tenth units and reported in the text in the following format: 0.0-0.0 (x=0.0) X 0.0-0.0 (x=0.0), where 0.0-0.0 (x=0.0), respectively, as low measured value-high measured value (x=arithmetic mean). Units are in cm, mm, or μm. Data derived from less than five measurements are reported without arithmetic means, and where only one measured value was possible, no range of values is given.

CHAPTER III

BRACHYTHECIUM OF LATIN AMERICA

Taxonomic Concepts

My species concept utilizes objective and quantified morphological characters of both the sporophyte and gametophyte, the geography, and the habitat to define practical limits of individual taxa. In this approach, species limits of this revision are defined by a least one nonintergrading character or a combination of characters without priority weighted toward gametophyte or sporophyte.

Infrageneric classification in the genus has been proposed by several authors using a combination of sporophytic and gametophytic characters. Yet, as demonstrated by Wigh (1971, p. 96) a consensus of philosophy and truly natural infrageneric classification have yet to be attained. Most authors follow the classification of Brotherus (1909, 1925) or some slight modification thereof.

For the taxa recognized here, I have developed sectional groupings based primarily on sporophytic characters (nodose vs. appendiculate cilia, degree of annulus development, operculum shape, and seta texture) and secondarily by the pseudoparaphyllia of the gametophyte. Although I find these combinations of characters suitable for delimiting "natural groupings" of taxa, the evolutionary significance of these characters is unknown. Sections, as I have defined them, are derived solely from taxa represented in the Latin America flora, and therefore do not reflect the genus in a world view.

Several philosophies for circumscribing infraspecific groups have been utilized or proposed; however, there seems to be no consensus among bryophyte systematists as to a standard for applying infraspecific groups (Touw, 1982). Historically, infraspecific categories have accommodated taxa of uncertain distinction, being used mostly to formalize names for size variations or geographical disjuncts. Much of the difficulty in defining infraspecific structure for species of *Brachythecium* is the interpretation of notorious phenotypic plasticity combined with ubiquitous distributions of several of the taxa.

A limitation to this study has been heavy reliance on herbarium specimens. It is difficult to assess the taxonomic significance of ecotypic or allopatric variations given the limited information of specimen labels. A serious attempt to incorporate variant forms into infraspecific categories for the taxa treated proved impractical to the task of defining species limits. Therefore, I have constructed a taxonomy whereby weakly defined variation is treated in a descriptive manner within species (*sensu lato*) and well-defined variants are segregated as separate species.

Morphological Characters

Gametophyte

Sexuality: In *Brachythecium* four sexual conditions are exhibited: autoicous, dioicous, synoicous, and polyoicous. Autoicy occurs in 52% of the species recognized in this study and generally is the easiest condition to confirm.

In autoicous, sporophyte-bearing plants, perigonia are usually located at the first sexual bud below the sporophyte, whereas in non-sporophyte-bearing plants, perigonia are located nearest the stem's origin or on the oldest stem portions. Individual stems usually produce one or two perigonia and two or more perichaetia.

Dioicy occurs in 36% of the species recognized in this study and is more difficult to confirm. In dioicous, sporophyte-bearing plants, there is an obvious lack of perigonia on the fertile plants. In dioicous, non-sporophyte-bearing, plants the lack of perigonia on stems with several perichaetia along its length, is usually detectable. In both fertile and sterile specimens, dioicy can be verified by the presence of individual plants with only (several) perigonia. Occasionally, collections with all male plants can be found. Although false dioicous conditions are known to occur in other examples of mosses by protandry, I have not observed such in dioicous *Brachythecium*.

Synoicy and polygamy occur respectively in 4% and 8% of the species recognized in this study. Synoicy is generally more easily detected since the archegonia and antheridia are mixed in all of the sexual buds. Polygamy is more difficult to detect since it may not be observed on every stem of the plant mat. The hermaphroditic inflorescences of polygamous plants may bear more antheridia than archegonia or vice versa.

The taxonomic value of the sexual condition has been well established for this genus. Sexuality is a consistently stable character state among all specimens I have observed and is crucial to identifying many of the taxa. Although most specimens lack sporophytes,

gametangial structures are usually present and sexuality can be determined.

Growth form: As noted by Robinson (1962, p. 78), there are two basic growth forms: a creeping main stem with erect or spreading branches; and an erect, tufted form. In both forms, differentiation between stem and branches in the younger portions is evident. In older portions primary branches will take the form of stems as they develop secondary branches. Even though the pattern and frequency of branching varies within a species, in creeping forms the patterns and frequencies of branching are generally similar, whereas in erect forms the pattern becomes very irregular and infrequent. In addition, the density of stems and branches can vary considerably among specimens of the same species. Generally, this latter variable is a reflection of differences in microhabitat.

Relative to stem and branch leaf: shape, decurrencies, apex length, plication, concavity, areolation size and shapes, and margins, there is some degree of heterophylly. Generally, the branch leaves display the characters of the stem leaves in a reduced series.

Taxonomically, growth form is useful to a limited extent since it can intergrade within a species. Thus, growth form is only useful when augmented with other discrete characters.

Stems: There are few character states of taxonomic value found in stems. In cross section, the stem is composed of a central strand of small diameter cells surrounded by larger thin-walled cells that gradually or quickly become smaller with thicker walls at the stem surface. In surface view (longitudinally), all of the stem cells are

elongate and rectangular. The stems of this genus lack true paraphyllia, yet do produce, often distinctive, pseudoparaphyllia (discussed below). Other than pseudoparaphyllia, stem morphology and cell pattern are of limited taxonomic use.

Pseudoparaphyllia: Pseudoparaphyllia in *Brachythecium* are foliose appendages surrounding the branch primordia and at the base of branches. Although these structures have been recognized for a long time (Limpricht, 1904), they have only recently attracted due attention as useful characters for separating genera, subgenera, sections and, to some extent, species in pleurocarpous mosses. Ireland (1971) examined pseudoparaphyllia of North America pleurocarpous mosses and postulated an evolutionary scheme for their origin.

Pseudoparaphyllia occur in most of the families considered to be closely related to the Brachytheciaceae and have been recognized as useful taxonomical characters by some recent authorities of these families: Amblystegiaceae (Kanda, 1975), Sematophyllaceae (Seki, 1968), Plagiotheciaceae (Ireland, 1969; Iwatsuki, 1970; Lewinsky, 1974) and Hypnaceae (Ando, 1972, 1973, 1976). Contrary to the above, Buck (1980) declared that pseudoparaphyllia were of little taxonomic application in the Entodontaceae. Neither Grout (1928), Robinson (1962), nor Takaki (1955-56) pursued the taxonomic application of pseudoparaphyllia in the Brachytheciaceae.

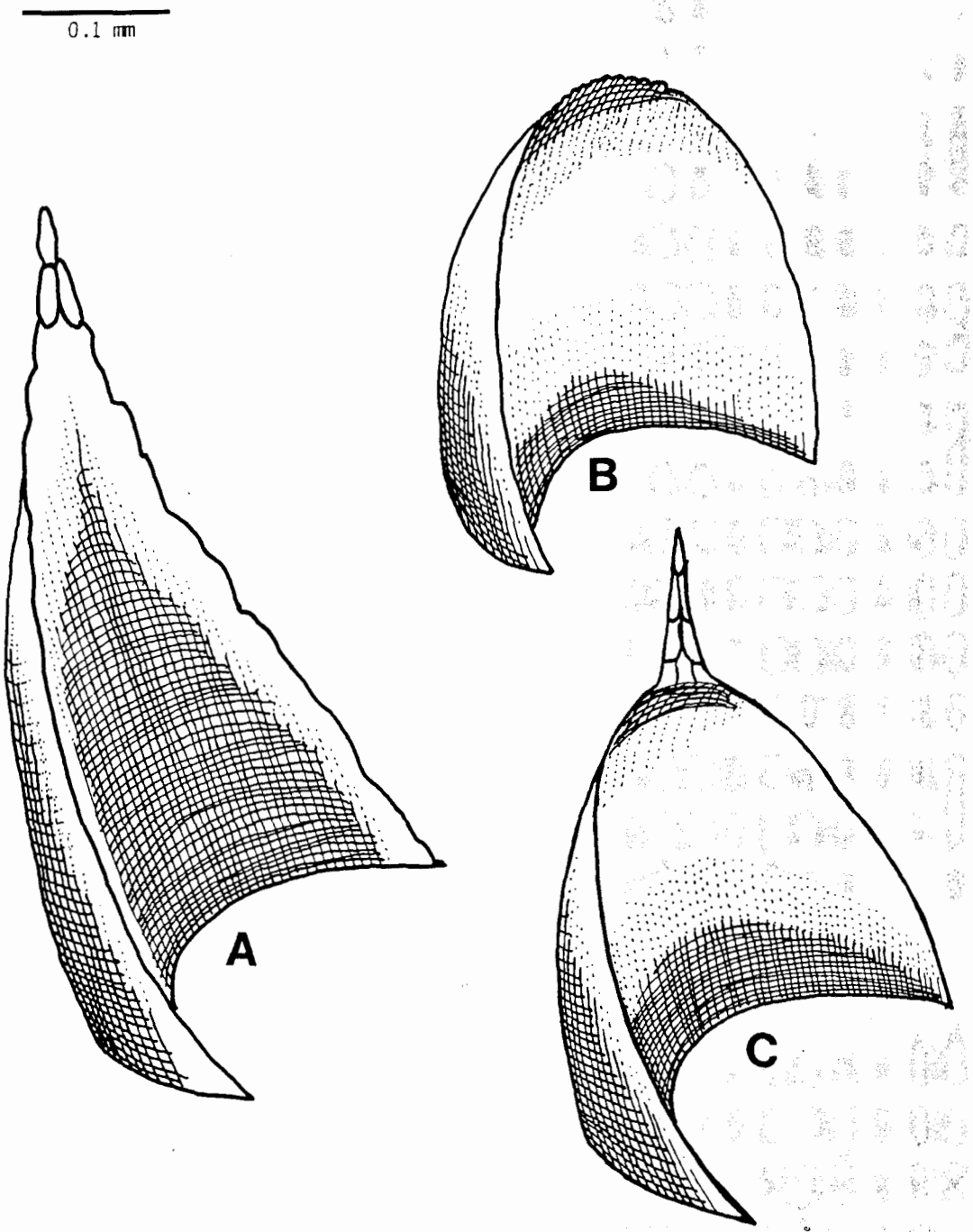
I have found pseudoparaphyllia to occur in all of the *Brachythecium* species examined. They are of two general character shapes: obicular to ovate-apiculate; and ovate-acuminate or triangular. I have found

these characters to be useful in delimiting some taxa at both the sectional and species levels (**Fig. 2**).

Leaf shape: The leaf shape of the taxa are quite variable, but to some extent, unique among species. The leaf shape of all taxa is somewhat ovate. Variation occurs in the width of the base, degree of decurrencies, degree of plication and concavity, and the shape of the apices. All of these characters can vary within a species but in combination have proven to be useful taxonomically.

Leaf margins vary from nearly entire to serrate, typically toothed above and smooth below except where slightly serrulate along rounded shoulders near the insertion. The degree of serrulation is more pronounced in younger leaves. In some taxa with abruptly formed apices, teeth are produced at the base of the acumen. Margins are frequently reflexed at base or above the decurrencies.

Costa: The single costa is one of the primary characters defining the family Brachytheciaceae. In this genus the costa varies in length, breadth, presence or absence of terminal spines, and lateral spurs. In cross section the costa is undifferentiated. In the majority of the species the costa is three to six cells wide at the leaf base and quickly tapers above, becoming two or three cells wide in the middle, and eventually ends with a single cell near or beyond the midleaf. Stout costae are wider at the base, to ten cells, taper more gradually before ending in a single cell. Many of the taxa exhibit a small inconspicuous spine protruding from the dorsal side at the tip. In some taxa, especially *B. conostomum*, as the costa tapers the lateral costal cells will protrude into the leaf laminae, effecting a lateral spur. In



Pseudoparaphyllia
A: ovate-acuminate
B: orbicular
C: ovate-apiculate

FIGURE 2. Pseudoparaphyllia characters

two of the taxa, the costa is subpercurrent (>72% of leaf length). Only the latter two costa characters are considered to be of taxonomical significance.

Media leaf cells: Among the species of *Brachythecium* represented in this revision, the median leaf cells have smooth surfaces and blunt to tapering ends, are fusiform or rhomboidal to linear-flexuous in shape, and ± porose. Within a species, the size and shape of the cells is relatively uniform. There seems to be little correlation between length and width or size of these cells to the width and length of the leaf. In a few taxa, the size and shape of the median cells is taxonomically useful (i.e., *B. conostomum* with cells significantly broader than any of the other taxa).

Apical cells: The size and shape of apical leaf cells varies among the species represented in this revision. The apical cells are transitional from the terminal cell to the median cells. Generally, the terminal cell is linear and slightly shorter than the apical cells below it and the apical cells are shorter than the median cells. Apical cells are smooth and usually are similar in shape to the median cells.

The shape/length of the apical cells can be influenced by the size and shape of the leaf apices. In a few species, apical cells are diagnostic. For example, in *B. zanonii*, the linear apices of the leaves have apical cells which are longer than the median cells, and in *B. plumosum* apical cells are distinctly shorter than the median cells and its terminal leaf cell is noticeably smaller than other apical cells.

Basal cells: Among and within species, the basal cells vary considerably in size and somewhat in shape. Overall, basal cells are

generally differentiated from median and alar cells by their elongate rectangular shape with cell ends that vary from plane-perpendicular or oblique to gradually tapering. They are generally twice as wide as median cells, and become narrower as they intergrade with them. In most taxa the basal cells are longer and therefore differentiated from the alar cells. The walls of basal cells tend to be porose in the medium- to large-sized species. In general, as the stems and branches increase in diameter the basal cells become wider, and to some extent more porose. Basal cells display no unique characters, thus only become taxonomically important when used in conjunction with other characters.

Alar cells: The alar cells vary significantly among taxa and are useful in delimiting many of the species. Also, they can be distinctive within some of the sections. Alar cells of most taxa are defined by an abrupt transition from the median and basal cells. These cells vary from small thick-walled quadrate or rectangular to large thin-walled inflated cells and rarely have porose walls. Their symmetry varies from square to rhomboidal in relation to the curvature of the associated margins at the stem insertion. As the basal margins become more rounded, squarish alar cells become more rhomboidal. Leaves with linear insertion contain squarer alar cells. In some species of the sections *Velutina* and *Julacea*, the upper and outer cell corners of rhomboidal marginal cells project outward creating a distinctive serrulation.

The size/shape of the alar cells may vary within a species in relation to the age of the leaf. In younger leaves the alar cells have not completely enlarged, thus absolute characterization of the alar cells requires that leaves have reached mature size. In some instances

the older stem leaves become broadened such that the alar cells appear distorted and enlarged beyond the norm (i.e., *B. majusculum*).

The alar regions of *B. frigidum, B. subpilosum, B. austro-salebrosum* and occasionally several other taxa, are defined within small auricles. The auricles may be formed as a result of the bulge produced from enlarged alar cells or may consist of a group of smaller dense cells at the margin.

Decurrencies: The decurrencies of leaf bases range from weakly formed to long and broad. They are of mixed utility in delimiting taxa, depending upon the intraspecific range of variation. Taxa with non-inflated alar cells produce decurrencies from a continuation of the alar cells or as transitional longer rectangular cells. The decurrencies of taxa with inflated alar cells may also consist of a continuation of the alar cells or consist of smaller cells, or in extreme cases as in *B. filirepens, B. rutabulum*, and to some extent *B. subpilosum*, a secondary decurrent wing of small delicate quadrate cells is juxtaposed to the inflated cells. This secondary decurrency seems to be an aberration of unknown cause and is not considered taxonomically important.

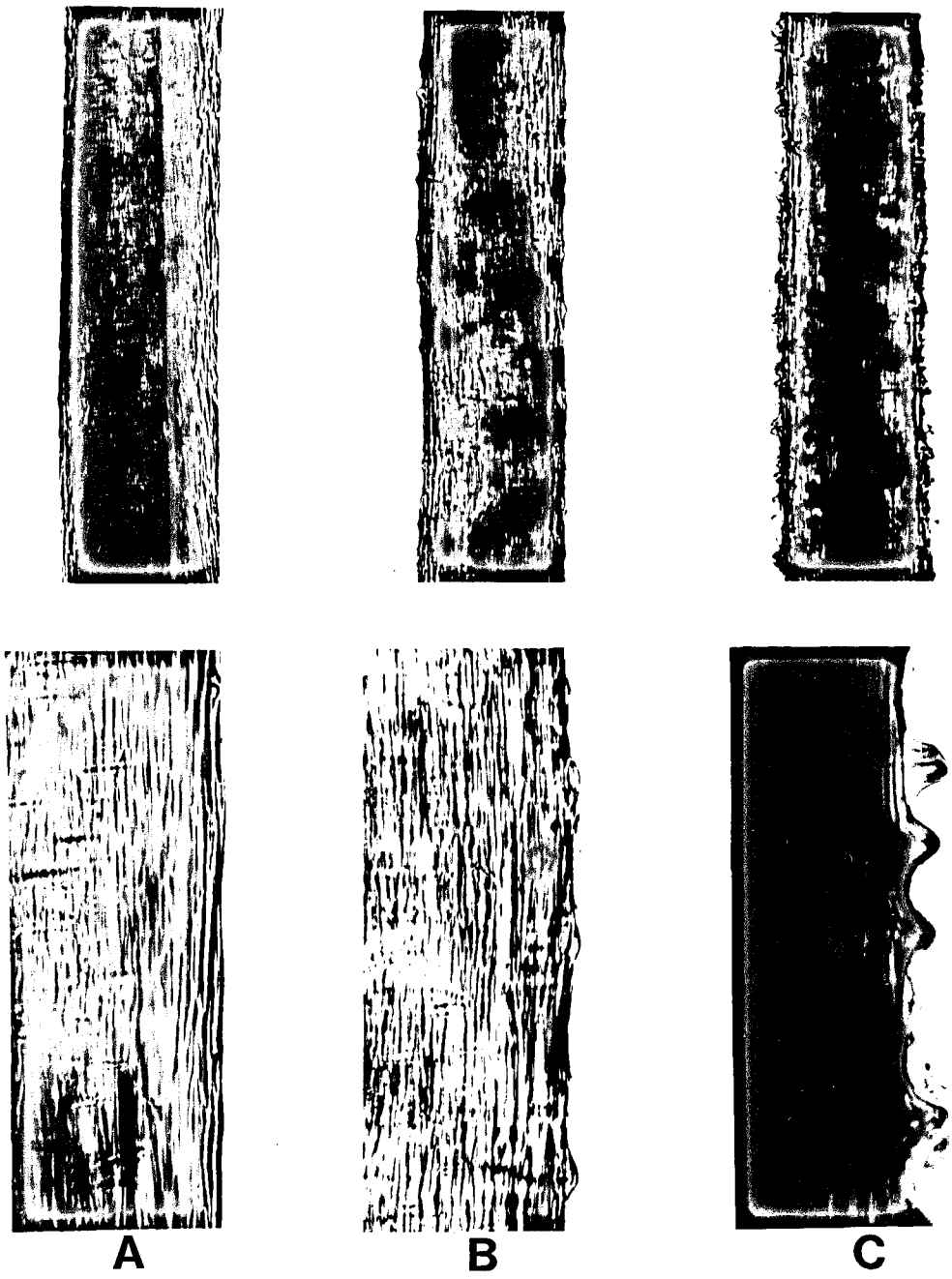
Sporophyte

Seta: The seta varies considerably in length and surface texture among the taxa studied, but is fairly uniform in color. The length of the seta ranges, from the longest being 2 to 3 times the shortest, and appears more related to the size of the gametophyte than to fixed species differences. The most useful taxonomic character of the seta is surface texture, which can be lumped into several categories: smooth, weakly papillose, papillose with low scattered papillae, papillose with

dense tall papillae, and papillose above while smooth below. *Brachythecium stereopoma* exemplifies the taxa with smooth setae in that the surface is smooth throughout the length and consistently smooth throughout distributional range of the species. In contrast, the setae of *B. collinum, B. fendleri* and *B. occidentale* are typically smooth but occasionally will produce low papillae. This variation, even though not unique to the taxa of this region, has little taxonomic significance since it does not parallel other discrete character differences. The low scattered papillae found on the setae of *B. polyoicum* and *B. chocayae* are consistent among specimens and are useful for delimiting taxa with similar gametophytic morphology. The dense tall papillae on setae of *B. rutabulum* typifies the condition for all taxa with this character as it occurs throughout the length of the seta. The setae of *B. filirepens, B. plumosum,* and *B. subpilosum* have low papillae above that diminish and gradually disappear toward the base. This feature may vary both in the degree of papillosity and in the distance the papillosity descends toward the base of the seta.

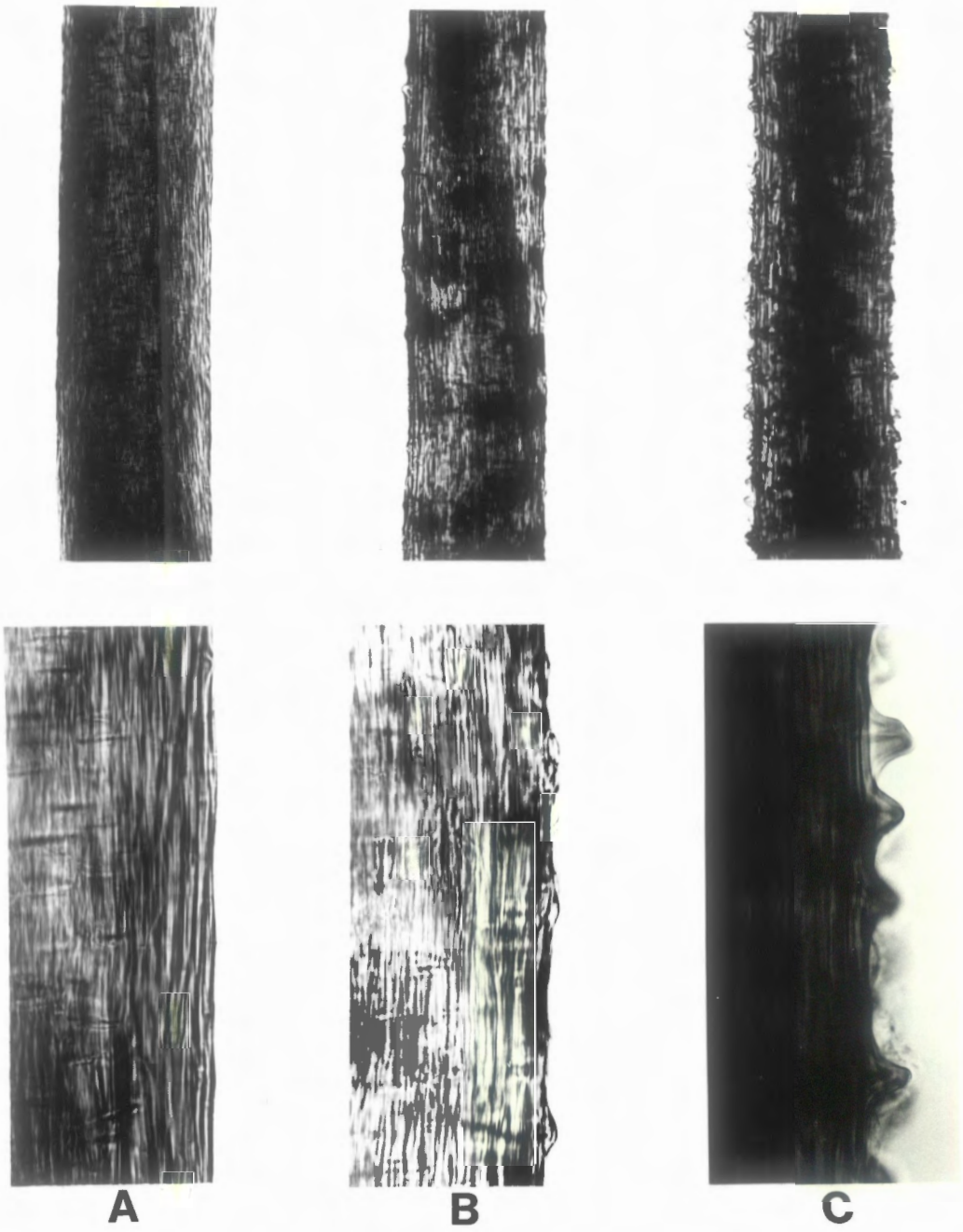
The red-brown color of mature setae is relatively consistent among taxa. During development the seta color changes from greenish when younger to darker red-brown when older (**Fig. 3**).

Capsule: The capsule varies in position, size, shape, and exothecial cell patterns. All of these character states are definable, but weak, in discriminating various taxa. Inclined capsule position, although often consistent with a species, is rarely diagnostic among species (exceptions being erect in *B. fendleri* and horizontal in *B. cirriphylloides*). Capsule size seems correlated to plant size and may



Setae
A: smooth (*B. stereopoma*); upper 87X; lower 348X.
B: low scattered papillae (*B. chocayae*); upper 87X; lower 348X.
C: dense tall papillae (*B. rutabulum*); upper 87X; lower 348X.

FIGURE 3. Setae characters



Setae
A: smooth (*B. stereopoma*); upper 87X; lower 348X.
B: low scattered papillae (*B. chocayae*); upper 87X; lower 348X.
C: dense tall papillae (*B. rutabulum*); upper 87X; lower 348X.

FIGURE 3. Setae characters

vary considerably within a species. The majority of taxa have asymmetric capsules, being curved, and vary from short-ovoid to cylindrical. The age of the capsule and presence of spores influences the plumpness. Similarly, the color of the capsule changes as it matures from reddish green or reddish yellow to red-brown, darker red-brown or black. In the dry, empty state the urn will shrink beneath the mouth. In mature capsules, the exothecial cells are generally rectangular in shape and are patterned in rows. In addition, the end walls are thicker than the lateral. In smaller capsules the cells have a more random pattern and the walls appear more uniform in thickness (**Fig. 4**).

Operculum: The operculum shape has historically been one of the primary characters that unites the species recognized for this genus. In the species represented in Latin America the operculum varies from concave-conic with short and non-apiculate apices to convex-conic, short or gradually elongate (not-rostrate), ± black, apiculate, apices. The sizes and shapes of the opercula among most of the species (except *B. fendleri, B. collinum*, and *B. stereopoma*) are not considered species diagnostic, in most cases (**Fig. 4**).

Annulus: The cells of the annular zone and suboral zone vary from undifferentiated to highly differentiated with two rows of enlarged to inflated cells. I recognize four categories: undifferentiated, differentiated with cells larger than adjacent (not inflated), differentiated with a single row of inflated cells, and differentiated with two rows of inflated cells. Robinson (1962, p. 89-99) recognized three conditions in the annulus for *Brachythecium*; undifferentiated,

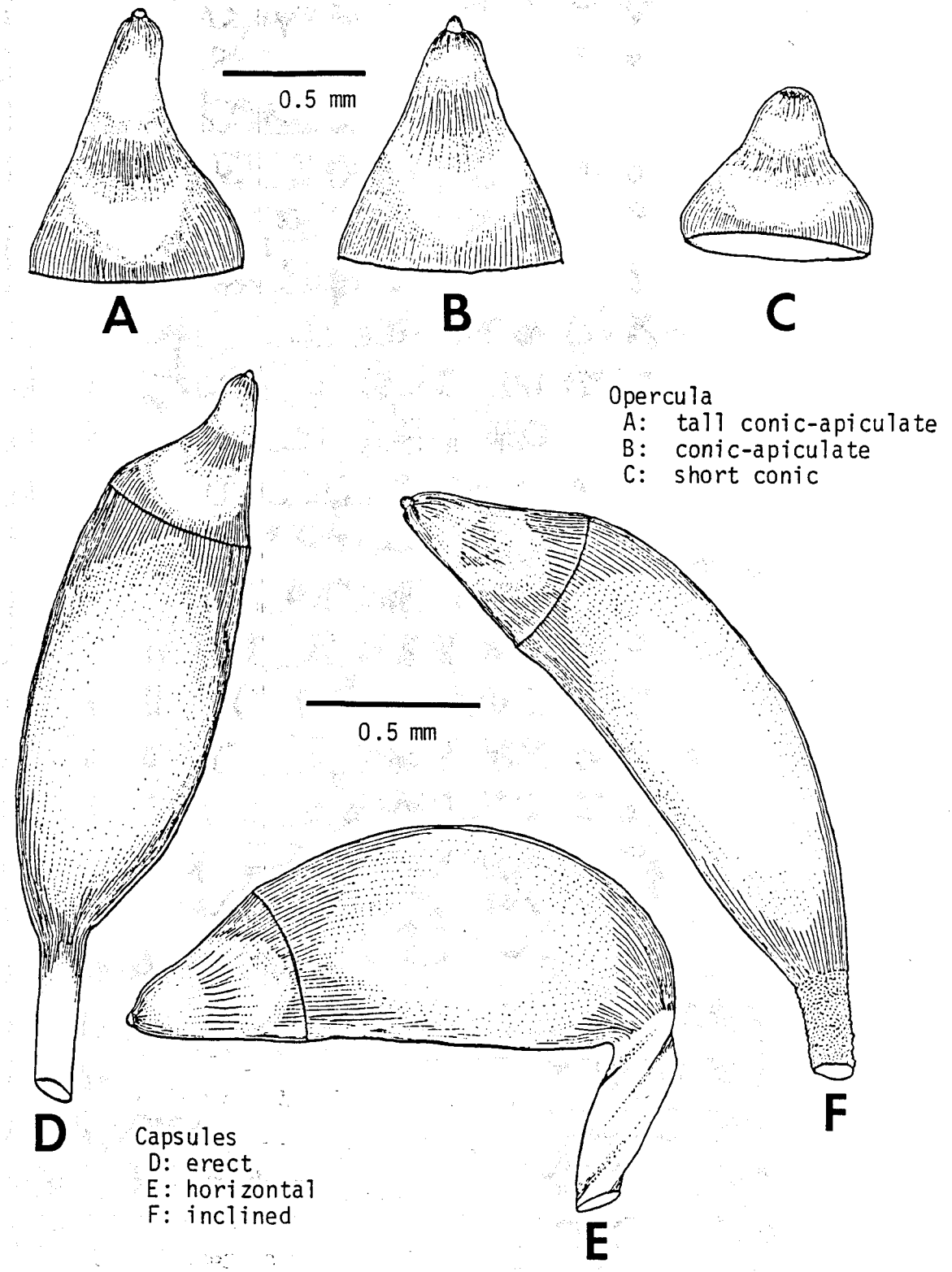


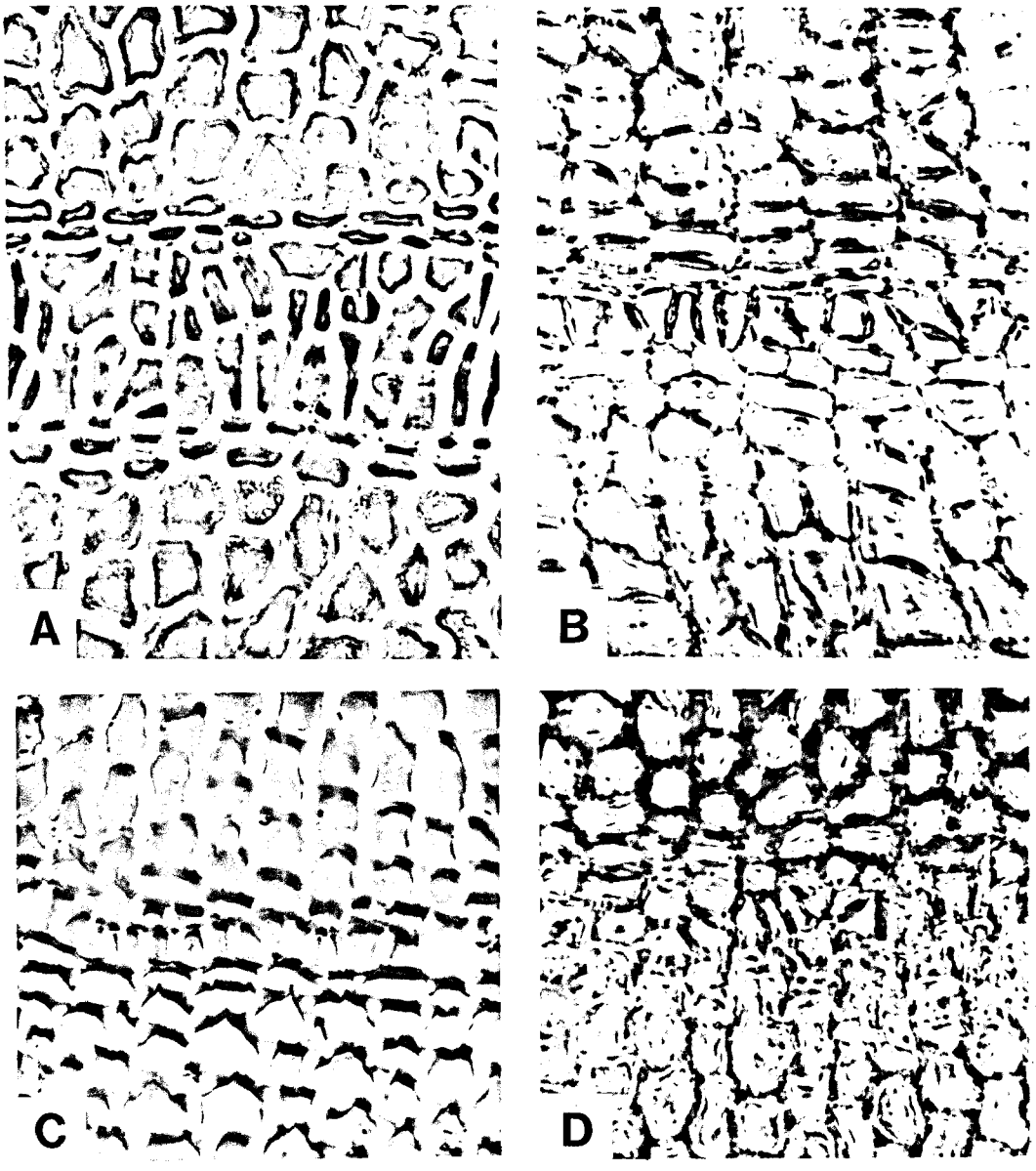
FIGURE 4. Capsules and opercula characters

narrow with one row of differentiated cells, and large with two rows of cells. However, he did not consider the single vs. double row of cells to be of any significance and related the undifferentiated annulus to the taxa with erect capsules (**Fig. 5**).

Each category is consistent and taxonomically useful at the species level. Other authors have also considered the presence or absence of the annulus to be useful only at the species level--Sematophyllaceae (Seki, 1968), Hypnaceae (Ando, 1972), Amblystegiaceae (Kanda, 1975), and Entodontaceae (Buck, 1980). Furthermore, I find the annulus character to be useful in delimiting sections when combined with other characters of the gametophyte and sporophyte.

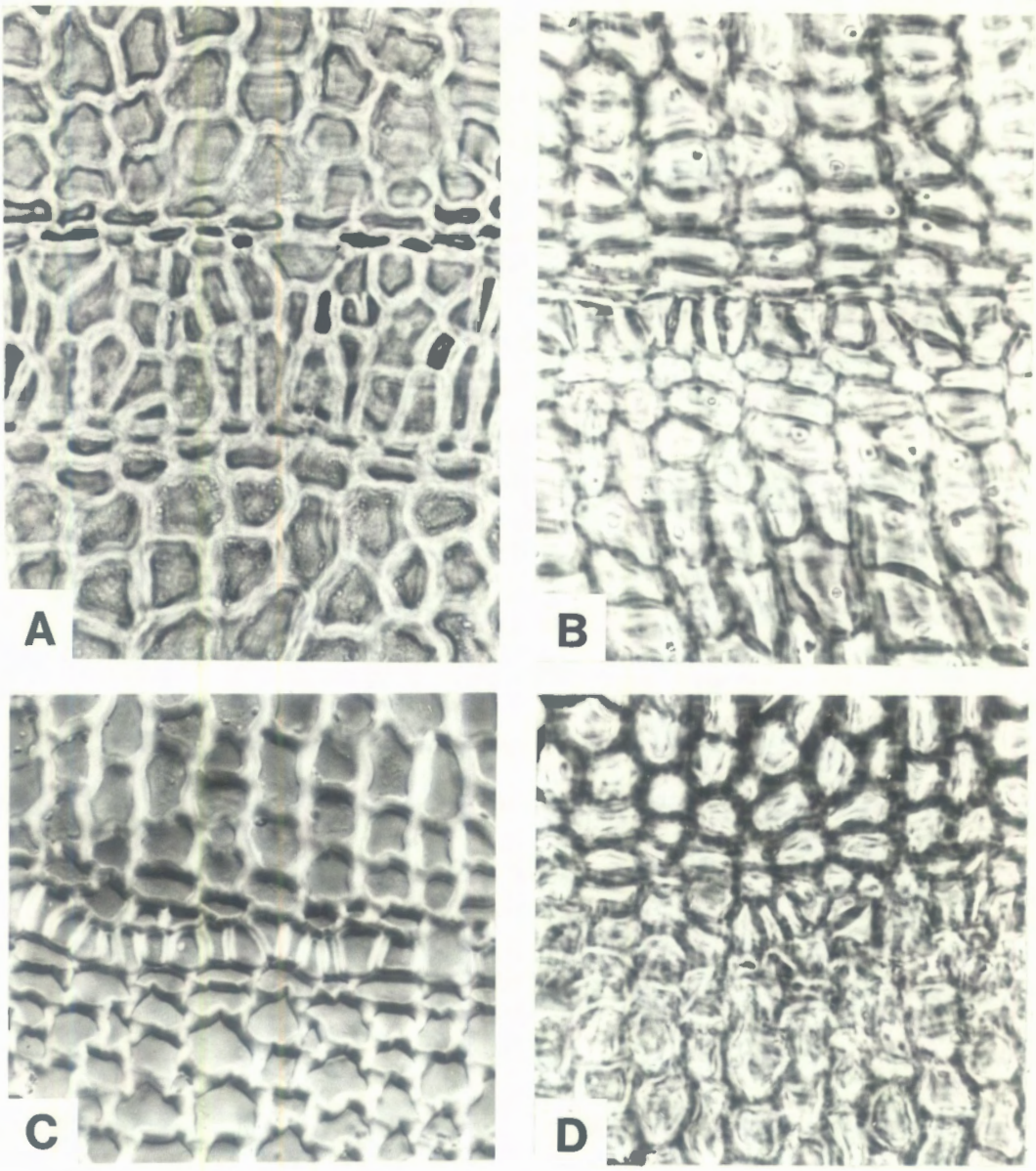
Peristome: Except for the cilia of the endostome, the exostome and endostome are similar among species. Cilia characters of importance are their presence, nodose or appendiculate, or absence. The number of cilia present between each endostome tooth is, however, not considered taxonomically significant, since the number varies between 1 and 4 within a capsule.

In the Brachytheciaceae the lack of cilia is considered to be a degenerative condition related to the erect position of the capsule (Robinson, 1962, p. 90). Among the Latin American species with known peristomes, cilia are lacking only in *B. fendleri*. Whereas *B. fendleri* generally supports Robinson's contention, a few specimens that I have examined produced complete cilia (± appendiculate). And, in other species (*B. stereopoma* and *B. conostomum*) that produce erect capsules, well-developed cilia are routinely observed.



Annuli
A: differentiated two rows of inflated cells (*B. rutabulum*); phase contrast 440X.
B: differentiated one row of inflated cells (*B. salebrosum*); phase contrast 440X.
C: differentiated non-inflated cells (*B. plumosum*); differential interference contrast 440X.
D: undifferentiated (*B. stereopoma*); phase contrast 440X.

FIGURE 5. Annuli characters



Annuli
A: differentiated two rows of inflated cells (*B. rutabulum*); phase contrast 440X.
B: differentiated one row of inflated cells (*B. salebrosum*); phase contrast 440X.
C: differentiated non-inflated cells (*B. plumosum*); differential interference contrast 440X.
D: undifferentiated (*B. stereopoma*); phase contrast 440X.

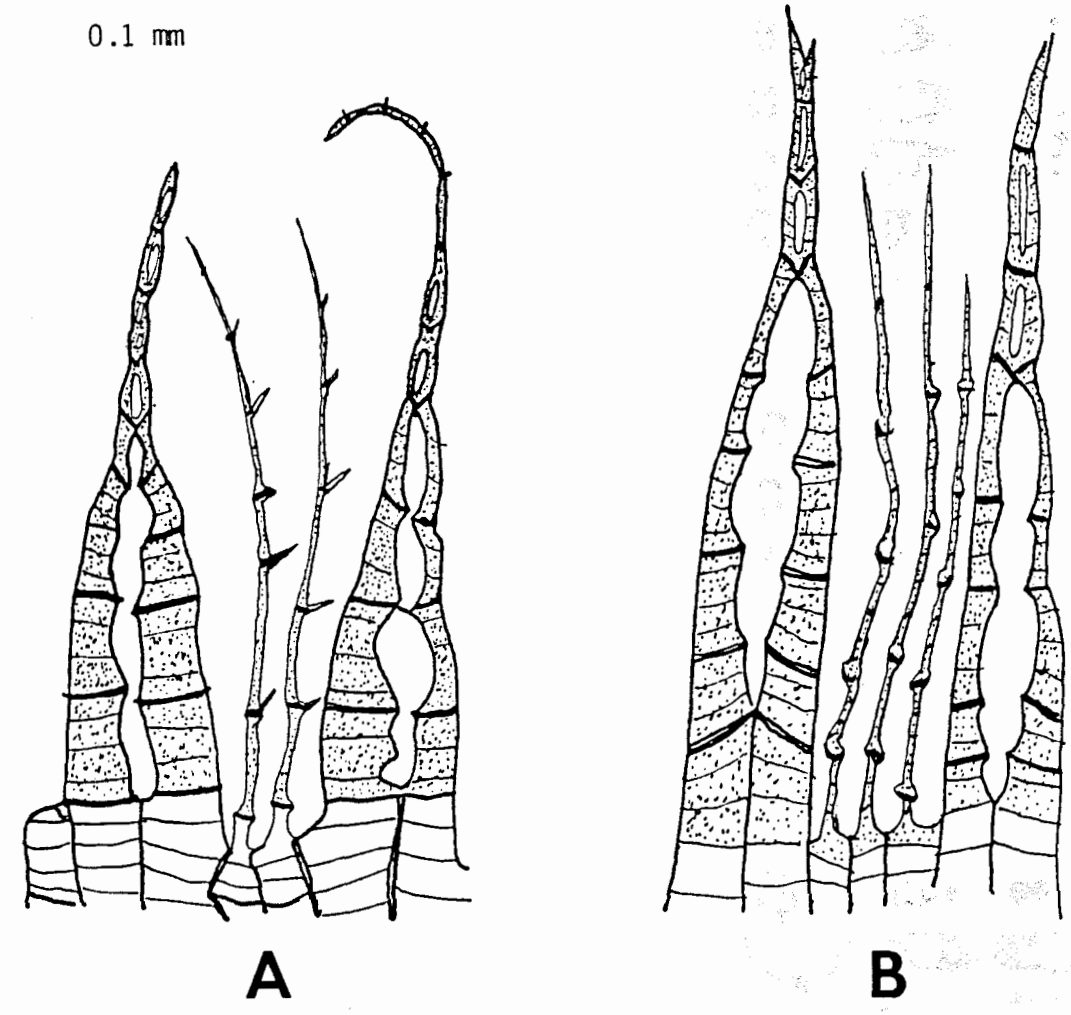
FIGURE 5. Annuli characters

Within the Brachytheciaceae the presence or absence of appendiculae on the cilia has been used by others in delimiting species and to some extent sections. I also find this character useful in delimiting species and sections when used together with other sporophytic and gametophytic characters (**Fig. 6**).

Ecology

Within Latin America, the taxa of *Brachythecium* are distributed throughout several different vegetation zones and a diversity of habitats. They are associated primarily with the high altitude forests and grasslands (1500-4000 m) although certain taxa are known from the tropical lowland forests. In southern South America, Antarctica, and subantarctic islands, the species occur in forests, glacial fields, and tundra areas.

Most of the taxa are not substrate specific and can occur as epiphytes, on soil, and/or on rock. Generally, the plants from Mexico, Central America, and most of South America are associated with moist shaded habitats in forests, on tree trunks and roots, woody shrubs, rotting wood, moist ± calcareous rocks, rock outcrops, moist terrestrial soil or soil over rock, along trails or stream banks, and in some cases, in running stream water. Occasionally, they inhabit drier exposed sites. Above tree line, they occur in exposed sites or associated with other plants on ± moist soils or rocks. Under most conditions, the plants generally form mats; however, tufted forms are common on extreme sites.



Inner peristome
A: cilia with appendiculae
B: cilia nodose

FIGURE 6. Peristome characters

In the latitudes south of the 35° S, *Brachythecium* grows at lower elevations (5-2000 m). In this region, the taxa generally form mats on moist to wet substrates in forests. In tundra and glacial outcrops, the taxa often form tufts along streams, on moist to submerged rocks or rock outcrops, or mixed with other vegetation in hummocks.

Phytogeography

Within Latin America, taxa of *Brachythecium* show several definable distributional patterns. Interestingly, but not surprising, these patterns roughly correlate to distributional patterns of phanerogams illustrated by Takhtajan (1986) and other bryophytes discussed by Schuster (1983).

There are two major phytogeographical regions, 26° N to 35° S, and the 35° S parallel to the antarctic circle (66.5° S). Considering only the species of *Brachythecium* confined to South America, there are 12 species north and 11 species south of the 35° parallel of which only 3 are common to both areas. This divergence in the *Brachythecium* flora near the 35° S parallel is related to the climatic transitional zone of the area. In addition, there is also some evidence that past glaciation in the area around 35° S latitude (Brüggen, 1950) was a barrier to migration of certain plants and animals (Reiche, 1934; Simpson, 1973).

South of the 35° S parallel, which includes southern Chile and Argentina, Antarctica, Falkland Islands (Malvinas), and South Georgia, there is a high level of endemism, and several disjuncts. Endemic species include *B. austro-salebrosum, B. austro-glareosum, B. majusculum, B. subpilosum, B. subplicatum, B. paradoxum, B. filirepens*,

and *B. microcollinum*. Disjuncts include *B. albicans* and *B. collinum*. In addition, *Brachythecium praelongum*, a South American endemic, *B. rutabulum*, and *B. plumosum* (cosmopolitan) are also found there. Even though *B. austro-glareosum* is disjunct to the higher elevations in Ecuador, Colombia, and Peru, I consider it to be indigenous to the southern region because of its greater abundance and broader distributional range at this latitude.

In the more northern phytogeographic region (26° N to 35° S parallel), I recognize five distinct distributional subregions: northern Mexico and Baja California; Central America, excluding northern Mexico; West Indies; mountainous regions of South America north of the 35° S parallel including northern Argentina, Colombia, Venezuela, Ecuador, Peru, Bolivia, northern Chile; and highlands of southeastern Brazil.

In northern Mexico and Baja California all of the *Brachythecium* taxa, except *B. stereopoma* are on the southern or western extremes of their North American ranges. These species include *B. oxycladon, B. albicans, B. fendleri*, and *B. collinum*. Conversely, *B. stereopoma* is found here at the northern limit of its range. This area forms a transitional zone between Latin American taxa and northern North American taxa of *Brachythecium*. Other Latin American taxa of *Brachythecium* which reach their northern distributional limits here are *B. cirriphylloides, B. conostomum*, and *B. occidentale*.

In the Central American region defined by the northern limit discussed above and the southern limit at the isthmus of Panama there are two endemic taxa, one disjunct taxon, several indigenous Latin

American taxa and two cosmopolitan taxa. The two endemics, *B. guatemalense* in Guatemala, and *B. polyoicum* in Mexico, have very limited distributions. *Brachythecium frigidum* also has a limited distribution within Mexico, but is more widespread in northwestern North America, including Alaska and Canada. The Latin America indigenous taxa *B. cirriphylloides, B. conostomum, B. occidentale*, and *B. stereopoma* are also distributed southward into southern South America. Similarly, the cosmopolitan taxa *B. plumosum* and *B. rutabulum* reach their northern Latin American distribution in central Mexico and in Guatemala respectively, and a continuous distribution to the southern tip of South America.

I recognize the West Indies as a distinct regional flora with *Brachythecium* diversity low and consisting of an interesting combination of two weedy species, *B. plumosum* and *B. stereopoma*, and a single endemic taxon *B. zanonii*. This latter, newly described species (Buck, in press) suggests that some speciation has occurred through isolation of a *B. stereopoma*-like biotype in the island groups.

The mountainous region of South America north of the 35° S parallel shows some distributional limits to the north at the isthmus of Panama and several distributional limits at 35° S. Even though several *Brachythecium* taxa have continuous distributional patterns on either side of the isthmus of Panama, two species, *B. chocayae* and *B. praelongum*, that are widely distributed in South America, are absent from Central America. Excluding taxa with disjunct distributions and species known only from their types, the following taxa reach a southern distributional limit near 35° S: *B. chocayae, B. cirriphylloides, B.*

conostomum, B. occidentale, B. plumosum, and *B. stereopoma*. The taxa unique to this region are *B. chocayae, B. praelongum*, and three taxa known only from their types: *B. cavifolium, B. calliergonoides* and *B. rivularioides*. Taxa common to both Central America and this region are discussed above. Taxa found in this area and south of the 35° S parallel are: *B. rutabulum* and *B. plumosum* (cosmopolitan taxa); *B. praelongum*, disjunct to the southern tip of S. America; and *B. austro-glareosum*, which is widely distributed in the circum-subantarctic and antarctic area and disjunct to the high elevations of the northern Andes.

Brachythecium

Brachythecium B.S.G., Bryol. Eur. 6: 535. 1853. (fasc. 52-54 Mon. 1). = *Chamberlainia* Grout, Mem. Torry. Bot. Club. 6: 163. 1897. *sensu* Robinson, Bryologist 65(2): 100. 1962.

Type specimen (des. mihi): *Brachythecium rutabulum* B.S.G., Bryol. Eur. 6: 543. 1853 (fasc. 52-54 Mon. 11. 9. plate 11). (See typification below.)

Plants small- to large-sized, yellow-green to dark green, ± shiny, in loose or dense mats to erect and tufted. Stems and branches terete to complanate-foliate, ± julaceous, paraphyllia absent. Stems prostrate to erect, pinnate to irregularly branched; branches prostrate to erect, ± tapering; central strand narrow, inner cortex large and thin-walled, gradually becoming smaller with thickened walls at stem surface, or with a few layers of small thick-walled cells at surface; pseudoparaphyllia orbicular, ovate-obtuse ± erose to apiculate or acuminate, or elongate-

triangular to lanceolate. Leaves in many rows, imbricate to spreading, straight to secund at tips, or occasionally secund (asymmetrical), concave to deeply concave, ± plicate, weakly to long and broadly decurrent, lanceolate to broadly cordate-ovate; apices gradually to abruptly or aristately acuminate, tips short-blunt to long and pointed; margins reflexed at base and occasionally at constriction of apex bases, plane elsewhere, entire to serrate above, generally entire below, occasionally toothed at constriction of apex bases; costae single, rarely double, broad at base, tapering above, ending near midleaf or in acumina, smooth or with lateral spurs, ± ending in an inconspicuous dorsal spine. Median cells smooth, short fusiform to long vermicular-linear; apical cells similar; basal cells fusiform to elongate-rectangular, ± porose, ± lax; alar cells small quadrate to inflated-rectangular, generally in a defined group, ± extending into decurrencies. Dioicous, Autoicous, Synoicous, or Polygamous. Perichaetia cylindrical; leaves closely imbricate, ecostate or rarely with weak short costae; outer leaves sheathing at base, ovate, short-acuminate; inner leaves longer acuminate, tips straight to reflexed; cells rectangular to linear ± lax; margins entire or serrulate above, bordered by elongate rectangular cells to near tips in shorter leaves and along base in longer leaves. Perigonia pyriform; leaves closely imbricate, ecostate; outer leaves sheathing at base ovate to acute; inner leaves longer, acuminate, straight; cells rectangular to linear, ± lax; margins entire, bordered by elongate rectangular cells to apices in short leaves and to near tips in longer leaves. Setae ± elongate, smooth to densely papillose. Capsules erect to horizontal, asymmetric,

short-ovoid to cylindrical, ± curved, ± constricted below mouth when dry, short-necked; exothecial cells quadrate to rectangular, irregular, arranged in rows, walls uniformly thickened to thicker on end walls; annuli undifferentiated to consisting of 1-2 rows of enlarged cells; opercula concave-conic to convex-conic, blunt to elongate (not rostrate), ± apiculate; peristome teeth 16, lance-subulate, bordered, trabeculate, cross-striolate below; endostome arising from a high membrane, about as long as the teeth with gaping keeled segments, cilia well-developed, nodose to appendiculate, rarely rudimentary or lacking. Spores spherical slightly papillose. Calyptra cucullate, smooth, naked.

TYPIFICATION: Robinson (1962, p. 103) "propose[d] that *Brachythecium rivulare* be recognized as the lectotype" for the genus *Brachythecium*. Acceptance of this proposal is evident by the citation and use of *B. rivulare* as the lectotype for the genus in Index Muscorum Vol. 5 (Wijk, 1969, p. 343) and Index Muscorum supplement (Crosby, 1977, p. 290; Crosby and Bauer, 1981, p. 670; 1983, p. 672).

The validity of *B. rivulare* as type of the genus is questionable for two reasons: (1) Robinson's argument for its selection was arbitrary; and (2) *Brachythecium rivulare* does not represent the concept of the original author of the genus.

Robinson (1962) divided the North American species of *Brachythecium sensu lato* into two main groups (or genera). He considered *B. oxycladon* and *B. rivulare* as representative of opposite ends of a continual "intergrading morphological series" of species. By comparing all the morphological intergrading species to the two extremes, he defined one group as the genus *Brachythecium* (containing the species he placed in

the sections *Brachythecium, Cirriphyllopsis*, and *Reflexa*) typified by *B. rivulare* and the other group as the genus *Chamberlainia* (containing the species he placed in the sections *Acuminata, Salebrosa*, and *Velutina*) typified by *C. acuminata*.

Schimper in his discussions on the philosophy used in splitting the genus *Brachythecium* away from *Hypnum*, stated that he based the concept of *Brachythecium* upon the four species "*populeum, velutinum, reflexum et rutabulum*." For prioral and historical accuracy the type of the genus should have been selected from among these four species. Since Robinson's selected type for the genus is not one of Schimper's four original taxa and since Robinson's selection was based on a restricted (perhaps arbitrary) generic concept that has since been abandoned, I consider the lectotype *B. rivulare* an inappropriate type for the genus *Brachythecium*.

I designate *Brachythecium rutabulum* (L. ex Hedw.) in B.S.G. as the lectotype for the genus *Brachythecium sensu lato* since it is one of four taxa on which Schimper based the original generic concept of *Brachythecium*.

Keys to the Sections of *Brachythecium* for Latin America[1]

1. Annuli differentiated, 1-2 rows of small to inflated cells, plants monoicous or dioicous 2
1. Annuli undifferentiated to weakly differentiated, plants dioicous . . . . . Section *Stereopoma* (p. 48)

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[1] *Brachythecium calliergonoides, B. cavifolium*, and *B. rivularoides* are not included in this key since their sectional or generic placement is uncertain (see p. 211).

2. Annuli composed of small cells (not inflated), setae papillose above. . . . . Section *Cirriphyllopsis* (p. 52)

2. Annuli composed of large to inflated cells, setae smooth or papillose throughout 3

3. Cilia of endostome complete, nodose; opercula conic-apiculate . . . 4

3. Cilia of endostome complete, nodose with appendiculae (in *B. fendleri* rudimentary and/or complete nodose and occasionally with appendiculae); opercula conic-apiculate or concave-conic with apiculus sunken or absent 7

4. Setae papillose, annulus 2 rows of inflated cells. . . . . Section *Brachythecium* (p. 50)

4. Setae smooth or weakly papillose, annulus 1 or 2 rows of inflated cells 5

5. Setae smooth, annulus 1 row of inflated cells . . . . . Section *Salebrosa* (p. 49)

5. Setae smooth to weakly papillose, annulus 2 rows of inflated cells. 6

6. Leaves slightly concave, plicate; apices gradually long-acuminate, alar region not auriculate; alar cells well defined, quadrate to rectangular. . . . . Section *Albicans* (p. 50)

6. Leaves deeply concave, ± cucullate, not plicate; apices aristate with a long awn; alar region auriculate, alar cells not well defined, lax to inflated, rectangular. . . . . Section *Subplicata* (p. 49)

7. Plants small, leaves averaging 1.2 X 0.4 mm or smaller; opercula concave-conic, apiculus sunken or absent; cilia complete, nodose with

appendiculae (*B. fendleri* several or all cilia rudimentary), setae smooth to weakly papillose. . . . . Section *Julacea* (p. 51)

7. Plants medium to large, leaves averaging 1.5 x 0.6 mm or larger; opercula conic-apiculate; cilia complete nodose with appendiculae; setae strongly papillose or in *B. occidentale* setae smooth to weakly papillose 8

6. Leaves ovate-lanceolate and asymmetrical; alar cells few, small, and quadrate in a small defined group . Section *Velutina* (p. 51)

6. Leaves broadly ovate, abruptly acuminate and symmetrical; alar cells many, large to inflated in a large group . . . . . Section *Reflexa* (p. 50)

Section Stereopoma

1. Leaves elongate triangular, short-acuminate, plicate; alar cells ± opaque; pseudoparaphyllia orbicular to ovate-apiculate. . . . . *B. oxycladon* (p. 80)

1. Leaves elongate-triangular, long-acuminate to ovate or ovate-lanceolate, ± long acuminate, weakly to strongly plicate; alar cells rarely opaque, pseudoparaphyllia ovate-acuminate. 2

2. Leaf areolation lax, medium leaf cells averaging 10 µm wide; basal and alar regions weakly differentiated . . . . . *B. conostomum* (p. 70)

2. Leaf areolation not lax, medium leaf cells less than 10 µm wide; basal and alar regions differentiated. 3

3. Leaves plicate, elongate-triangular; apices long and slender. . . . . *B. zanonii* (p. 98)

3. Leaves weakly plicate, ovate, gradually acuminate; apices ± long. . 4

4. Leaf apices long, once or twice twisted; margins serrate; median leaf cells linear ± vermicular . . . . . *B. poadelphus* (p. 84)

4. Leaf apices short to long, ± once twisted; serrulate; median leaf cells long fusiform to short linear, not vermicular . . . 5

5. Stems loosely foliate; leaves decurrent, broadly ovate, gradually acuminate, apices ± short; alar cells not distinct and becoming lax in decurrencies; capsules inclined; operculum short conic-apiculate, straight. . . . . *B. guatemalense* (p. 75)

5. Stems densely foliate; leaves slightly decurrent, ovate-lanceolate, acuminate, apices ± long; alar cells in distinct groups; capsules erect to slightly inclined; operculum long conic-apiculate, curved . . . . . *B. stereopoma* (p. 89)

Section Salebrosa

1. Plants large, leaves weakly plicate averaging 3.0 x 1.1 mm, broadly-ovate, gradually to abruptly short-acuminate; autoicous . . . . . *B. austro-salebrosum* (p. 103)

1. Plants medium-sized; leaves plicate averaging 2.4 x 0.8 mm, ovate-lanceolate, gradually ± long acuminate; polygamous. . . . . *B. polyoicum* (p. 109)

Section Subplicata

Plants robust, stems julaceous; leaves deeply concave with long and broad decurrencies, broadly ovate, abruptly long filiform; autoicous . . . . . *B. subplicatum* (p. 113)

Section Albicans

1. Leaves long decurrent; alar cells numerous, extending into decurrencies and along margin; plants dioicous. *B. albicans* (p. 120)
1. Leaves short decurrent; alar cells in discrete groups; plants autoicous . . . . . *B. austro-glareosum* (p. 125)

Section Brachythecia

1. Leaves distinctly plicate, ovate to triangular gradually long-acuminate, alar cells enlarged to inflated; dioicous. . . . . *B. frigidum* (p. 136)
1. Leaves not or weakly plicate, ovate to broadly ovate gradually to abruptly ± long-acuminate, alar cells ± inflated; autoicous 2
    2. Alar cells ± inflated; pseudoparaphyllia ovate, ± acute; setae strongly papillose . . . . . *B. rutabulum* (p. 141)
    2. Alar cells not inflated; pseudoparaphyllia ovate-acuminate; setae with low scattered papillae. . . . . *B. chocayae* (p. 132)

Section Reflexa

1. Plants soft; leaves broadly cordate-ovate; costae slender, ending in midleaf; alar cells not inflated; pseudoparaphyllia ovate-acuminate; dioicous. . . . . *B. cirriphylloides* (p. 150)
1. Plants rigid; leaves triangular to broadly ovate; costae stout, ending above midleaf or subpercurrent; alar cells ± inflated; pseudoparaphyllia ovate erose to apiculate; autoicous 2
    2. Costae subpercurrent; decurrencies long and narrow; alar cells inflated . . . . . *B. filirepens* (p. 155)

2. Costae ending above middle; decurrencies weak or long and broad; alar cells quadrate to rectangular, ± lax, rarely inflated 3

3. Leaves with long, broad decurrencies; margins at base of awn forming toothed shoulders . . . . . *B. majusculum* (p. 161)

3. Leaves weakly decurrent; no shoulders at base of awn. . . . . *B. subpilosum* (p. 168)

Section Velutina

1. Leaves falcate; setae papillose . . . . . *B. paradoxum* (p. 182)

1. Leaves straight to slightly curved, not falcate; setae smooth to weakly papillose or papillose 2

2. Leaves slightly curved, weakly plicate or plicate at base, narrowly ovate-lanceolate; autoicous, setae smooth to weakly papillose. . . . . *B. occidentale* (p. 174)

2. Leaves straight, strongly plicate, ovate to broadly ovate-lanceolate; autoicous and/or synoicous, setae strongly papillose throughout . . . . . *B. praelongum* (p. 186)

Section Julacea

1. Leaves broadly ovate, abruptly short-acuminate; costae subpercurrent; setae smooth; autoicous . . . . . *B. microcollinum* (p. 200)

1. Leaves ovate-lanceolate to lanceolate, costae ending near middle; setae smooth to weakly plicate; autoicous or synoicous. 2

2. Leaves weakly plicate; cilia of endostome complete; operculum with sunken apiculus; autoicous. . . . . *B. collinum* (p. 192)

2. Leaves strongly plicate; many cilia rudimentary; operculum without apiculus; synoicous. . . . . *B. fendleri* (p. 197)

Section Cirriphyllopsis

Plants medium-sized; leaves ovate to elongate-triangular, acuminate, apices short and blunt; autoicous. . . . . *B. plumosum* (p. 203)

Keys to the Species of *Brachythecium* for Latin America

1. Costa subpercurrent, >74% of the leaf length; autoicous 2
1. Costa to midleaf or slightly above, <74% of the leaf length; monoicous or dioicous 3
   2. Plants small; leaves <1.0 mm long, weakly decurrent; alar cells small quadrate . . . . . *B. microcollinum* (p. 200)
   2. Plants medium- to large-sized; leaves >1.0 mm long, strongly decurrent; alar cells large lax to inflated. . . . . *B. filirepens* (p. 155)
3. Leaves of stems and branches falcate-secund or homomallous; autoicous 4
3. Leaves of stems and branches straight or apices variously bent; monoicous or dioicous 5
   4. Leaf apices long and narrow; median leaf cells linear 14:1; setae papillose throughout . . . . . *B. paradoxum* (p. 182)
   4. Leaf apices short and blunt; median leaf cells fusiform to linear 8:1; setae papillose above. . . . . *B. plumosum* (p. 203)
5. Stem leaves gradually narrowed into short to long apices. 6
5. Stem leaves abruptly narrowed into short to long apices 29

6. Stem leaf apices short, apiculate, acute, and/or blunt 7

6. Stem leaf apices longer. 10

7. Terminal cell of stem leaves distinctly smaller than apical cells; median cells ± long fusiform. 8

7. Terminal cell of stem leaves similar in size to apical cells; median cells linear. 9

8. Stem leaf apices acute to broadly acute; alar cells set in columns gradually transitioning into basal cells; areolation lax; sexuality and sporophyte unknown. *B. rivularioides* (p. 217)

8. Stem leaf apices apiculate; narrowly acute to short-acuminate; alar cells in discrete groups; areolation of narrow and smaller cells; autoicous, setae papillose above. . *B. plumosum* (p. 203)

9. Plants large-sized; stem leaves averaging 2.3 X 1.1 mm, cordate to broadly ovate, concave, decurrent; alar cells generally few and lax or rarely inflated; autoicous, setae papillose. *B. rutabulum* (p. 141)

9. Plants medium-sized; stem leaves averaging 1.6 X 0.8 mm, broadly ovate, deeply concave, weakly decurrent; alar cells lax, without inflated cells at corners; sexuality and sporophyte unknown . . . . . *B. cavifolium* (p. 214)

10. Stem leaves with long ± broad decurrencies. 11

10. Stem leaves with short, or weak or narrow decurrencies. . . 16

11. Stem leaves strongly plicate; monoicous or dioicous, setae smooth to weakly papillose, or strongly papillose. 12

11. Stem leaves weakly plicate or plicate at base; dioicous, setae smooth 14

12. Older stem leaves with inflated alar cells; dioicous, setae papillose throughout . . . . . *B. frigidum* (p. 136)

12. Older stem leaves with quadrate to lax rectangular alar cells; dioicous or monoicous, setae smooth to weakly papillose. . 13

13. Insertion of stem leaves straight into decurrencies, alar region composed of distinct columns of quadrate cells between leaf margins and plicae and extending into decurrencies; dioicous . . . . . *B. albicans* (p. 120)

13. Insertion of stem leaves rounded and extending into decurrencies; alar region composed of weakly formed columns of quadrate to rectangular cells not extending into decurrencies; autoicous or polygamous . . . . . *B. polyoicum* (p. 109)

14. Stem leaves with lax areolation; median cells 10 µm wide, alar and basal cells weakly differentiated; costa with short lateral spurs extending into leaf lamina; margins entire . . . . . *B. conostomum* (p. 70)

14. Stem leaves with smaller/narrower areolation; median cells <10 µm wide, alar and basal cells differentiated; costa rarely with short lateral spurs; margins serrulate to serrate . . 15

15. Stem leaves erect imbricate and densely arranged; leaf apices short to long, ± bent, alar cells rarely or not lax; capsules erect to slightly inclined, operculum long-conic. . . . *B. stereopoma* (p. 89)

15. Stems leaves erect, loosely arranged; leaf apices short, not bent; alar cells becoming lax into decurrencies; capsules inclined, operculum short-conic. . . . . *B. guatemalense* (p. 75)

16. Stem leaves strongly plicate 17

16. Stem leaves not to weakly plicate or only at base. 23

17. Stem leaves averaging >2.0 mm long; apices narrow, evenly tapering and extremely long 18

17. Stem leaves averaging <2.0 mm long; apices short and broad or long-acuminate. 19

18. Stem leaf bases distinctly rounded into short decurrencies; alar cells numerous, quadrate to rectangular, sublax; dioicous . . . . . *B. zanonii* (p. 98)

18. Stem leaf bases only slightly rounded or straight into decurrencies; alar cells few, forming discrete groups not, lax; autoicous. . . . . *B. austro-glareosum* (p. 103)

19. Pseudoparaphyllia orbicular to ovate-acute 20

19. Pseudoparaphyllia ovate-acuminate. 21

20. Plants small and delicate; stem leaves narrowly ovate-acuminate; basal margin straight or slightly rounded into short decurrencies, serrulate; synoicous, setae smooth to weakly papillose . . . . . *B. fendleri* (p. 197)

20. Plants medium-sized, stem leaves ovate-lanceolate to elongate-triangular, basal margins rounded into short decurrencies, entire; dioicous, setae smooth . . . . . *B. oxycladon* (p. 80)

21. Leaf areolation loose, basal and alar cells more lax than median cells; dioicous, setae smooth. . . . . *B. stereopoma* (p. 89)

21. Leaf areolation more compact, basal cells slightly broader than median cells, alar cells small in discrete groups; synoicous or rarely autoicous, setae papillose. . . . . *B. praelongum* (p. 186)

22. Plants small and delicate to medium-sized; alar cells of stem leaves in small groups, slightly incrassate, sharply defined from surrounding cells, marginal alar cells serrulate to serrate. 23

22. Plants medium- to large-sized; alar cells of stem leaves prominent, thin-walled, intergrading into surrounding cells, marginal alar cells entire 24

23. Plants small and delicate, stems julaceous; leaves <1.4 mm, apices short-acuminate and straight; setae smooth . . *B. collinum* (p. 192)

23. Plants medium-sized, stems terete; leaves >1.4 mm; apices long-acuminate and curved; setae smooth or weakly papillose . . . . . *B. occidentale* (p. 174)

24. Plants loosely foliate; basal leaf margin straight or slightly rounded into short decurrencies; cells across leaf insertion lax; sexuality and sporophyte unknown. . . . . *B. calliergonoides* (p. 211)

24. Plants densely foliate; basal leaf margin with a distinct rounded shoulder; cells across leaf insertion ± lax. . . . 25

25. Plants dioicous. 26

25. Plants autoicous 27

26. Plants small- to medium-sized, leaves x=1.6 X 0.7 mm; median cells linear x=76.1 X 6.9 μm; alar cells distinctly differentiated; dioicous, setae smooth . . . . *B. stereopoma* (p. 89)

26. Plants medium- to large-sized, leaves x=2.0 X 0.8 mm; median cells linear x=87.8 X 7.0 μm; alar cells weakly differentiated; dioicous, the rest unknown . . . *B. poadelphus* (p. 84)

27. Pseudoparaphyllia orbicular to ovate-apiculate or acute; setae with tall dense papillae. . . . . *B. rutabulum* (p. 141)

27. Pseudoparaphyllia ovate-acuminate; setae nearly smooth or with low diffuse papillae 28

28. Plants medium-sized, stem leaves narrowly ovate; polyoicous or rarely autoicous, setae nearly smooth, annulus single row of enlarged cells . . . . . *B. polyoicum* (p. 109)

28. Plants medium- to large-sized, stem leaves broadly ovate; autoicous, setae with low diffuse papillae, annulus double row of enlarged cells. . . . . *B. chocayae* (p. 132)

29. Stem leaves with long ± broad decurrencies; autoicous, setae papillose. 30

29. Stem leaves with weak or short decurrencies; autoicous or dioicous, seta smooth or papillose 32

30. Stem leaf apices, ± sharply toothed at base; costa stout; alar cells numerous quadrate and becoming lax in decurrencies . . . . . *B. majusculum* (p. 161)

30. Stem leaf apices serrulate to serrate, never toothed at base; costa slender; alar cells few in number and inflated, decurrencies narrow. 31

31. Stem leaves broadly deltoid, apices long; costa subpercurrent; setae with low dense papillae, cilia with appendiculae . . . . . *B. filirepens* (p. 155)

31. Stem leaves cordate-ovate to broadly ovate, apices short and twisted; costa ending near midleaf; setae with tall dense papillae, cilia nodose . . . . . *B. rutabulum* (p. 141)

32. Pseudoparaphyllia ovate-acuminate to triangular. 33

32. Pseudoparaphyllia ovate-obtuse, ± erose or ovate-apiculate .34

33. Stem leaf areolation lax, median leaf cells averaging 10 µm wide; costa with prominent short lateral spurs extending into laminae; setae smooth . . . . . *B. conostomum* (p. 70)

33. Stem leaf areolation narrower, median leaf cells averaging 7 µm wide; costa lacking lateral spurs; setae papillose . . . . . *B. cirriphylloides* (p. 150)

34. Stems julaceous and/or tumid; leaves deeply concave. . . . 35

34. Stems terete, not julaceous; leaves shallowly concave. . . 38

35. Plants large-sized, stems erect; stem leaves averaging >2.4 mm long, apices forming long awns; alar cells lax, wider than basal cells, ± auriculate; autoicous, setae smooth. . . . . *B. subplicatum* (p. 113)

35. Plants medium-sized, stems prostrate; stem leaves averaging <2.4 mm long, apices short to long; alar cells as wide as basal cells, not auriculate 36

36. Stem leaves broadly ovate, apices with short awns, costa slender; sexuality and sporophyte unknown. . . . . *B. cavifolium* (p. 214)

36. Stem leaves triangular-ovate, apices with long awns; costa stout; autoicous, setae with low scattered papillae. . . . . *B. subpilosum* (p. 168)

37. Plants rigid, prostrate; stem leaves triangular-ovate, averaging <2.3 mm long; costa stout; autoicous, setae with low scattered papillae . . . . . *B. subpilosum* (p. 168)

37. Plants softer, erect to rarely prostrate; stem leaves broadly ovate, averaging >2.3 mm long; costa slender; autoicous, setae smooth . . . . . *B. austro-salebrosum* (p. 103)

Keys to the Species of *Brachythecium* for Central America

1. Stem leaves gradually narrowing into short to long apices 2
1. Stem leaves abruptly narrowing into short to long apices. 15
    2. Stem leaf apices short, ± homomallous, apiculate, acute, and/or blunt, terminal cell of leaf shorter than apical cells; autoicous, setae papillose above . . . . . *B. plumosum* (p. 203)
    2. Stem leaf apices longer, straight or bent, terminal cell of leaf as long as apical cells; monoicous or dioicous, setae smooth or papillose. 3
3. Stem leaves with long ± broad decurrencies. 4
3. Stem leaves with short or weak decurrencies 10
    4. Stem leaves strongly plicate 5
    4. Stem leaves weakly plicate or plicate at base only 7
5. Older stem leaves with inflated alar cells; dioicous, setae papillose throughout. . . . . *B. frigidum* (p. 136)
5. Older stem leaves with quadrate to lax rectangular alar cells; dioicous or monoicous, setae smooth to weakly papillose 6
    6. Base of stem leaves extending straight into decurrency; alar region composed of distinct columns of quadrate cells between leaf margins and plicae and extending into decurrencies; dioicous . . . . . *B. albicans* (p. 120)

6. Base of stem leaves rounded before extending into decurrencies; alar region composed of weakly formed columns of quadrate to rectangular cells not extending into decurrencies; autoicous or polygamous . . . . . *B. polyoicum* (p. 109)

7. Plants large-sized; stem leaves cordate to broadly ovate, generally with a few lax alar cells, margins serrate; autoicous, setae papillose . . . . . *B. rutabulum* (p. 141)

7. Plants medium-sized; stem leaves narrower ovate, alar cells ± lax, margins entire to serrulate; dioicous, setae smooth 8

8. Stem leaves with lax areolation, alar and basal cells weakly differentiated; costa with short lateral spurs extending into leaf laminae; margins entire . . . . . *B. conostomum* (p. 70)

8. Stem leaves with smaller/narrow areolation, alar and basal cells differentiated; costa rarely with short lateral spurs; margins serrulate to serrate 9

9. Stem leaves erect, imbricate and densely arranged; leaf apices short to long, ± bent to one side; alar cells rarely becoming lax not extending into decurrencies; capsules erect to slightly inclined, operculum long-conic. . . . . *B. stereopoma* (p. 89)

9. Stems leaves erect, loosely arranged; leaf apices short, not bent; alar cells becoming lax into decurrencies; capsules inclined, operculum short-conic . . . . . *B. guatemalense* (p. 75)

10. Stem leaves strongly plicate; synoicous or dioicous 11

10. Stem leaves not to weakly plicate or only at base; autoicous 13

11. Pseudoparaphyllia ovate-acuminate; dioicous . *B. stereopoma* (p. 89)

11. Pseudoparaphyllia orbicular to ovate-acute 12

12. Plants small and delicate; stem leaves narrowly ovate-acuminate; basal margins serrulate, straight or slightly rounded into short decurrencies; synoicous, setae smooth to weakly papillose . . . . . *B. fendleri* (p. 197)

12. Plants medium-sized; stem leaves ovate-lanceolate to elongate-triangular; basal margins entire, rounded into short decurrencies; dioicous, setae smooth . . *B. oxycladon* (p. 80)

13. Stem leaves averaging >2.0 mm, broadly ovate; setae papillose. . . . . *B. rutabulum* (p. 141)

13. Stem leaves averaging <2.0 mm; narrowly ovate; setae smooth. . . 14

14. Plants small and delicate; stems julaceous; leaves >1.4 mm, apices short-acuminate and straight; setae smooth. . . . . *B. collinum* (p. 192)

14. Plants medium-sized; stems terete; leaves >1.4 mm, setae smooth or weakly papillose . . . . . *B. occidentale* (p. 174)

15. Pseudoparaphyllia ovate-obtuse, ± erose or ovate-apiculate; autoicous setae papillose, cilia nodose. . . . *B. rutabulum* (p. 141)

15. Pseudoparaphyllia ovate-acuminate to triangular; dioicous, setae smooth or papillose, cilia nodose or appendiculate 16

16. Stem leaf areolation lax, median leaf cells averaging 10 µm wide; costa with prominent short lateral spurs extending into lamina; setae smooth, cilia nodose. *B. conostomum* (p. 70)

16. Stem leaf areolation narrower, median leaf cells averaging 7 µm wide; costa lacking lateral spurs; setae papillose, cilia appendiculate. . . . . *B. cirriphylloides* (p. 150)

Keys to the Species of *Brachythecium* for South America North of 35° S

1. Stem leaves gradually narrowed into short to long apices. 2
1. Stem leaves abruptly narrowed into short to long apices 17
    2. Stem leaf apices short, apiculate, acute, and/or blunt, ± homomallous. 3
    2. Stem leaf apices longer, ± not or variously bent 6
3. Terminal cell of stem leaves distinctly smaller than apical cells, median cells ± long fusiform 4
3. Terminal cell of stem leaves similar in size to apical cells, median cells linear 5
    4. Leaves straight; stem leaf apices acute, alar cells in columns gradually transitioning into basal cells, areolation lax; sexuality and sporophyte unknown . . . *B. rivularioides* (p. 217)
    4. Leaves ± homomallous; stem leaf apices apiculate, alar cells in a discrete group, areolation narrow and smaller; autoicous, setae papillose above. . . . . *B. plumosum* (p. 203)
5. Plants large-sized; stem leaves averaging 2.3 X 1.1 mm, cordate to broadly ovate, concave, decurrent; generally with a few inflated alar cells; autoicous, setae papillose . . . . . *B. rutabulum* (p. 141)
5. Plants medium-sized; stem leaves averaging 1.6 X 0.8 mm, broadly ovate, deeply concave, weakly decurrent; alar cells lax, not inflated; sexuality and sporophyte unknown. . *B. cavifolium* (p. 214)
    6. Stem leaves with long ± broad decurrencies 7
    6. Stem leaves with short or weak decurrencies. 9

7. Pseudoparaphyllia orbicular to ovate-apiculate or acute; autoicous setae papillose . . . . . *B. rutabulum* (p. 141)

7. Pseudoparaphyllia ovate-acuminate; dioicous setae smooth. 8

8. Stem leaves with lax areolation, (median cells x=10.6 μm), alar and basal cells weakly differentiated; costa with short lateral spurs extending into leaf lamina; margins smooth; dioicous, setae smooth . . . . . *B. conostomum* (p. 70)

8. Stem leaves with smaller/narrower areolation, (median cells x=6-8 μm), alar and basal cells differentiated; costa rarely with short lateral spurs; margins serrulate to serrate. . . . . *B. stereopoma* (p. 89)

9. Stem leaves strongly plicate. 10

9. Stem leaves not to weakly plicate or only at base 12

10. Stem leaves averaging >2.0 mm long, elongate-triangular, long tapering acuminate; autoicous, setae smooth . . . . . *B. austro-glareosum* (p. 103)

10. Stem leaves averaging <2.0 mm long, ovate to broadly ovate short- to long-acuminate; synoicous autoicous or dioicous; setae smooth or papillose 11

11. Leaf areolation loose, basal and alar cells more lax than median cells; dioicous, seta smooth . . . . . *B. stereopoma* (p. 89)

11. Leaf areolation more compact, basal cells slightly broader than median cells, alar cells small in discrete groups; synoicous or rarely autoicous, setae papillose. . . . . *B. praelongum* (p. 186)

12. Stem leaves erect to spreading; branch leaves ± squarrose when moist, ± curved; alar cells small, as wide as basal cells, in discrete groups; autoicous . . . . . *B. occidentale* (p. 174)

12. Stem leaves straight, imbricate erect when moist; branch leaves never squarrose, alar cells medium-sized to lax ± inflated, wider than basal cells; autoicous or dioicous. . 13

13. Plants loosely foliate; leaves elongate-triangular, bases straight to slightly rounded into short decurrencies; sexuality and sporophyte unknown . . . . . *B. calliergonoides* (p. 211)

13. Plants densely foliate; leaves broadly ovate, bases rounded into short to long decurrencies; setae smooth to papillose. 14

14. Plants dioicous. 15

14. Plants autoicous 16

15. Plants small- to medium-sized, leaves x=1.6 X 0.7 mm; median cells linear x=76.1 X 6.9 µm; alar cells distinctly differentiated; dioicous, setae smooth . . . . . *B. stereopoma* (p. 89)

15. Plants medium- to large-sized, leaves x=2.0 X 0.8 mm; median cells linear x=87.8 X 7.0 µm; alar cells weakly differentiated; dioicous, the rest unknown . . . . . *B. poadelphus* (p. 84)

16. Pseudoparaphyllia orbicular to ovate-apiculate or acute; setae with tall dense papillae . . . . . *B. rutabulum* (p. 141)

16. Pseudoparaphyllia ovate-acuminate; setae with low diffuse papillae . . . . . *B. chocayae* (p. 132)

17. Stem leaves with long, ± broad decurrencies; autoicous, setae papillose. . . . . *B. rutabulum* (p. 141)

17. Stem leaves with weak or short decurrencies; autoicous or dioicous, setae smooth or papillose. 18

    18. Pseudoparaphyllia ovate-obtuse, ± erose, or ovate-apiculate; leaf apices short. . . . . *B. cavifolium* (p. 214)

    18. Pseudoparaphyllia ovate-acuminate to triangular; leaf apices long 19

19. Stem leaf areolation lax, median leaf cells averaging 10 µm wide; costa with prominent short lateral spurs extending into laminae; setae smooth . . . . . *B. conostomum* (p. 89)

19. Stem leaf areolation narrower, median leaf cells averaging 7 µm wide; costa lacking lateral spurs; setae papillose . . . . . *B. cirriphylloides* (p. 150)

Keys to the Species of *Brachythecium* for Latin America South of 35° S and Antarctica

1. Costa subpercurrent, >74% of the leaf length; autoicous 2

1. Costa to midleaf or slightly above, <74% of the leaf length; monoicous or dioicous 3

    2. Plants small, leaves <1.0 mm long, weakly decurrent; alar cells small quadrate . . . . . *B. microcollinum* (p. 200)

    2. Plants medium- to large-sized, leaves >1.0 mm long, strongly decurrent; alar cells large lax to inflated. . . . . *B. filirepens* (p. 155)

3. Leaves of stems and branches falcate-secund or homomallous; autoicous, setae papillose ± throughout 4

3. Leaves of stems and branches straight or apices bent variously; autoicous or dioicous, setae smooth or papillose. 5

    4. Stem leaves elongate-triangular, apices long and narrow, falcate-secund, median leaf cells linear 14:1; setae papillose throughout . . . . . *B. paradoxum* (p. 182)

    4. Stem leaves ovate to oblong-ovate, gradually ± short-acuminate, apices blunt, median leaf cells fusiform to linear 8:1; setae papillose above . . . . . *B. plumosum* (p. 203)

5. Stem leaves gradually narrowed to short or long apices; monoicous or dioicous 6

5. Stem leaves abruptly narrowed to short or long apices; autoicous. 10

    6. Plants small-sized; stem leaves not to weakly plicate; apices short- to long-acuminate; alar cells numerous, small quadrate in a distinct cluster; basal margins serrate; autoicous. . . . . . *B. collinum* (p. 192)

    6. Plants medium- to large-sized; stem leaves ± distinctly plicate; apices ± long-acuminate, alar cells in weakly defined clusters or in distinct columns; basal margins entire; monoicous or dioicous 7

7. Stem leaf apices apiculate to short-acuminate and blunt; terminal cell of leaves shorter than apical cells; autoicous, setae papillose above . . . . . *B. plumosum* (p. 203)

7. Stem leaf apices long-acuminate; terminal cells of leaf as long as or longer than apical cells; monoicous or dioicous, setae smooth or papillose 8

8. Bases of stem leaves straight and continuous into long decurrencies; alar region distinct, of columns of quadrate cells between leaf margins and plicae and extending into decurrencies; dioicous, setae smooth . . . . . *B. albicans* (p. 120)

8. Bases of stem leaves rounded into short decurrencies, alar cells in small discrete groups, not extending into decurrencies; autoicous or polyoicous, setae smooth or papillose. 9

9. Stem leaves elongate, ovate-triangular; apices gradually narrowed into long acumina; areolation porose, median cells averaging 7.6 μm wide; autoicous, setae smooth . . . . . *B. austro-glareosum* (p. 103)

9. Stem leaves broadly ovate to ovate, quickly narrowing to short to long acumina; areolation smooth-walled, basal cells ± pitted, median cells averaging 6.1 μm wide; polygamous, setae papillose. . . . . *B. praelongum* (p. 186)

10. Stem leaves deltoid to ovate-deltoid, abruptly long-acuminate; costa stout and decurrencies short or costa subpercurrent and decurrencies long and narrow; setae with low papillae . . . 11

10. Stem leaves broadly ovate to oblong-ovate, abruptly short- or long-acuminate; costa stout and decurrencies long and broad or costa slender and decurrencies short; setae smooth or papillose 12

11. Stem leaves weakly decurrent; costa stout, alar cells small quadrate to rectangular . . . . . *B. subpilosum* (p. 168)

11. Stem leaves with long, narrow decurrencies; costa subpercurrent, alar cells lax to inflated . . . . . *B. filirepens* (p. 155)

12. Costa stout; alar cells numerous, quadrate; decurrencies long and broad with cells lax; setae papillose. . . . . *B. majusculum* (p. 161)

12. Costa slender; alar cells rectangular; decurrencies short, with cells lax to inflated; setae smooth or papillose . . 13

13. Plants large-sized; stems erect, julaceous, tips blunt; leaves oblong-ovate, apices long-awned; alar region ± auriculate, cells lax to inflated; setae smooth. . . . . *B. subplicatum* (p. 113)

13. Plants medium- to large-sized; stems erect or prostrate, terete, tips tapering; leaves broadly ovate, apices short to long; alar region ± auriculate, cells quadrate to rectangular ± lax and/or inflated; setae smooth or papillose. 14

14. Plants erect, rarely prostrate, infrequently branched, branches tapered at tips; decurrencies short; alar region ± auriculate, cells lax; setae smooth . . . . . *B. austro-salebrosum* (p. 103)

14. Plants prostrate, rarely erect, irregularly branched, branches gradually tapering; decurrencies ± long; alar region not auriculate, cells ± inflated; setae papillose . . . . . *B. rutabulum* (p. 141)

Keys to the Species of *Brachythecium* for the Highlands of Southeastern Brazil

1. Plants small- to medium-sized, leaves x=1.6 X 0.7 mm; median cells linear x=76.1 X 6.9 µm; alar cells distinctly differentiated; dioicous, setae smooth. . . . . *B. stereopoma* (p. 89)

1. Plants medium- to large-sized, leaves x=2.0 X 0.8 mm; median cells linear x=87.8 X 7.0 μm; alar cells weakly differentiated; dioicous, the rest unknown. . . . . *B. poadelphus* (p. 84)

Keys to the Species *Brachythecium* for the West Indies

1. Leaves ± homomallous, apices ± short and blunt, terminal cell shorter than apical cells, median leaf cells fusiform to linear 8:1; autoicous, setae papillose above. . . . . *B. plumosum* (p. 203)
1. Leaves straight, apices long and pointed, terminal cell as long as or longer than apical cells, median cells 11:1; dioicous, setae smooth 2
   2. Leaves elongate triangular, sharply rounded at insertion, strongly plicate . . . . . *B. zanonii* (p. 98)
   2. Leaves ovate to ovate-lanceolate, acuminate, apices ± long, gradually rounded at insertion, weakly plicate . . . . . *B. stereopoma* (p. 89)

Section *Stereopoma* McFarland, *sect. nov.*

Folia caulina ovata sive late ovata, gradatim vel abrupts accuminata. Dioicus; setae laeves; capsula erecta vel inclinata, cellulae annuli ab aliis cellulis non differentes amplitudine, cilia nodosa, opercula ± longa conico-apiculate.

Plants soft, small- to medium-sized. Leaves concave, short to long, narrow, ± plicate, ovate to broadly ovate, gradually to abruptly acuminate. Dioicous; seta smooth; capsule erect to slightly inclined or

inclined to horizontal, annulus not differentiated, cilia nodose, operculum ± long conic-apiculate.

* * *

Brachythecium conostomum (Tayl.) Jaeg., Ber. Thätigk St. Gallischen Naturwiss. Ges. 1876-77 :326. 1878 (Ad. 2: 392).

Basionym: *Hypnum conostomum* Tayl., London J. Bot. 7: 194. 1848. [!]

= [*Hypnum taylori* Spruce *in* Mitt., J. Linn. Soc. Bot. 12: 559. 1869.]

= *Brachythecium cladoneuron* (C. Müll.) Par., Ind. Bryol. 132. 1894.

Basionym: *Hypnum cladoneuron* C. Müll., Linnaea 38: 652-653. 1874. [!]

≡ *Campthothecium cladoneuron* (C. Müll.) Jaeg., Ber. Thätigk St. Gallischen Naturwiss. Ges. 1876-77 :316. 1878 (Ad. 2: 382).

= *Brachythecium crocatum* Hamp. *apud.* C. Müll., Bull. Herb. Boissier 5: 218. 1897. [!]

= *Brachythecium grandirete* C. Müll., Nuovo Giorn. Bot. Ital. n. ser. 4(2): 155. 1897. [!]

= *Brachythecium tenui-prostratum* C. Müll., Hedwigia 36: 128. 1897.

= [*Brachythecium grandirete* var. *robustum* C. Müll. in Par. Ind. Bryol. Suppl. 44. 1900. *nom. nud.*] [!]

= *Brachythecium fissidentoides* Herz., Biblioth. Bot., 87: 160. 1916. [!]

= *Brachythecium laxireticulatium* Card., Rev. Bryol. Lichénol. 37: 67. 1910. [!]

= [*Brachythecium parvulum* Dus. in Par., Ind. Bryol. ed. 2, 1: 151. 1904. *nom. nud.*] [!]

Plants medium-sized to ± robust, pale yellow to pale yellow-green, forming loose or compact intertwined mats. Stems prostrate or ascending, terete, densely foliate, with tufted rhizoids in older portions, freely branched; branches erect to prostrate, terete, ± tapering at tips; pseudoparaphyllia ovate-acuminate. Leaves imbricate to erect when dry becoming patent when moist. Stem leaves 1.4-2.7 (x=2.0) X 0.7-1.1 (x=0.8) mm, deeply concave, narrowly decurrent, not to slightly plicate, broadly ovate to ovate-lanceolate from a narrow base, abruptly or gradually tapering into long slender acumina, apices 0.5-0.7 (x=0.7) mm long, ± flexuose, half-twisted; margins recurved at base, plane above, entire below, entire to serrulate above; costae broad at base, tapering above and ending near midleaf (48%), with one or more short lateral spurs; median leaf cells hexagonal to fusiform, rarely linear 57.0-96.9 (x=74.7) X 8.0-12.5 (x=10.6) μm; apical cells linear 51.3-136.8 (x=77.2) X 6.8-10.3 (x=8.3) μm; basal cells rectangular, walls ± slightly pitted 30.8-91.2 (x=64.5) X 12.5-29.6 (x=20.6) μm; alar cells quadrate to rectangular 22.8-62.7 (x=32.9) X 11.4-25.1 (x=18.7) μm; not sharply delimited among median, basal, and alar cells. Branch leaves 1.0-2.3 (x=1.5) X 0.3-0.7 (x=0.5) mm, slightly smaller and narrower. Dioicous. Setae 7.0-21.0 (x=13.8) mm long, smooth, red-brown. Capsules 0.6-2.5 (x=1.7) X 0.3-0.7 (x=0.5) mm, erect to slightly inclined, slightly curved, light red-brown; annulus undifferentiated; operculum 0.3-0.8 (x=0.5) X 0.3-0.6 (x=0.5) mm, conic-apiculate; cilia 1-3, nodose. Spores 11.0-18.7 (x=15.2) μm finely papillose.

HABITAT AND DISTRIBUTION: Moist, shaded areas, on rock, tree trunks, rotted wood, and moist soil: Tucumán, **Argentina**; Cochabamba,

Bolivia 2200-3200 m; Cautín, Llanquihue, Malleco, **Chile** 140-700 m; Boyacá, and Santander, **Colombia** 3100; Cartago, **Costa Rica** 3050-3300 m; Pichincha, **Ecuador** 3100-4500 m; Huehuetenango, Quezaltenango, and Sacatepeguez, **Guatemala** 1800-3020 m; Chiapas, Distrito Federal, Guerrero, Hidalgo, Jalisco, México, Michoacan, Oaxaca, and Puebla (91) 2000-3900 m; **Mexico** 2000-3900 m; and Merida, **Venezuela** 3650 m (**Fig. 7**).

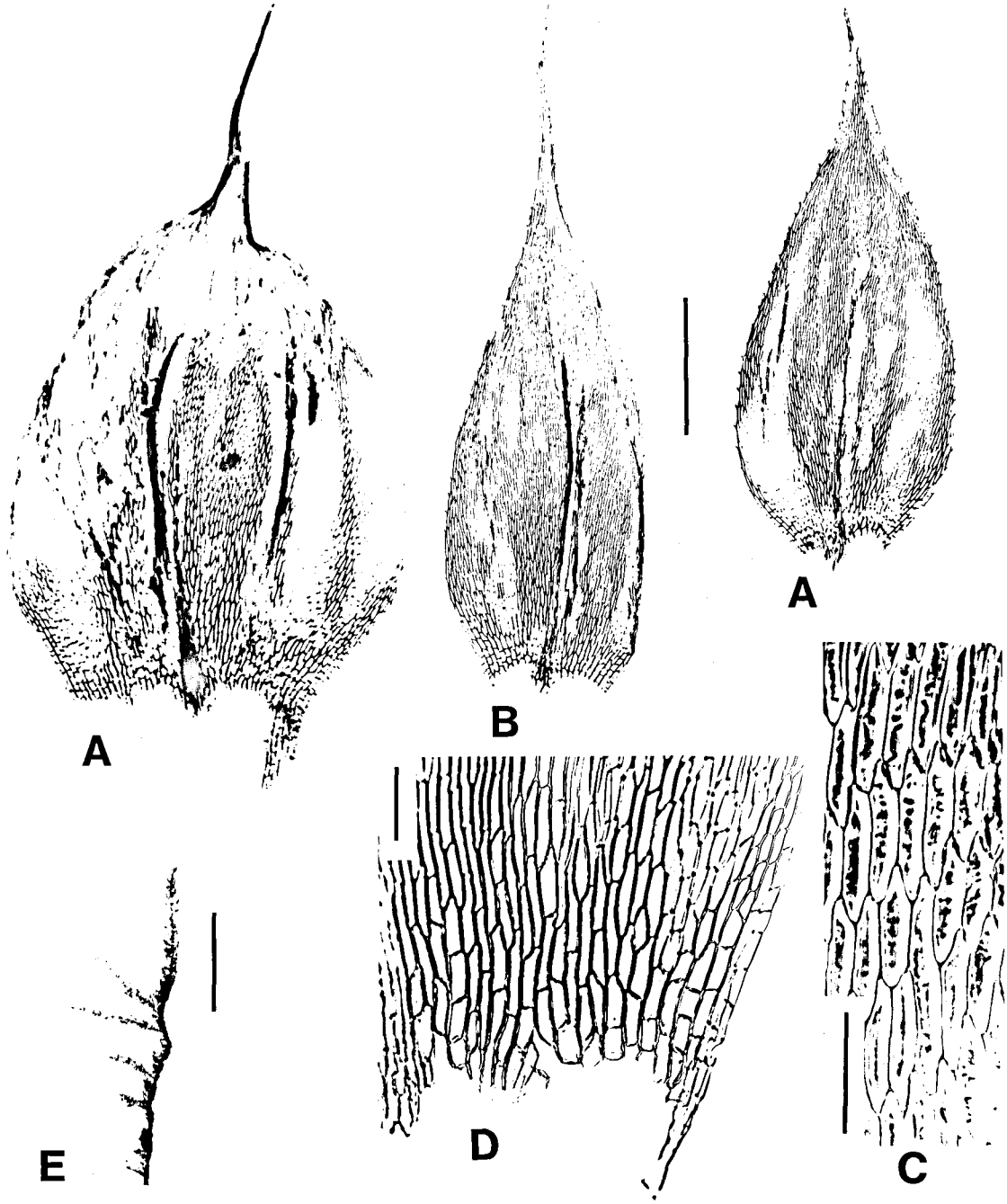
ILLUSTRATIONS: Herz., 1916. 87. Fig. 77, e-h (as *Brachythecium fissidentoides* Herz.) and Fig. 77, i & k (as *Brachythecium grandirete* C. Müll.); Sharp and Crum. Mexican Moss Flora (unpublished); (**Fig. 8**).

COMMENTS: This species is indigenous to the mountains of Latin America. Its lax leaf areolation is unique among all of the species of *Brachythecium* for the Americas.

Brachythecium conostomum exhibits a narrow range of variation and is distinguished by its compact growth form, broadly-ovate, abruptly long-acuminate leaves with lax areolation and broad costae with lateral spurs. *Brachythecium cirriphylloides*, a sympatric dioicous species, is distinguished from this species by its larger size, deeper concave leaves, narrower, median leaf cells, smaller basal and alar cells, more slender costae, and papillose setae. The other sympatric dioicous taxa of this section *B. guatemalense* and *B. stereopoma* can be distinguished from this species as follows: both have narrower, median leaf cells, more rounded leaf bases, distinct alar cells and costae without lateral spurs. The sympatric monoicous *Brachythecium* taxa can be separated from *B. conostomum* by their autoicous or synoicous sexuality, more rounded leaf bases, narrower median cells, less dissected costae, and differentiated annuli. More specifically, they can be distinguished as

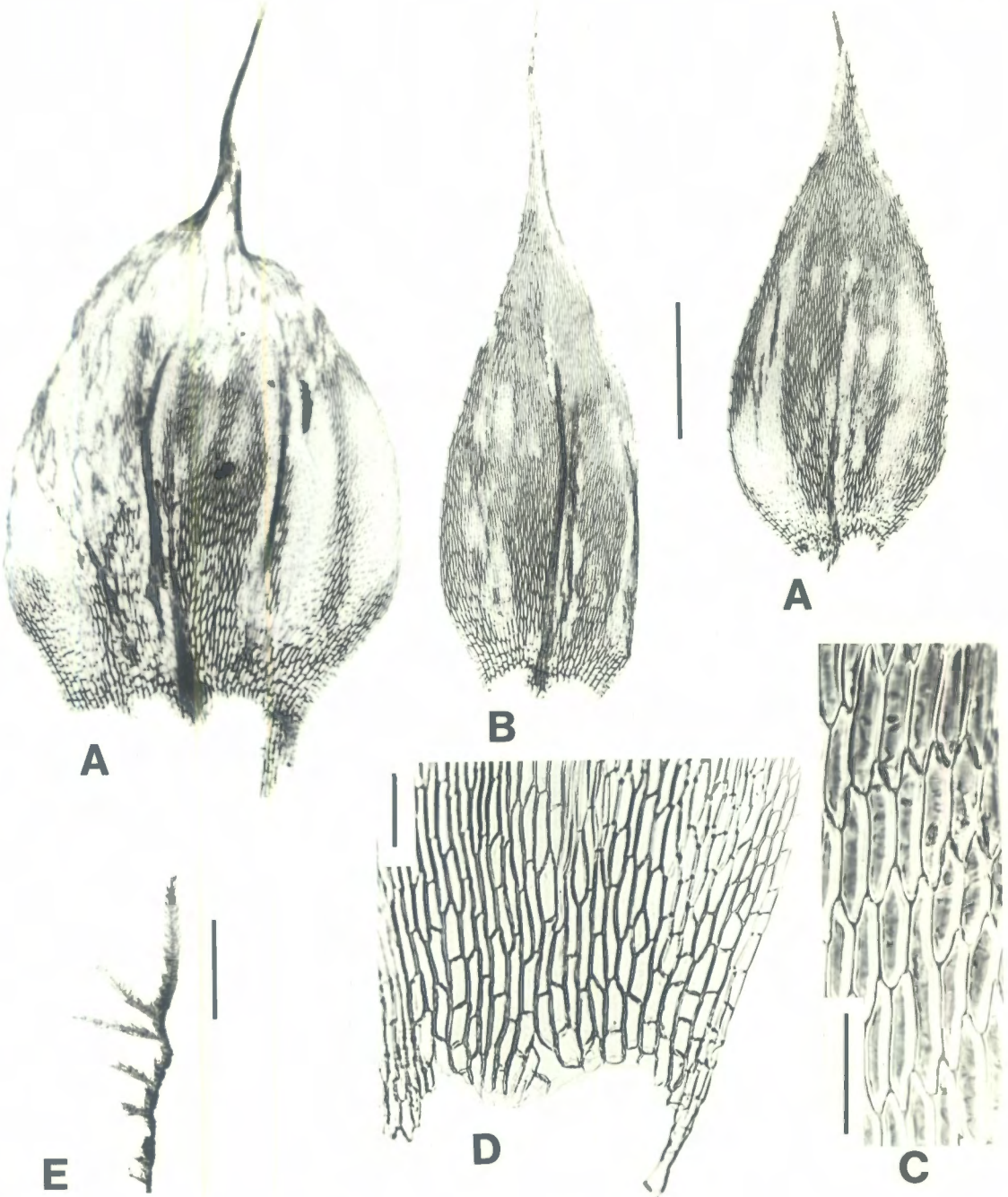


FIGURE 7. Distribution of *Brachythecium conostomun*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 8. Illustrations of *Brachythecium conostumun*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 8. Illustrations of *Brachythecium conostumun*

follows: *B. chocayae* is larger in size, stems and branches not tapering, and setae with papillae; *B. occidentale* is smaller in size, and leaves narrower and ± slightly curved; *B. plumosum* has shorter, more blunt leaf apices, and papillose setae; *B. praelongum* has plicate leaves, distinctly smaller alar cells, and papillose setae; *B. rutabulum* is larger, branches tapering, and papillose setae.

Bartram did not include this taxon in his *Mosses of Guatemala* (1947a). I suspect that he never developed a confident concept for this species since he included *Brachythecium crocatum* (=*B. conostomum des. mihi*) whose type is from Guatemala, as a synonym of *Brachythecium stereopoma* (Spruce *ex* Mitt.) Jaeg. In addition, specimens of this species from Guatemala originally identified by Bartram were named either *B. stereopoma*, *B. stereopoma* forma *robusta* or *B. flexiventrosum*.

The species key prepared by Robinson (1967, p. 37) indicated this species as synoicous. My examination of the specimen he cited as well as other specimens of this species show them to be dioicous.

* * *

Brachythecium guatemalense McFarland. *sp. nov.*

Type specimen (holotype) F: "Guatemala, Quezaltenango, Slopes of Volcan de Canta Maria above Palojunos, alt. 2400-3769 m, March 6, 1939, *Standley 67674*." [!] Isotype FH.

Caules prostrati, laxe foliati, sive teretes sive complanati sive incipientes complanati fieri, in tenuibus tegibus. Folia erecta-patentia, leviter concava, cum decurrentibus et longis et decrescentibus, leviter plicata, sive cordata-triangularia sive late ovata-lanceolata sive incipientia ovata-lanceolata fieri; acuminata, cum

apicibus aliquando torta et aliquando ad latus flexa, et cum nervo tenui ultra medium foliorum; cellulae alares numerosae, parvae, quadratae, extendentes ad decurrentia; cellulae decurrentes inferiores longae et angustae. Dioicus. Setae leves. Capsulae ad horizontale inclinatae, et infra orificium constrictae, cum operculo lato et conico-apicali.

Plants medium-sized, yellow-green, forming a thin mat. Stems loosely foliate, terete to complanate, prostrate with tufts of rhizoids, irregularly pinnately branched; branches loosely foliate, terete, prostrate to erect, tapering, with rhizoids at tips; pseudoparaphyllia ovate-acuminate. Leaves loosely imbricate to spreading when dry becoming erect to spreading when moist, slightly concave, winged-decurrent, not to slightly plicate; stem leaves 1.2-2.2 (x=1.7) X 0.7-1.1 (x=0.9) mm, cordate-triangular to broadly ovate-lanceolate, acuminate, apices ± twisted and/or bent; margins reflexed at base ± in acumina, plane elsewhere, serrate to serrulate in apices, serrulate to entire below; costae broad at base, quickly tapering above, ending above middle (57%) in an inconspicuous spine; branch leaves smaller, not as broad, margins more sharply serrate, costae stronger ending in a spine. Median leaf cells fusiform 36.5-79.8 (x=55.6) X 5.7-10.3 (x=6.9) µm; apical cells similar 26.2-79.8 (x=54.2) X 5.7-8.0 (x=7.0) µm; basal cells irregularly rectangular 28.5-61.6 (x=42.8) X 6.8-18.2 (x=12.4) µm; alar cells numerous, small, quadrate to rectangular, extending into decurrencies 11.4-38.8 (x=24.2) X 9.1-17.1 (x=12.1) µm, lower cells of decurrencies long and narrow. Dioicous. Setae 13.0-27.0 (x=17.2) mm long, red-brown, smooth. Capsules 0.9-2.3 (x=1.5) X 0.4-0.6 (x=0.5) mm, dark red-brown, inclined to horizontal, cylindric, curved,

constricted below mouth when dry; cilia single, nodose; annulus of two rows of small cells; operculum 0.6-0.8 (x=0.7) X 0.4-0.6 (x=0.5) mm conic-apiculate. Spores 11.0-15.4 (x=13.0) μm, finely papillose.

HABITAT AND DISTRIBUTION: On moist soil, tree trunks and tree crotches: Chimaltenango, Huehuetenango, and Quezaltenango, **Guatemala**, 2400-4200 m (**Fig. 9**).

ILLUSTRATIONS: Bartram, 1949a. Fig. a-c; (**Fig. 10**).

COMMENTS: This species is endemic to the higher elevations in Guatemala. It is distinguishable by its open, loose growth form, loosely foliate stems and branches, broadly ovate, short-acuminate leaves with long decurrencies, slight plication, smooth setae, inclined capsules which are constricted below the mouth, and a conic-apiculate operculum.

The report of *B. alboflavens* Card. *sensu* Bartram (1949a) for Guatemala is based on a single specimen (*Steyermark 5007*) that should now be referred to *B. guatemalense*. This species is a tenuous segregate for *B. stereopoma*; both taxa are similar in the size and shape of median and basal cells, leaf shape, smooth setae, and the dioicous sexual condition. However, *B. stereopoma* differs from *B. guatemalense* in having a more compact growth form, more dense foliation, weaker decurrencies, fewer and larger-sized alar cells, erect capsules and the apex of the operculum are larger.

Separating characters of other sympatric *Brachythecium* from *B. guatemalense* are as follows: *B. cirriphylloides* is larger in size, has larger and broader ovate leaves with an abruptly formed apices, and papillose setae; *B. conostomum* has a more lax areolation and costae with

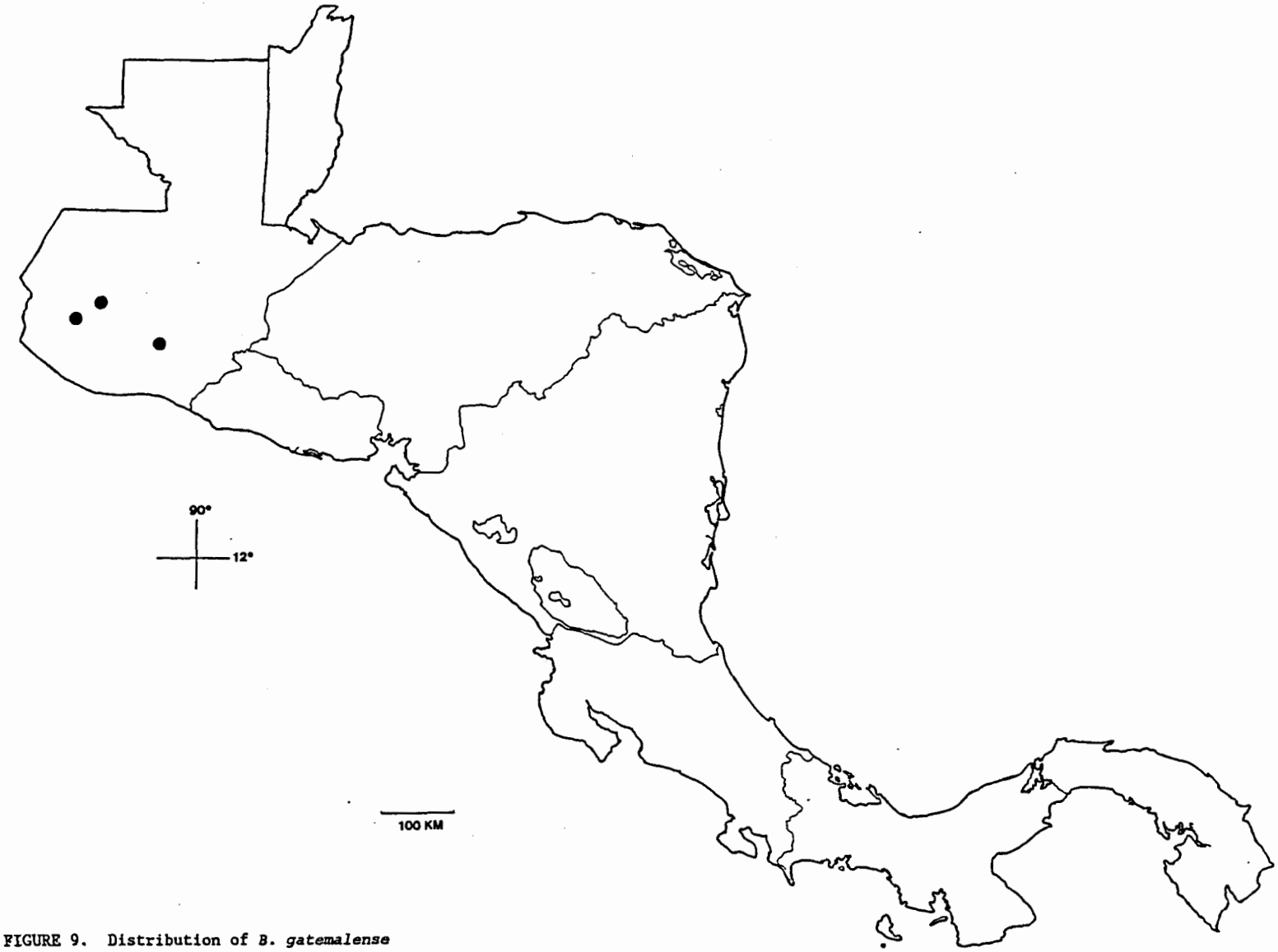
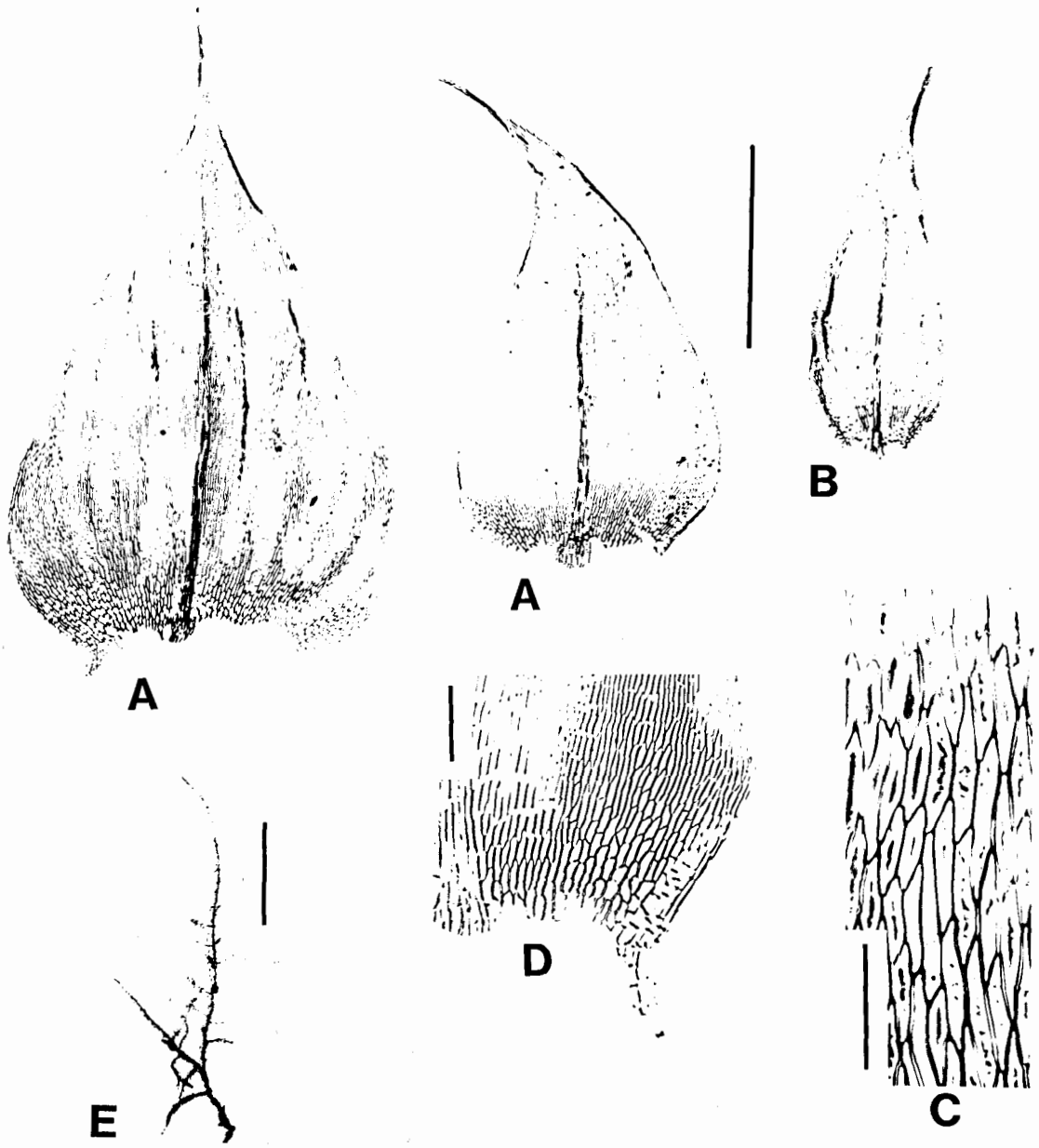
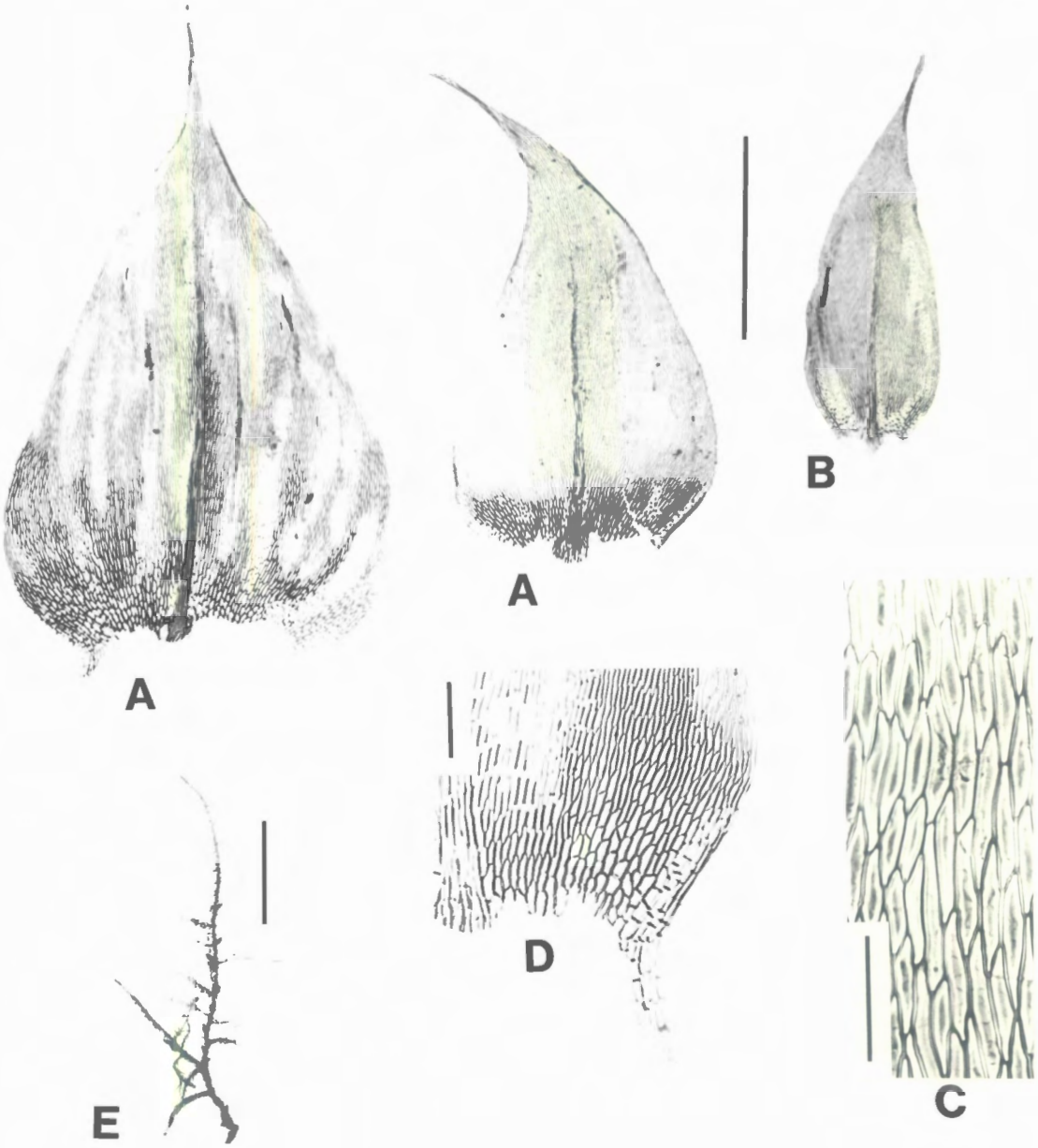


FIGURE 9. Distribution of *B. gatemalense*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 10. Illustrations of *B. guatemalense*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 10. Illustrations of *B. guatemalense*

lateral spurs; *B. occidentale* has narrower leaves, smaller-sized and fewer alar cells, and is autoicous; and *B. rutabulum*, occasionally found intertwined with this species, is larger-sized, has more prominent serration of the leaf margin, is autoicous, and has papillose setae.

* * *

Brachythecium oxycladon (Brid.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 322. 1878. (Ad. 2: 388).

Basionym: *Hypnum oxycladon* Brid., Musc. Recent. Suppl. 2: 123. 1812.

Plants medium to large, in thin to thick, spreading, yellow-green, intricate mats. Stems prostrate, terete, densely foliate, irregularly to pinnately branched; branches unequal in length, the tips becoming attenuate; pseudoparaphyllia orbicular to ovate-acute or apiculate. Leaves appressed-imbricate to erect when dry, becoming open when moist. Stem leaves 1.1-1.8 (x=1.4) X 0.4-0.9 (x=0.6) mm, concave, plicate, slightly decurrent, ovate-lanceolate, gradually short-acuminate to attenuate, rounded at the excavate base; margins recurved, entire to serrulate at base, plane and serrulate above; costae stout at base, tapering above, ending above middle (72%) occasionally in a short dorsal spine. Median leaf cells linear to linear-rhomboidal 31.9-68.4 (x=47.4) X 5.7-8.0 (x=6.6) μm; apical cells shorter, 22.8-57.0 (x=38.5) X 5.7-9.1 (x=7.1) μm; basal cells quadrate to rectangular, walls slightly pitted 13.7-51.3 (x=28.0) X 5.7-13.7 (x=9.3) μm; alar cells small, quadrate, numerous in well-defined groups, ± opaque 8.0-25.1 (x=15.8) X 8.0-18.2 (x=13.5) μm. Branch leaves smaller 0.5-1.4 (x=1.0) X 0.3-0.6 (x=0.4) mm,

ovate-lanceolate to lanceolate short-acuminate; margins serrulate nearly to base. Dioicous. Sporophytic material not known from Latin America.

HABITAT AND DISTRIBUTION: On rock, soil or base of trees, usually in shaded areas: Nuevo Leon, and Tamaulipas, **Mexico** 1500-2000 m. Europe, eastern North America, west to Minnesota, Nebraska (Crum 1983, p. 302), south to Louisiana (Crum and Anderson 1981, p. 1047), southwest to Colorado [!] (Grout 1928, p. 35), and Arizona [!] (Haring 1961, p. 236); (**Fig. 11**).

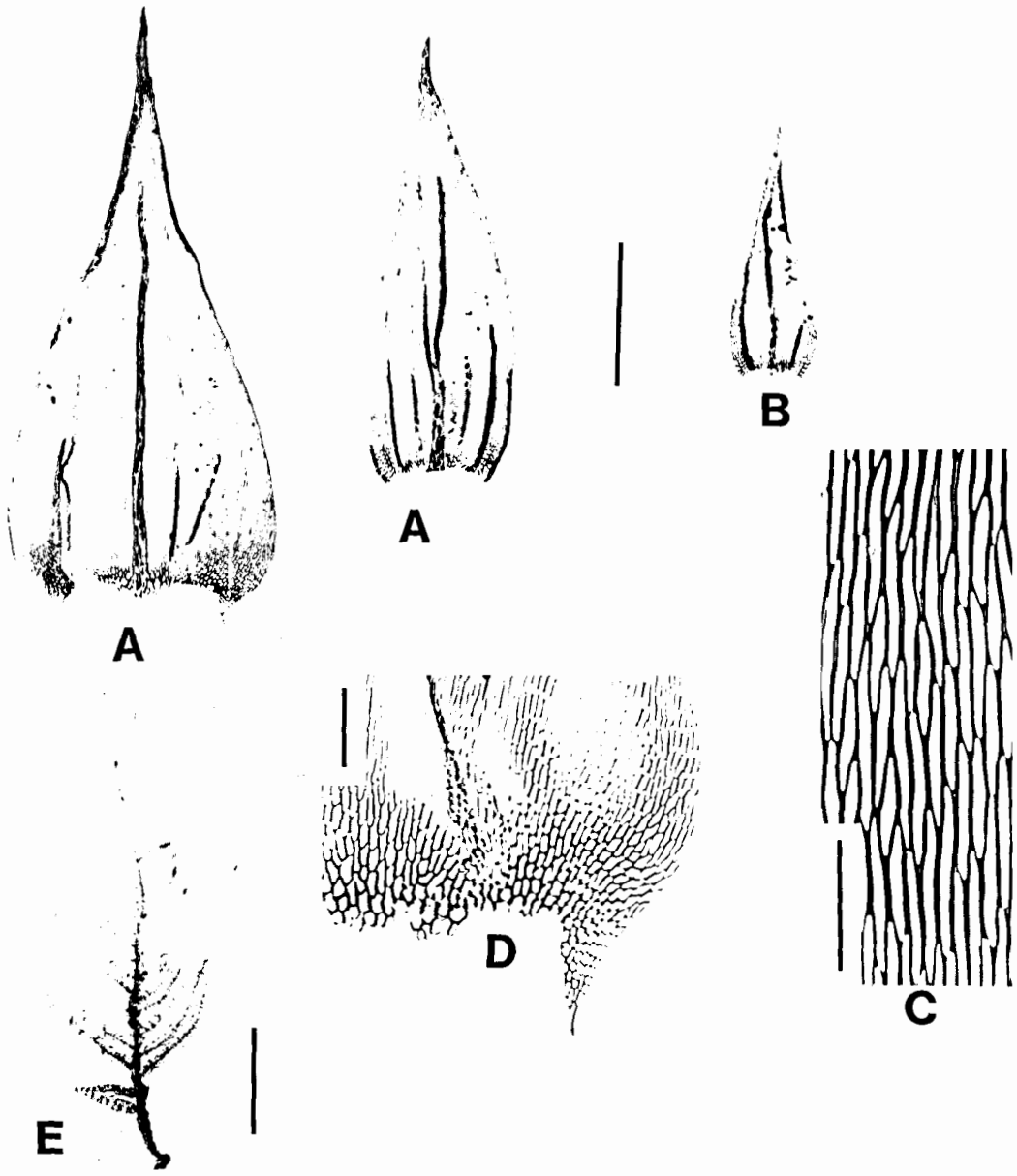
ILLUSTRATIONS: B.S.G., 1853, vol. 6. Tab. XX. (as *Hypnum laetum* B.S.G.); Sullivant, 1874., Plate 115. (as *Hypnum laetum* B.S.G.); Roth, 1905 Taf. XLIII. Fig. 5 a-d; Welch, 1957, Fig. 150; Limpricht, 1904 Band IV. Fig. 374; Robinson, 1962, Figs. 41-57; Flowers, 1973, Plate 103. Figs. 1-6; Conard, 1979, Fig. 313; Ireland, 1982, Plate 318; Crum and Anderson, 1981, Fig. 512; Crum, 1983, Fig. 120; Reese, 1984, Fig. 52. C-D; (**Fig. 12**).

COMMENTS: This species is common in eastern North America, less so in Europe, and rare in the western U.S. Specimens from northern Mexico are a southern extension of the previously reported southwestern U.S. range. This species is distinguished by the ovate, gradually short-acuminate plicate leaves, well-defined group of many small quadrate ± opaque alar cells and dioicous condition.

Other Mexican sympatric *Brachythecium* can be distinguished from *B. oxycladon* as follows: *B. fendleri* is smaller in size, with weaker leaf plication, and synoicous condition; *B. stereopoma* has a softer growth form, weaker leaf plication, more lax basal and alar cells, and more

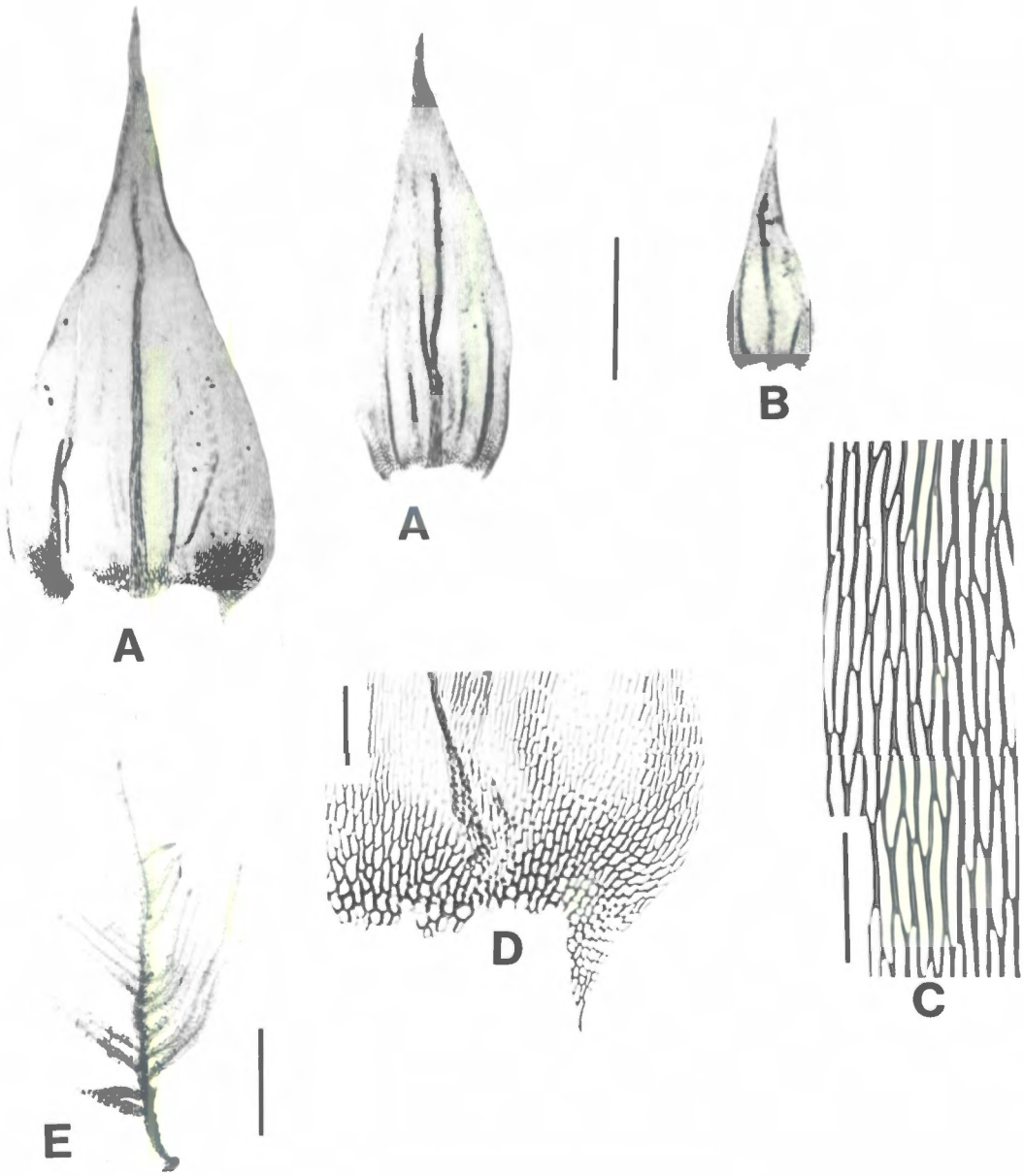


FIGURE 11. Distribution of *B. oxycladon*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 12. Illustrations of *B. oxycladon*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 12. Illustrations of *B. oxycladon*

filiform leaf apices; and *B. albicans* has a larger decurrency with non-opaque alar cells in distinct columns, and larger narrow leaf apices.

Extralimital to this study area, *Brachythecium acuminatum* (Hedw.) Aust. is morphologically similar to *B. oxycladon*. It was mistakenly reported for Mexico by Cardot (*in* Brotherus 1925, p. 360) when he synonymized three of his Mexican-described species, *B. lanceolifolium* Card., *B. tenuinerve* Card. and *B. albulum* Besch. *ex* Card. under *B. acuminatum*. As discussed under comments in the type studies of each of these species, I disagree with Cardot's assessment of these taxa and present a new disposition for each of them. Although I have seen no Mexican specimens, I would attribute to *B. acuminatum*, its occurrence in northern Mexico might be expected since *B. acuminatum* is distributed in the southeastern U.S., Arizona [!] (Haring 1961, p. 236), and Texas [!] (*McVaugh 7644*. TENN).

Brachythecium acuminatum is distinguished from *B. oxycladon* by its smaller size, compact growth form, stronger costae, shorter acute leaf apices, smaller basal cells of the leaf, by its erect capsule with a ring of enlarged annular cells, and lack of cilia on the endostome.

* * *

Brachythecium poadelphus C. Müll., Hedwigia 40: 76. 1901.

= *Brachythecium crinitirameum* C. Müll., Hedwigia 40: 75. 1901.

Plants medium-to large-sized, yellowish green, shiny, forming an open or dense mat. Stems prostrate to decumbent, terete, with tufted rhizoids at attachment to substrate and in older portions, subpinnately branched; branches terete, tapering tips; pseudoparaphyllia ovate-acuminate. Leaves erect, ± imbricate, ± homomallous, becoming erect and

± homomallous when moist; branch leaves ± complanate when dry. Stem leaves 1.4-2.6 (x=2.0) X 0.4-1.1 (x=0.8) mm, concave, not to slightly decurrent, not to slightly plicate, ovate-lanceolate, ± long-acuminate, to cordate and broadly ovate-acuminate; apices short and twisted to long filiform and double-twisted; margins slightly reflexed at base, plane above, serrate in upper 2/3, serrulate to entire below, older leaves less sharply serrate; costae broad at base, rapidly tapering and slender above, ending near middle (58%) in an inconspicuous spine. Median leaf cells long rhomboidal to linear, ± vermicular 57.0-142.5 (x=87.8) X 5.7-9.1 (x=7.0) μm; apical cells similar 52.4-114.0 (x=80.8) X 5.7-6.8 (x=6.3) μm; basal cells ± lax, rectangular to irregularly rectangular, ± porose 36.5-114.0 (x=60.0) X 6.8-25.1 (x=13.2) μm; alar cells quadrate to rectangular, ± lax, forming indiscrete groups 17.1-57.0 (x=34.0) X 11.4-23.9 (x=17.4) μm. Branch leaves 1.2-2.2 (x=1.7) X 0.4-0.7 (x=0.5) mm, slightly smaller, narrower, ovate-lanceolate, long-acuminate, apices twisted; margins more distinctly serrate. Dioicous. The rest unknown.

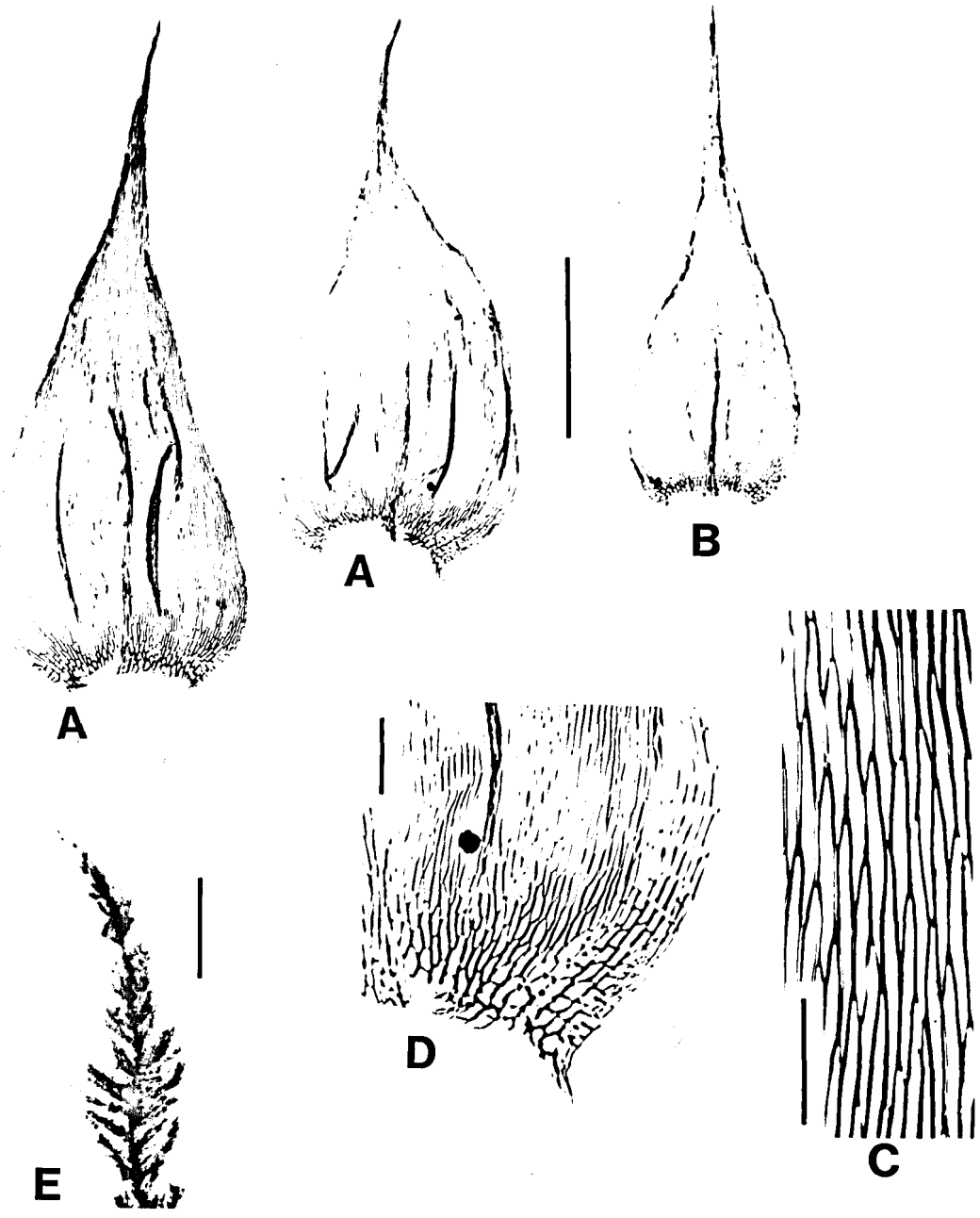
HABITAT AND DISTRIBUTION: On moist rotting logs, soil banks near rivers and tree trunks: Minas Geraës and São Paulo, **Brazil** 900-1600 m (**Fig. 13**).

ILLUSTRATIONS: **Figure 14.**

COMMENTS: This species is endemic to the mountainous region of southeastern Brazil. It is distinguished by its large size, ± homomallous stems and branches, broadly ovate leaves generally with long-twisted serrate apices, long linear median cells and large basal and alar cells.

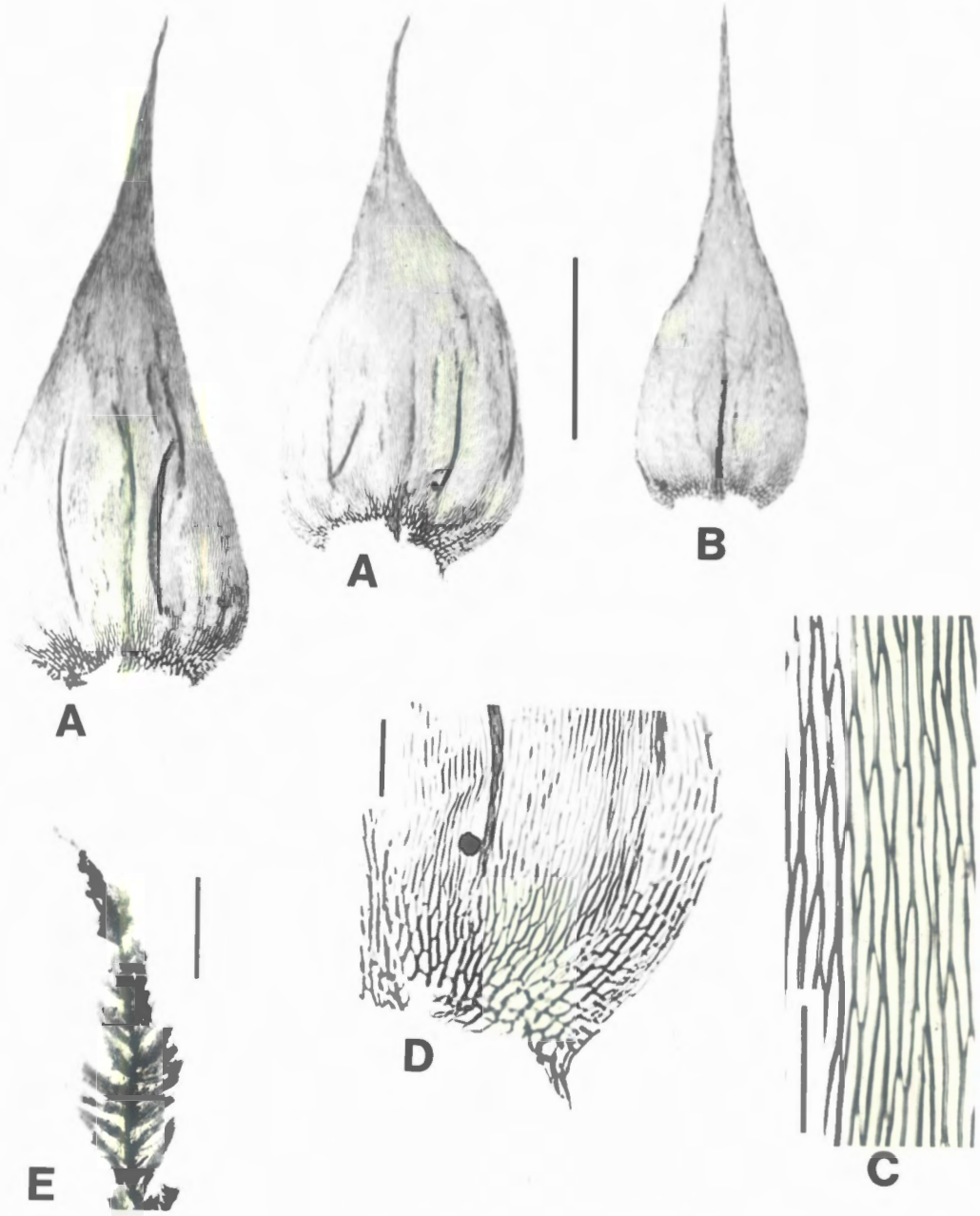


FIGURE 13. Distribution of *B. poadelphus*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 14. Illustrations of *B. poadelphus*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 14. Illustrations of *B. poadelphus*

This species is probably a weak segregate from *Brachythecium stereopoma*, the only sympatric species of the genus. *Brachythecium stereopoma* can be distinguished from this species by its smaller-sized, shorter leaf apices, shorter median cells that are fusiform to long rhomboidal, smaller basal cells which are not pitted, and smaller quadrate alar cells in a defined group. *Brachythecium poadelphus* shares many of the characteristics of *Brachythecium chocayae* (range: northern Andes) and *Brachythecium rutabulum* (range in Latin America: mountainous ranges of central and western South America). *Brachythecium chocayae* differs in being autoicous. *Brachythecium rutabulum* differs in being autoicous, stem and branches being more complanate, and leaf apices being much shorter.

Of the five collections of *B. poadelphus* known to me, one was sterile and the other four produced only perigonia, thus making it dioicous. In other dioicous species of this genus (e.g., *B. stereopoma* and *B. conostomum*) non-sporophytic plants are either sterile or the majority of the plants of a mat bear only perichaetia. For *B. poadelphus*, the absence of perichaetia is unusual which may indicate that female plants have been lost or that male populations are recent arrivals to this area. The latter situation is plausible since disjunctive populations of dioicous taxa have been reported in bryophytes (Schuster, 1969 and Schofield and Crum, 1972). If this is a disjunct species, I suspect that sibling populations may be found in Africa. Clarification of this species and its disposition may not be resolved until more populations are studied or sporophytes are discovered.

* * *

Brachythecium stereopoma (Spruce *ex* Mitt.) Jaeg., Ber. S. Gall. Naturw. Ges. 1876-77: 327. 1878. (Ad. 2: 393).

Basionym: *Hypnum stereopoma* Spruce *ex* Mitt. J. Linn. Soc. Bot. 12: 561. 1869. [!]

≡ [*Brachythecium stereopoma* Spruce, Catal. Musc. Amaz. et Andian. p. 20. 1867. *nom. nud.*]

≡ *Chamberlainia stereopoma* (Spruce *ex* Mitt.) Robinson, Bryologist 65(2): 105. 1962.

= *Brachythecium calerae* (C. Müll.) Kindb., Enum. Bry. Exot. p. 7. 1888.

Basionym: *Hypnum calerae* C. Müll., Linnaea 42: 452. 1879. [!]

= *Brachythecium nematogonium* (C. Müll.) Kindb., Enum. Bry. Exot. p. 8. 1888.

Basionym: *Hypnum nematogonium* C. Müll., Linnaea 42: 453. 1879. [!]

= *Brachythecium squalidissimum* (C. Müll.) Kindb., Enum. Bry. Exot. p. 8. 1888.

Basionym: *Hypnum (Brachythecium) squalidissimum* C. Müll., Linnaea 42: 452. 1879. [!]

= *Brachythecium eupopuleum* (C. Müll.) Kindb., Enum. Bry. Exot. Suppl. 2. p. 97. 1891.

Basionym: *Hypnum (Brachythecium) eupopuleum* C. Müll., Linnaea 42: 500. 1879. [!]

= *Brachythecium sulphureum* (Geh. & Hampe) Par., Ind. Bryol. 146. 1894.

Basionym: *Hypnum sulphureum* Geh. & Hampe, Flora 64: 415. 1881. [!]

= *Brachythecium fasciculato-caudatum* C. Müll., Hedwigia 36: 129. 1897. [!]

= *Brachythecium filirameum* C. Müll., Hedwigia 36: 127. 1897. [!]

= *Brachythecium jamaicense* C. Müll., Bull. Herb. Boissier 5: 218. 1897. *fide* Crum & Steere, 1957, p. 562. [!]

= *Brachythecium minusculifolium* C. Müll., Hedwigia 36: 128. 1897. [!]

= *Brachythecium mollirameum* C. Müll., Hedwigia 36: 129. 1897. [!]

= *Brachythecium trochalobasis* C. Müll., Bull. Herb. Boissier 5: 1897. *fide* Bartram 1949a, p. 353. [!]

= *Brachythecium pusillo-albicans* C. Müll., Bull. Herb. Boissier 5: 218. 1897. *fide* Bartram 1949a, p. 353. [!]

= *Brachythecium pseudo-laetum* C. Müll., Hedwigia 37: 260. 1898. *fide* Crum and Steere, 1957, p. 562. [!]

= [*Brachythecium macromitriadelphus* C. Müll. in Par., Ind. Bryol. Suppl. 46. 1900. *nom. nud.*] [!]

= [*Brachythecium tenui-pinnatum* C. Müll. in Par., Ind. Bryol. Suppl. 51. 1900. *nom. nud.*] [!]

Basionym: [*Hypnum (Brachythecium) tenui-pinnatum* C. Müll. in Ule, Hedwigia 38(Beibl.): 59. 1899. *nom. nud.*] [!]

= [*Brachythecium andrieuxii* (Mont.) Besch., Jour. de Bot. 15: 385. 1901. *nom. illeg. typ. inval.*] [!]

= *Brachythecium condensatissimum* C. Müll., Hedwigia 40: 75. 1901. [!]

= *Brachythecium fossarum* C. Müll., Hedwigia 40: 77. 1901. [!]

= *Brachythecium plicifolium* C. Müll., Hedwigia 40: 76. 1901. [!]

= *Brachythecium plicifolium* var. *tenui-pinnatula* C. Müll., Hedwigia 40: 77. 1901. [!]

= *Brachythecium productifolium* C. Müll., Hedwigia 40: 77. 1901. [!]

= *Brachythecium pseudo-sulphureum* C. Müll., Hedwigia 40: 75. 1901. [!]

= *Brachythecium costaricense* Ren. *et* Card., Bull. Soc. R. Bot. Belg. 41(1): 123. 1905. [!]

= *Brachythecium alboflavens* Card., Rev. Bryol. Lichénol. 37: 68. 1910. [!]

= *Brachythecium alboviride* Besch. *ex* Card., Rev. Bryol. Lichénol. 37: 69. 1910. [!]

= *Brachythecium albulum* Besch. *ex* Card., Rev. Bryol. Lichénol. 37: 66. 1910. [!]

= *Brachythecium flexinerve* Card., Rev. Bryol. Lichénol. 37: 67. 1910. [!]

= *Brachythecium hastifolium* Card., Rev. Bryol. Lichénol. 37: 69. 1910. [!]

= *Brachythecium hylocomioides* Card., Rev. Bryol. Lichénol. 37: 69. 1910. [!]

= *Brachythecium lanceolifolium* Card., Rev. Bryol. Lichénol. 37: 66. 1910. [!]

= *Brachythecium lanceolifolium* var. *gracile* Card., Rev. Bryol. Lichénol. 37: 66. 1910. [!]

= *Brachythecium sericeolum* Card., Rev. Bryol. Lichénol. 37: 66. 1910. [!]

= *Brachythecium tenuinerve* Card., Rev. Bryol. Lichénol. 37: 65. 1910. [!]

= *Brachythecium longisetum* Herz., Biblioth. Bot. 87: 159. 1916. [!]

= *Brachythecium mollirameum* var. *delicatulum* Herz., Biblioth. Bot. 88: 25. 1920. [!]

Plants generally medium-sized, occasionally small and slender or robust, bright yellow-green to dark green, mostly forming dense spreading mats, occasionally delicate thin mats or erect tufts. Stems prostrate to decumbent, terete, densely foliate, rarely loosely foliate, irregularly to pinnately branched; branches terete, ± tapering at tips, becoming shorter and more distant toward stem apices or equally long throughout; pseudoparaphyllia ovate-acuminate. Leaves erect-imbricate to erect when dry, becoming more open when moist, occasionally slightly homomallous. Stem leaves 1.1-2.3 (x=1.6) X 0.5-1.1 (x=0.7) mm, concave, short to long decurrent, slightly to occasionally plicate, cordate-ovate, ovate-lanceolate, triangular-acuminate or lanceolate, gradually ± long-acuminate, apices straight or curved and ± twisted, margins reflexed at base, plane above, serrulate to serrate in upper portion, generally entire smooth below; costae broad at base, tapering and ending near middle (54%) ± with an inconspicuous spine. Median leaf cells fusiform to linear 45.6-102.6 (x=76.1) X 5.7-9.1 (x=6.9) μm; apical cells similar 50.2-104.9 (x=68.8) X 4.7-8.0 (x=6.2) μm; basal cells rectangular to irregularly rectangular, ± slightly lax, walls smooth to slightly porose in larger leaves 22.8-57.0 (x=41.8) X 8.0-17.1 (x=12.2) μm; alar cells small to slightly lax, quadrate to rectangular, ± forming short columns extending into decurrencies 11.4-39.9 (x=26.0) X 9.1-28.5(x=15.4) μm. Branch leaves 0.6-1.5 (x=1.2) X 0.2-0.6 (x=0.5) mm, smaller and narrower, ovate-lanceolate, acuminate, apices ± twisted, margins more sharply serrate. Dioicous. Setae 4.0-27.0 (x=15.0) mm long, red-brown, smooth. Capsules 1.0-2.3 (x=1.6) X 0.4-0.8 (x=1.6) mm, light brown, erect to inclined, cylindrical and curved; annulus not

differentiated; cilia 2-3, papillose, nodose; operculum 0.7-1.1 (x=0.8) X 0.4-1.1 (x=0.7) mm, conic-apiculate to elongate-conic and ± curved. Spores 9.9-18.7 (x=13.3) µm, finely papillose.

HABITAT AND DISTRIBUTION: On various substrates in a diversity of habitats. Most commonly found at bases of trees, tree stumps, and fallen logs; occasionally on limestone rock, stone walls, and cliffs, soil (trail and road embankments), humus, and grassy areas; rarely on granitic rock. In Central America more common (Oak-pine and *Cupressus*) in tropical forests; in South America found in tropical, tropical, deciduous, and alpine vegetations: Chaco, Córdoba, Jujuy, Salta, and Tucumán, **Argentina** 400-1400 m; Cochabamba, La Paz, and Santa Cruz, **Bolivia** 700-2750 m; Maranháo, Minas Geraës, Rio de Janeiro, Rio Grande do Sul, Santa Catarina, and São Paulo, **Brazil** 30-2250 m; Boyacá, Caldas, Cundinamarca, and Tolima, **Colombia** 1800-3250 m; Alajuelita, Cartago, Guanacaste, Heredia, and San José, **Costa Rica** 450-3300 m; Havana, and Oriente, **Cuba**; Independencia, La Vega, and Santiago, **Dominican Republic** 560-2500 m; Azuay, Chimborazo, Cotapaxi, El Oro, Loja, Pichincha, Morona-Santiago, and Tungurahua, **Ecuador** 900-3100 m; Ahuachapán, and La Libertad, **El Salvador** 1300-1862 m; Alta Verapaz, Baja Verapaz, Chimaltenango, El Quiché, Guatemala, Huehuetenango, Jalapa, Quezaltenango, Sacatepéquez, San Marcos, Sololá, and Totonicapán, **Guatemala** 350-3400 m; Isla Isabela, **Galapagos Islands**; Choluteca, Comayagua, El Paraíso, Francisco Morazán, Intibucá, and Olancho, **Honduras** 720-1800 m; **Haiti** 1300-2000 m; Hanover, Manchester, Portland, St. Andrew, St. Elizabeth, St. Thomas, and Trelawny, **Jamaica** 280-1550 m; Chiapas, Coahuila, Distrito Federal, Durango, Guerrero, Hidalgo,

Jalisco, México, Michoacán, Morelos, Nayarit, Nuevo León; Oaxaca, Puebla, Querétaro, San Luis Potosí, Sinaloa, Tamaulipas, Tlaxcala, and Veracruz, **Mexico** (100) 600-3600 (4000) m; Jinotega, Managua, and Matagalpa, **Nicaragua** 800-1450 m; Chiriquí, **Panama**; **Paraguay**; Amazonas, Ancash, Apurímac, Ayacucho, Cuzco, Huánuco, Pasco, and San Martín, **Peru** 600-3100 m; **Puerto Rico**; Paysandú, **Uruguay**; Aragua, Distrito Federal, Lara, Mérida, Monagas, Portuguesa, Sucre, Táchira, and Trujillo, **Venezuela** 900-3650 m. Reported from Colorado and New Mexico by Robinson (1962, p. 106); (**Fig. 15**).

ILLUSTRATIONS: Bartram, 1949a. Fig. 156. D-F.; Sharp and Crum (unpublished); (**Fig. 16**).

COMMENTS: This species is widely distributed in Latin America, from northern Mexico to northern Argentina and disjunct to Galapagos Islands and several of the Caribbean Islands. In Latin America *B. stereopoma* is the most widely distributed and most commonly collected species in the genus. It is distinguished by the dioicous condition, ovate-lanceolate acuminate leaves, areolation, small quadrate alar cells forming distinct groups, smooth setae, suberect slightly curved capsules, and long-conic slightly curved opercula.

Brachythecium stereopoma, like many taxa of this genus, is extremely variable. Its plasticity, tolerance to diverse habitats and geographical range have contributed to the large number of geographical taxa listed in synonymy. The broad species interpretation presented here is based on the consistency of characters observed in sporophyte morphology, general leaf form, areolation, and dioicous condition. As with many other *Brachythecium* taxa, the greatest variations are seen in



Arabic numerals refer to the number of states or political divisions within countries indicated for which specimens of this species were collected.

FIGURE 15. Distribution of *B. stereopoma*

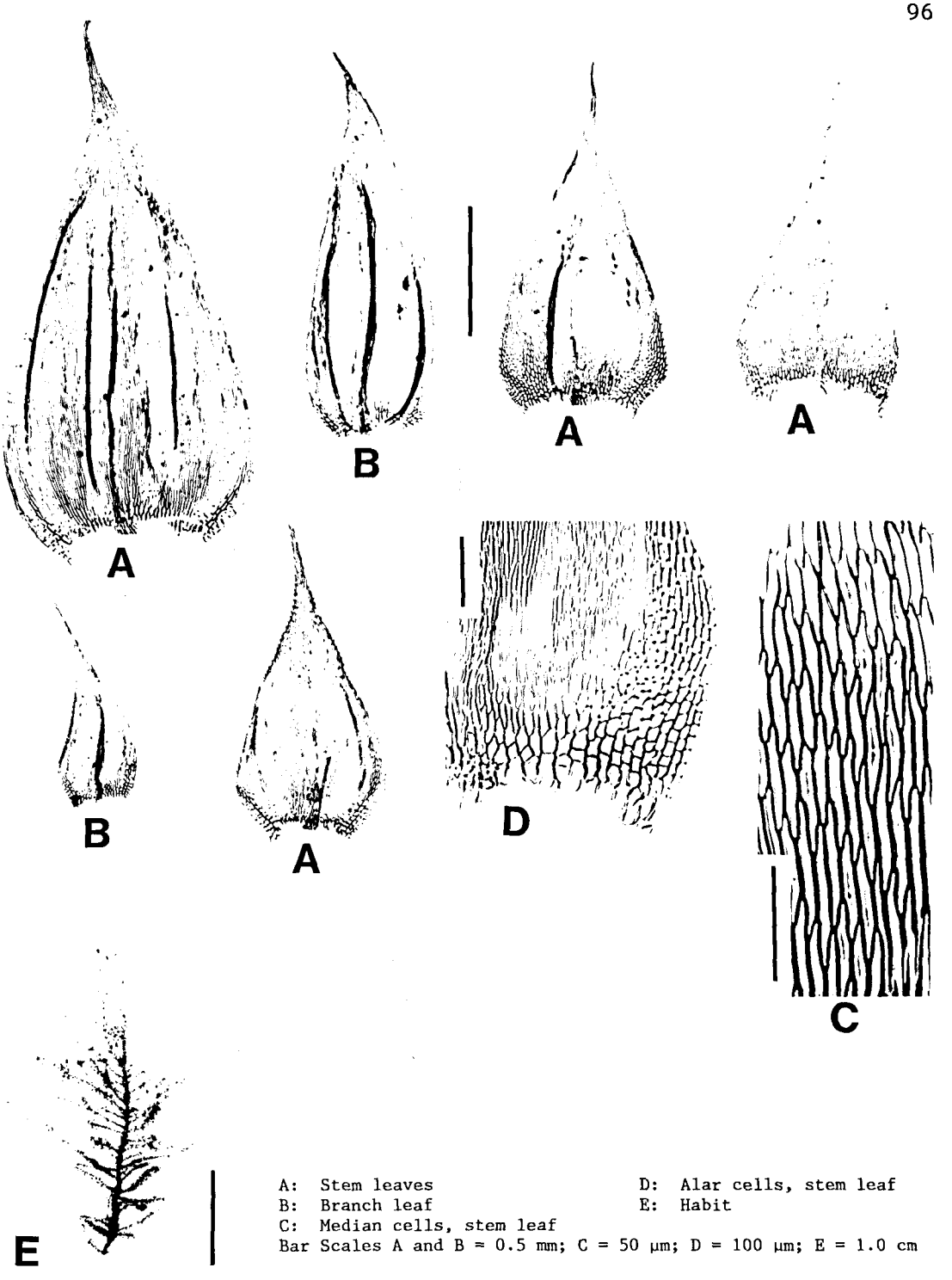
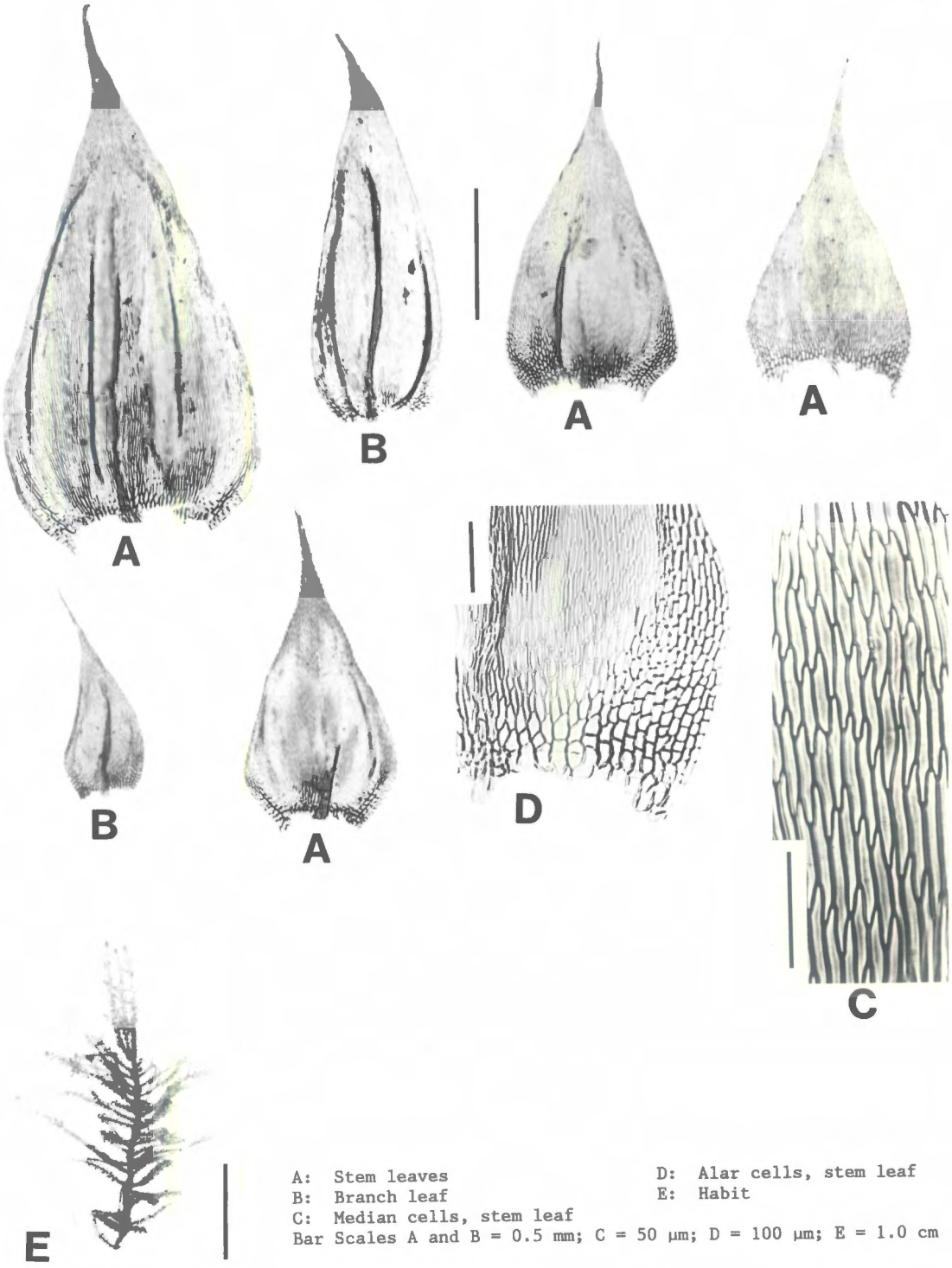


FIGURE 16. Illustrations of *B. stereopoma*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 16. Illustrations of *B. stereopoma*

the growth form, size of the plants, and leaf shape, especially the length of the acumina. Formal recognition of morphological variants in infraspecific groupings is considered too artificial because of continuous intergradation among variable character states.

Comparing the distributional range and frequency of occurrence of *B. stereopoma* to other Latin America taxa of this genus, it appears to be more widespread than all the other dioicous and monoicous taxa. The weedy nature of this species is similar to that of *Brachythecium salebrosum* (Web. & Mohr) B.S.G. and *Brachythecium oxycladon* (Brid.) Jaeg. in eastern North America, each being autoicous and dioicous respectively. As with many of the dioicous species of *Brachythecium, B. stereopoma's* distribution is continental. Yet, it is interesting to note that it has established disjunct populations, with sporophytes, in the Caribbean Islands and southeastern coastal Brazil (separated from Andean populations by a lowland tropical barrier). Throughout *B. stereopoma's* mainland range, sporophyte bearing populations are common. Thus, distribution by its spores is evident and is the probable agent for establishment of disjunct populations. Despite the success of this taxon as evidenced by its distribution and environmental adaptability, there is some unknown limiting factor that has kept this species from migrating into the Sierra and Rocky Mountains of the western U.S. or further south of the 30° S latitude.

This species is sympatric with most of the Latin America taxa of *Brachythecium* north of the 30° S latitude. The majority of these sympatric taxa are distinguished by being monoicous. Sympatric dioicous taxa can be separated from *B. stereopoma* as follows: *B. albicans* is

tufted, more julaceous with fewer branches, leaves more linear with prominent plicae, and columns of quadrate alar cells extending up the laminae between the plicae and margins; *B. cirriphylloides* forms plants and leaves that are much larger, leaves more deeply concave and broader cordate-ovate with abruptly constricted apices; *B. conostomum* has a more compact growth form with distinctly tapering stems and branches, more lax areolation, straight leaf bases, and weakly defined alar regions; *B. guatemalense* forms thinner mats, loosely foliate stems and branches, stronger leaf decurrencies, more cordate leaf bases, shorter apices, reduced leaf areolation, more inclined capsules, and shorter opercula; *B. oxycladon* exhibits narrower and more tightly appressed leaves with more prominent plicae, longer costae, reduced areolation, and well defined, ± opaque alar cells; and *B. zanonii* forms plants that are slightly larger, leaves more linear with prominent plicae, leaf bases with prominent shoulders, larger basal and alar cells, and longer median and apical cells.

* * *

Brachythecium zanonii Buck. *sp. nov.* in press. [!]

Plants medium-sized, yellow-green in younger portions, becoming brown below, forming a dense or loose spreading mat. Stems prostrate, terete, densely foliate, ± pinnately branched; branches erect, terete, tapering at tips; pseudoparaphyllia ovate-acuminate. Leaves erect ± imbricate when dry, patent to open when moist, concave, decurrent, distinctly plicate. Stem leaves 1.6-2.9 (x=2.3) X 0.5-1.0 (x=0.8) mm, ovate to elongate-triangular, gradually narrowing into long apices, base of leaves with sharp rounded shoulders and reflexed margins, plane

above, serrulate throughout to serrulate in apices and entire below; costae broad at base, tapering above and ending near middle (49%). Branches leaves 1.3-2.0 (x=1.61) X 0.3-0.5 (x=0.4) mm, elongate-triangular, with long gradually tapering apices. Median leaf cells fusiform to linear 50.2-131.1 (x=89.0) X 4.6-9.1 (x=7.1) μm; apical cells elongate-linear 54.7-142.5 (x=100.2) X 3.4-6.8 (x=5.6) μm; basal cells irregularly rectangular, pitted, ± a single row of enlarged cells at insertion 25.1-68.4 (x=46.1) X 11.4-28.5 (x=16.6) μm; alar cells lax, forming distinct groups, quadrate to rectangular becoming enlarged in decurrencies, 11.4-51.3 (x=29.7) X 12.5-28.5 (x=20.6) μm. Dioicous. Setae 8.5-15.0 (x=11.1) mm long, dark red-brown, smooth. Capsules 1.1-1.8 (x=1.5) X 0.4-0.7 (x=0.5) mm, suberect, cylindrical and curved, red-brown; cilia 2, papillose, nodose; spores 12.1-16.5 (x=14.1) μm, finely papillose. The rest unknown.

HABITAT AND DISTRIBUTION: In moist forest, wet rock along road side and moist exposed limestone. Endemic to **Hispaniola** (Dominican Republic and Haiti). 1400-1800 m (**Fig. 17**).

ILLUSTRATIONS: Buck, (in press); (**Fig. 18**).

COMMENTS: This species is distinguished by its plicate leaves with gradually tapering and very long apices, and alar cells grouped above enlarged cells forming the long decurrencies.

This species resembles *Brachythecium glareosum* (Bruch *ex* Spruce) B.S.G. and *Brachythecium oxycladon* (Brid.) Jaeg. in its growth form, dioicous condition, strongly plicate leaves, and the general pattern of basal areolation. In addition, *B. glareosum* is similar to *B. zanonii* in the gradually long tapering apices. *B. zanonii* differs in the shape of

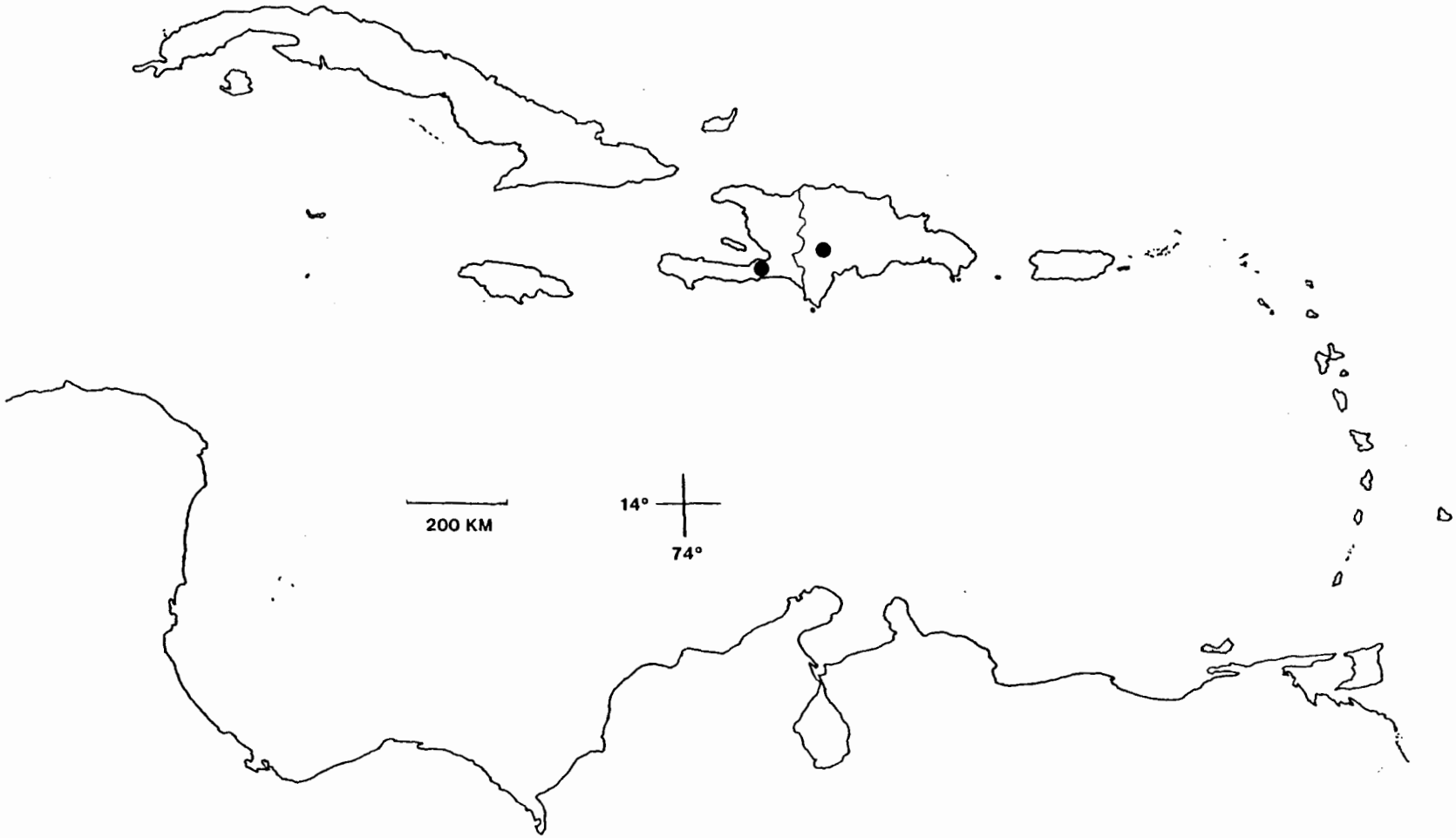
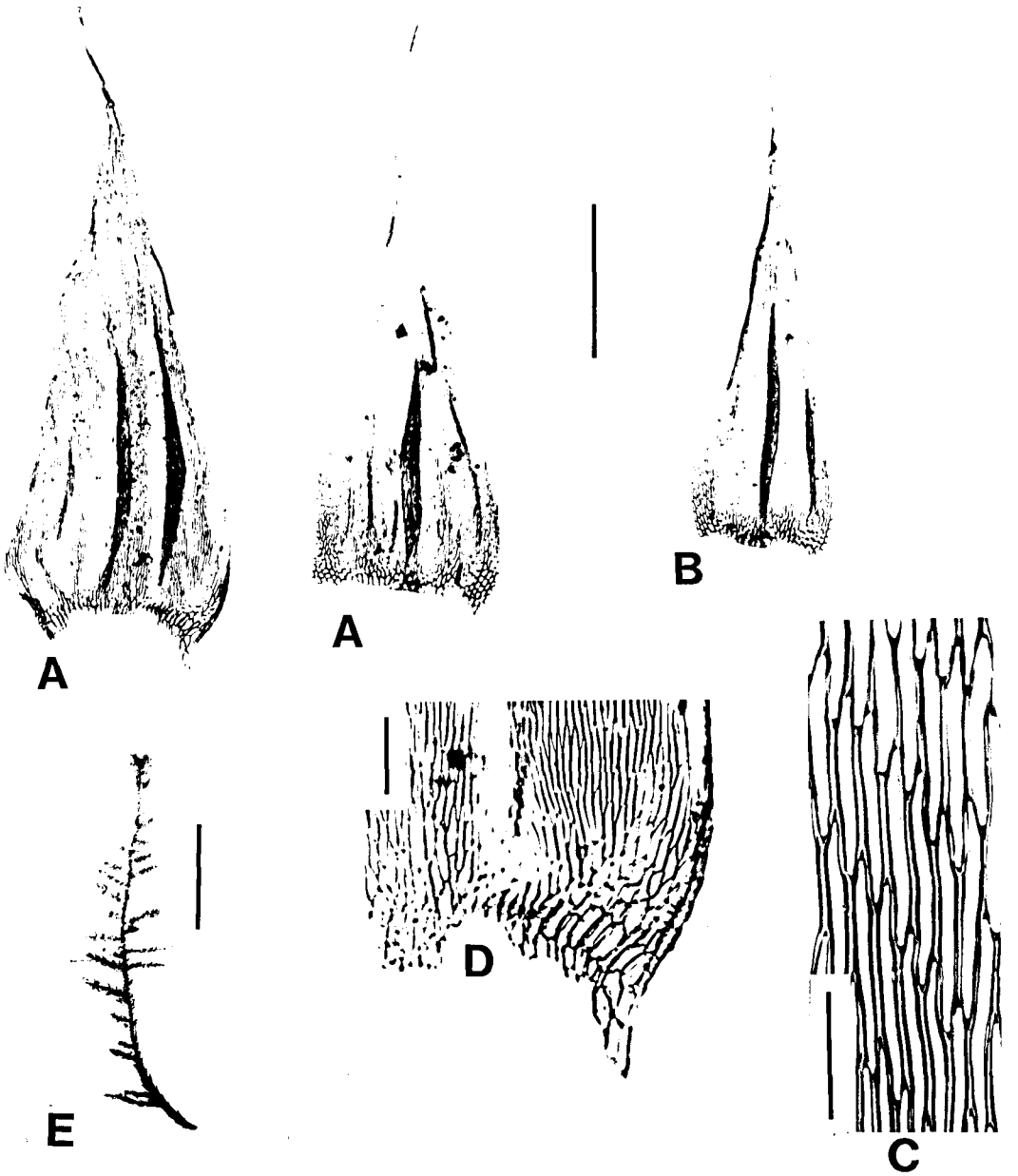
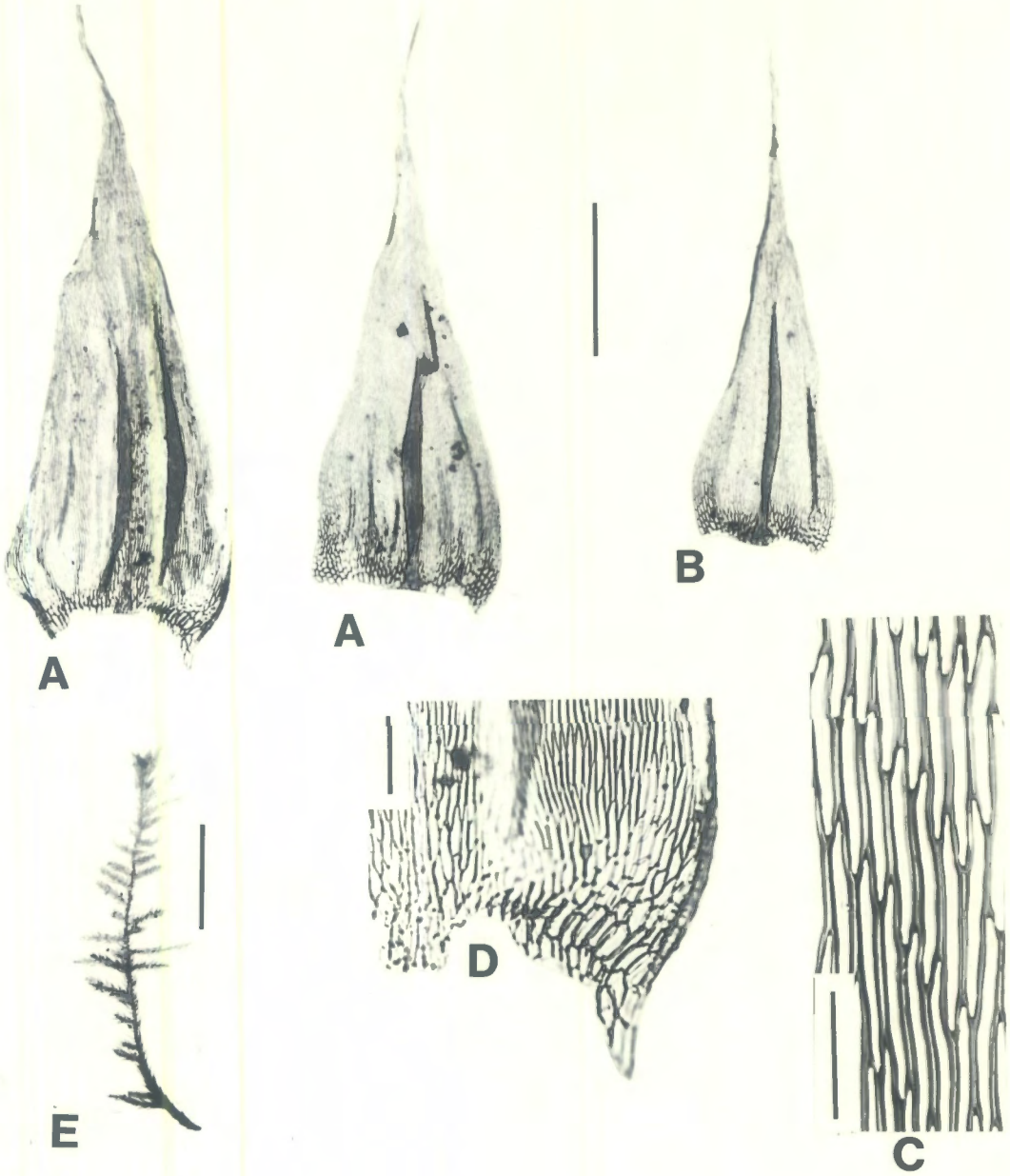


FIGURE 17. Distribution of *B. zanonii*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 18. Illustrations of *B. zanonii*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 μm; D = 100 μm; E = 1.0 cm

FIGURE 18. Illustrations of *B. zanonii*

the base of the leaf as it attaches to the stem (rounded to the insertion by conspicuous shoulders), the enlarged alar cells, and the longer apical cells. *B. oxycladon* forms a similar shape in the leaf base but differs by the smaller cells of the decurrencies and shorter more acute leaf apices. In all other respects *B. oxycladon* and *B. zanonii* are indistinguishable.

The plicate leaves, dioicous condition, distinctly rounded shoulders and enlarged alar cells of *B. zanonii* bear some resemblance to *Brachythecium frigidum*. However, *B. frigidum* can be distinguished by its shorter leaf apices, stronger plicae, inflated alar cells and papillose setae.

Confusion with *B. stereopoma*, the only sympatric *Brachythecium* on Hispaniola, is also possible. However, *B. stereopoma* differs by the more ovate, shorter acuminate leaves, and smaller alar cells.

* * *

Section *Salebrosa* (Limpr.) Brotherus, Nat. P61. 1(3) 1142. 1909.

Basionym: [Group--*Salebrosa* Limpr. Laubm 3: 62. 1895. *illeg. subdivisio*].

Plants soft, medium- to robust-sized. Leaves concave, decurrencies short ± with small auricles, weakly to strongly plicate, ovate to broadly ovate, gradually to abruptly acuminate. Autoicous; seta smooth or weakly papillose; capsules inclined to horizontal, annulus differentiated, one row on inflated cells, cilia nodose, operculum conic-apiculate.

* * *

Brachythecium austro-salebrosum (C. Müll.) Kindb., Enum. Bry. Exot., Suppl. 2. p. 97. 1891.

Basionym: *Hypnum austro-salebrosum* C. Müll., Bot. Jahrb. Syst. 5: 82. 1883. [!]

= *Brachythecium euryodictvum* C. Müll., Bot. Jahrb. Syst. 5: 82. 1884. *fide*. Newton, 1979, p. 127. [!]

= *Brachythecium georgico-glareosum* (C. Müll.) Kindb., Enum. Bry. Exot., Suppl. 2. p. 97. 1891. *fide*. Newton, 1979, p.127.

Basionym: *Hypnum* (*Brachythecium*) *georgico-glareosum* C. Müll., *in* Nenmaner, Deutsch. Exp. Int. Polarforsch. 2: 318. 1890. [!]

= *Brachythecium antarcticum* Card., Rev. Bryol. Lichénol. 27: 46. 1900. *fide*. Newton, 1979, p. 127. [!]

= *Brachythecium antarcticum* var. *cavifolium* Card., Rev. Bryol. Lichénol. 27: 46. 1900. *fide*. Newton, 1979, p. 127. [!]

= *Brachythecium skottsbergii* Card., Bull. Herb. Boissier ser. 2. 6: 12. 1906. *fide*. Newton, 1979, p. 128. [!]

Plants medium- to robust-sized, pale yellow-green to light green, forming dense erect tufts or infrequently in open loose intertwining mats. Stems terete, densely foliate in younger portions, becoming denuded and decomposed below, tufted plants not or infrequently branched, prostrate plants irregularly branched with tufts of rhizoids where attachment to substrate; branches erect, julaceous, tips tapering; pseudoparaphyllia orbicular to ovate-acute. Leaves 2.3-3.7 (x=3.0) X 0.5-1.7 (x=1.1) mm, erect to erect-patent tightly appressed to open when dry, more open when moist, tightly appressed at stem and branch tips, ± strongly concave, slightly decurrent ± with small rounded auricles,

plicate when dry, weakly plicate when moist, broadly ovate, cuspidate to ovate-lanceolate, abruptly or gradually short-acuminate, rarely long-acuminate; margins reflexed at base, plane above, entire; costae broad at base, gradually tapering and narrower above, ending near middle (56%). Median leaf cells fusiform, long rhomboidal to linear 74.1-125.4 (x=100.6) X 6.8-11.4 (x=8.5) μm; apical cells similar and shorter 57.0-114.0 (x=85.5) X 4.6-10.3 (x=7.6) μm; basal cells lax, rectangular, with thickened and pitted walls 28.5-102.6 (x=56.2) X 12.5-28.5 (x=16.5) μm; alar cells ± numerous, lax (not inflated), quadrate to rectangular 17.1-45.6 (x=32.5) X 11.4-28.5 (x=19.3) μm. Autoicous. Setae 11.0-25.0 (x=20.0) cm, smooth, dark red-brown. Capsules 1.3-2.3 (x=1.6) X 0.5-1.5 (x=0.9) mm, horizontal, oblong-ovate, curved, red-brown; cilia 2, nodose; annulus composed of single row of enlarged cells; operculum 0.4-0.8 (x=0.7) 0.6-1.0 (x=0.8) mm, conic-apiculate. Spores not observed. n=10, 11, 13 (Newton, 1972, 1980, 1979).

HABITAT AND DISTRIBUTION: On wet rocks or mud in open exposed areas or occasionally in water: Graham Land, Palmer Land, South Orkney Island, and South Shetland Island, **Antarctica**; Santa Cruz and Tierra del Fuego, **Argentina**; Magellan, **Chile**; **Crozet Island**; East and West **Falkland Island (Malvinas)**; **Kerguelen Island** 400 m; Marion Island, **Prince Edward Islands**; **South Georgia Islands** 1.5-460 m (**Fig. 19**).

ILLUSTRATIONS: **Figure 20.**

COMMENTS: This species is circum-subantarctic in distribution from Patagonia to Kerguelen Island. It is distinguished by the autoicous condition, tufted growth form, large broadly ovate to ovate-lanceolate

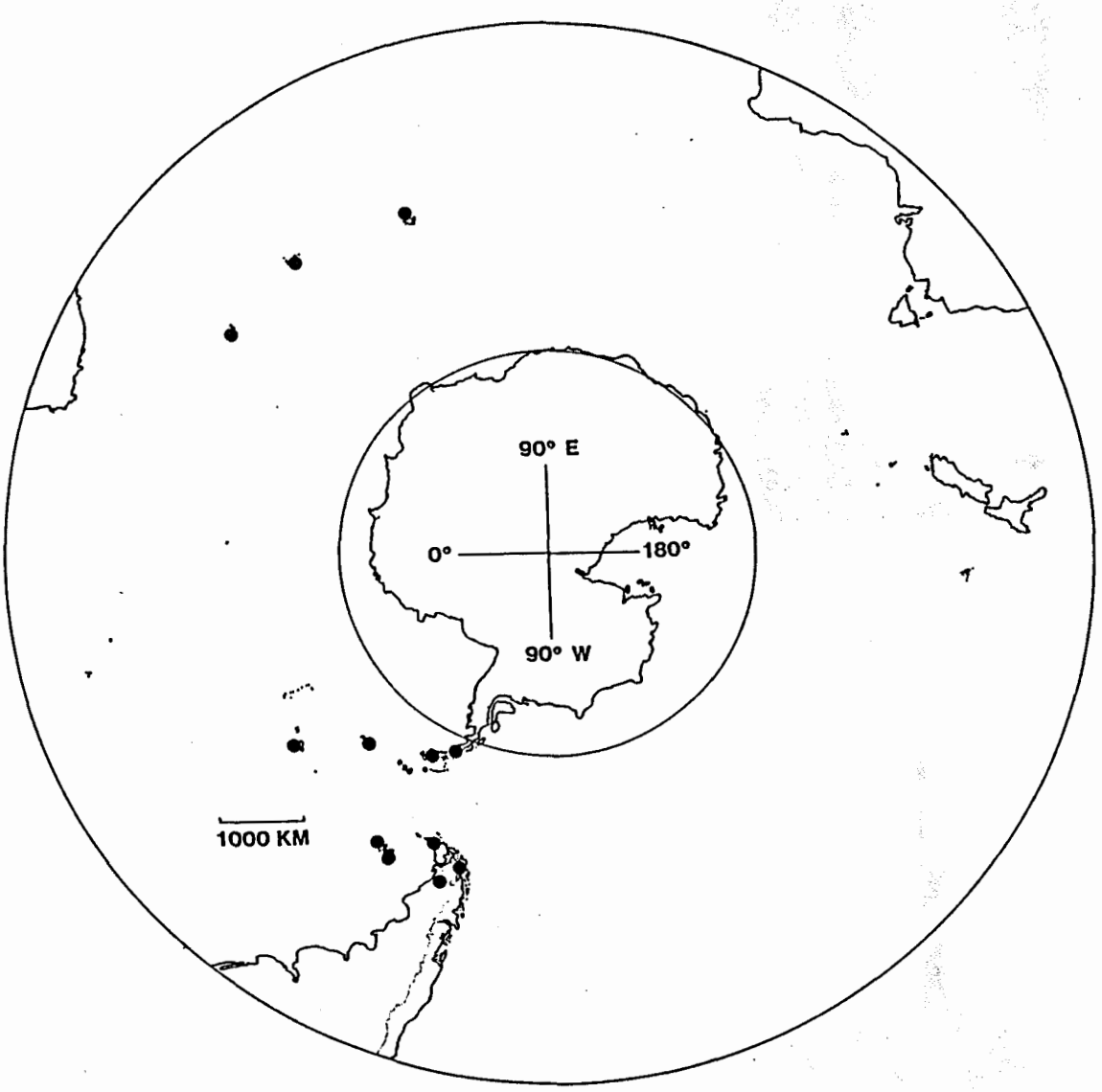
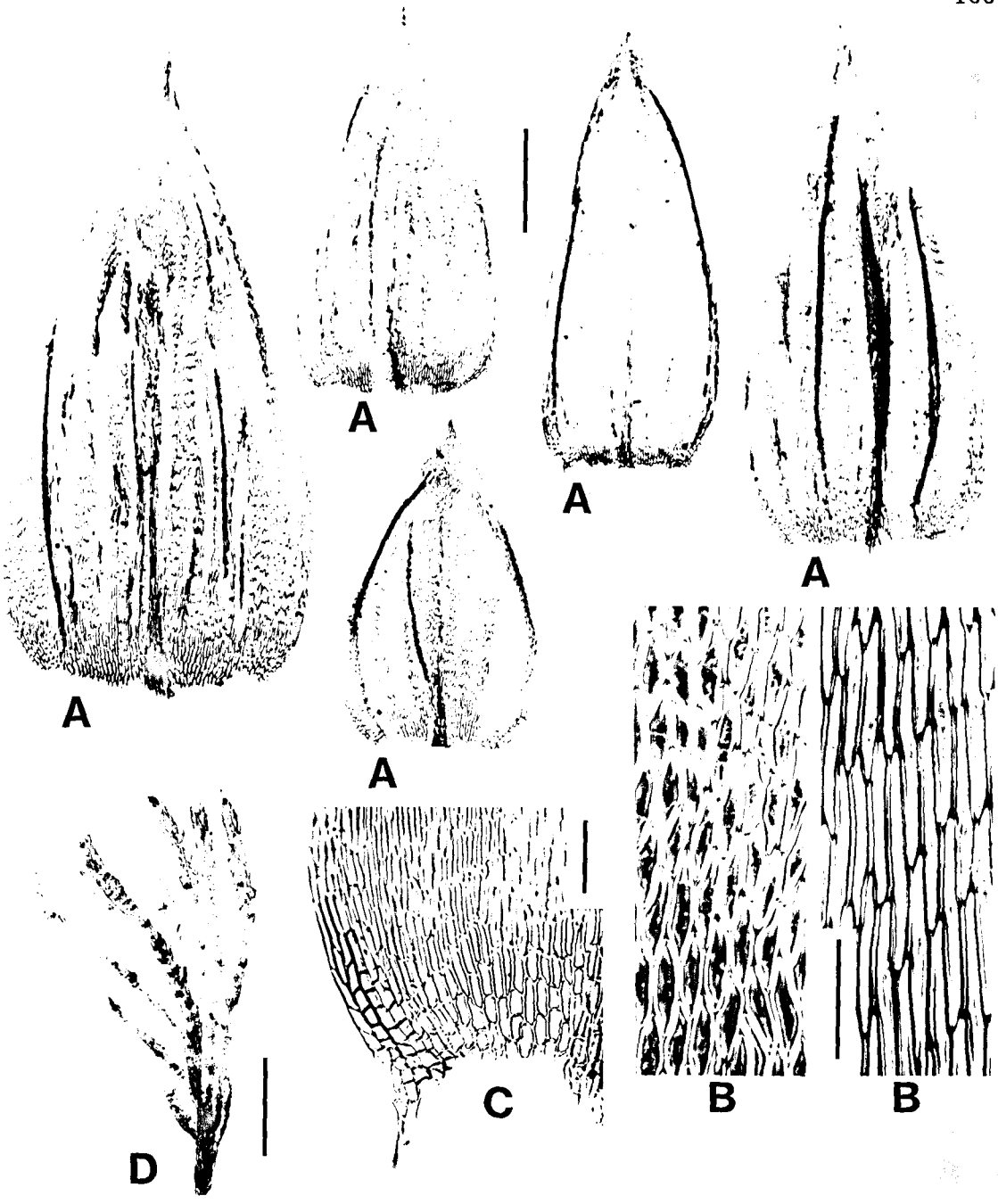
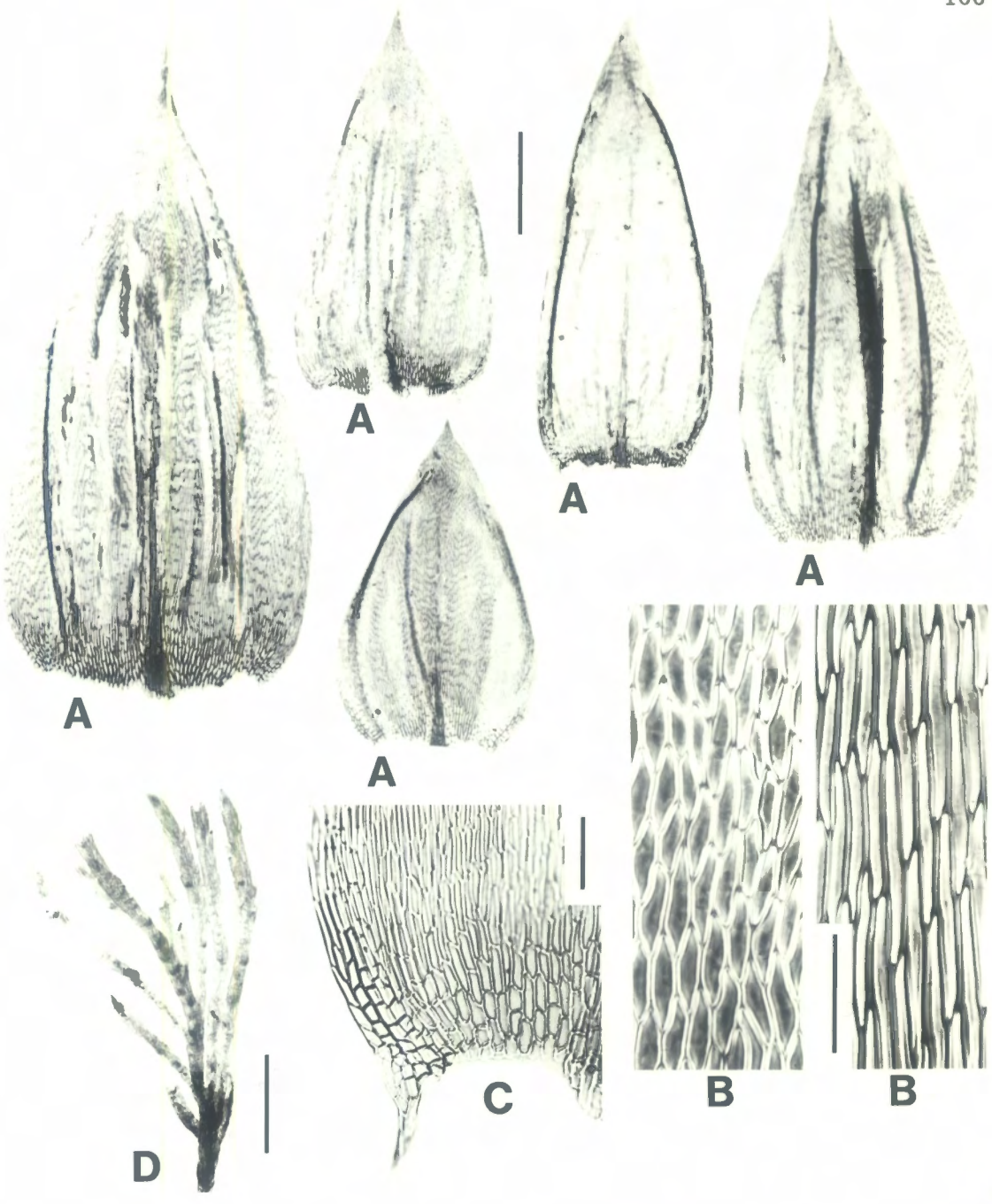


FIGURE 19. Distribution of *B. austro-salebrosum*



A: Stem leaves
B: Median cells, stem leaf
C: Alar cells, stem leaf
D: Habit
Bar Scales A = 0.5 mm; B = 50 µm; C = 100 µm; D = 1.0 mm

FIGURE 20. Illustrations of *B. austro-salebrosum*



A: Stem leaves
B: Median cells, stem leaf
C: Alar cells, stem leaf
D: Habit
Bar Scales A = 0.5 mm; B = 50 μm; C = 100 μm; D = 1.0 mm

FIGURE 20. Illustrations of *B. austro-salebrosum*

leaves, abruptly or gradually forming short apices, lax areolation, and small rounded auricles at leaf bases.

Brachythecium austro-salebrosum is usually distinguishable from sympatric species within its range. The following sympatric taxa differ from *B. austro-salebrosum* as follows: *B. austro-glareosum* is smaller with narrower leaves, longer, narrower, and pitted median leaf cells, and smaller basal and alar cells; *B. filirepens* has a subpercurrent costa, and inflated alar cells descending into the long narrow decurrencies; *Brachythecium majusculum* has a shorter costa, and long broad decurrencies composed of small quadrate cells; *B. subplicatum* bears more concave leaves with abruptly formed filiform apices, and inflated basal cells; and *B. subpilosum* is smaller with reduced leaf areolation, and rounded leaf bases.

In the protologue Müller compared this species to *Brachythecium salebrosum* (Web. *et* Mohr) B.S.G., hence, its name. He considered this species to be distinct from *B. salebrosum* by its larger compressed rigid stems with leaves having entire margins, short cuspidate apices and larger alar cells. *Brachythecium salebrosum*, which is widely distributed in the northern hemisphere, has been reported in the southern hemisphere from Kerguelen to New Zealand (Sainsbury, 1971, p. 437: Scott and Stone, 1976, p. 424) thus overlapping the range of this species. I have not examined any Sainsbury--or Scott and Stone--reported specimens of *B. salebrosum* or other specimens from the southern hemisphere that I would refer to this name. I therefore cannot comment on the relationship of this species to that of *B. salebrosum* as defined in the southern hemisphere. However, *B. austro-salebrosum* differs from

northern hemisphere *B. salebrosum* according to C. Müller (1883) and by the reduced leaf areolation.

Historically, *B. austro-salebrosum* has been recognized by different names from nearly each different land mass within its distributional range. This species' geographical morphs have resulted from separated island distributions and a considerable amount of morphological variability in size, growth from and length of the leaf apices.

Considerable variation in growth form occurs in Antarctica, Patagonia, and the south polar islands. Most plants from Antarctica are smaller in size, bear leaves with shorter broader apices, and are sterile. However, these features have been observed in specimens from other areas as pure or mixed with more robust plants. The dwarf habit and sterility (I have observed only one perigonium among all the specimens examined of this species from Antarctica) is related to the short growing season, high winds, and lower temperatures on the Antarctica peninsula (as observed in other plants from this area, Greene, 1964, p. 248).

Past treatments have regarded this dwarfed growth form as *B. antarcticum* and *B. antarcticum* var. *cavifolium*. However, similar morphological/environmental-related variations have been observed in other sympatric species *B. austro-glareosum*, *B. majusculum*, and *B. subpilosum*. Thus, I concur with Newton's (1979, pp. 126-128) recent assessment of this species and place all diminutive ecomorphs within the species.

* * *

Brachythecium polyoicum (Thér.) McFarland. *stat. nov.*

Basionym: *Brachythecium salebrosum* var. *polyoicum* Thér., Smithsonian Misc. Collect. 85(4): 36. 1931.

Plants medium-sized in a dense mat. Stems terete, densely foliate, decumbent, subpinnately to irregularly branched; branches spreading to erect, terete, densely foliate, tapering; pseudoparaphyllia ovate-acute to short-acuminate. Leaves 1.7-2.8 (x=2.1) X 0.5-1.0 (x=0.7) mm, erect-imbricate when dry, little changed when moist, concave, slightly decurrent, plicate, slightly falcate, ovate-lanceolate, gradually acuminate to slender and long-acuminate, apices ± twisted; margin reflexed at base, plane above, serrulate above, entire below; costae broad at base, tapering above, ending above middle (66%). Median leaf cells fusiform to linear 62.7-123.1 (x=90.6) X 6.8-10.3 (x=8.0) µm; apical cells similar 42.2-96.9 (x=63.1) X 5.7-11.4 (x=7.9) µm; basal cells irregularly rectangular to rectangular, pitted 30.8-93.5 (x=54.8) X 9.1-19.4 (x=12.9) µm; alar cells quadrate to rectangular, in discrete groups between margins and plicae forming pseudocolumns of 6-8 cells 11.4-34.2 (x=23.6) X 12.5-22.8 (x=16.1) µm. Branch leaves 1.3-2.2 (x=1.8) X 0.4-0.6 (x=0.3) mm, narrower, ± more serrate leaf apices. Polyoicous, rarely autoicous. Perichaetia ± with one or two antheridia, cylindrical. Perigonia occasionally with archegonia, pyriform. Setae 11.0-20.0 (x=15.2) mm long, with low papillae, light red-brown. Capsules 1.7-1.8 X 0.8-1.1 mm, inclined to horizontal, curved, oblong-ovoid, light red-brown; annulus of 1 layer of narrow to inflated cells; operculum 0.6-0.8 X 0.7-0.8 mm, conic apiculate; cilia 1-2, nodose. Spores 11.4-17.1 (x=13.4) µm, finely papillose.

HABITAT AND DISTRIBUTION: On moist soil: **Mexico** 2100-2400 m (**Fig. 21**).

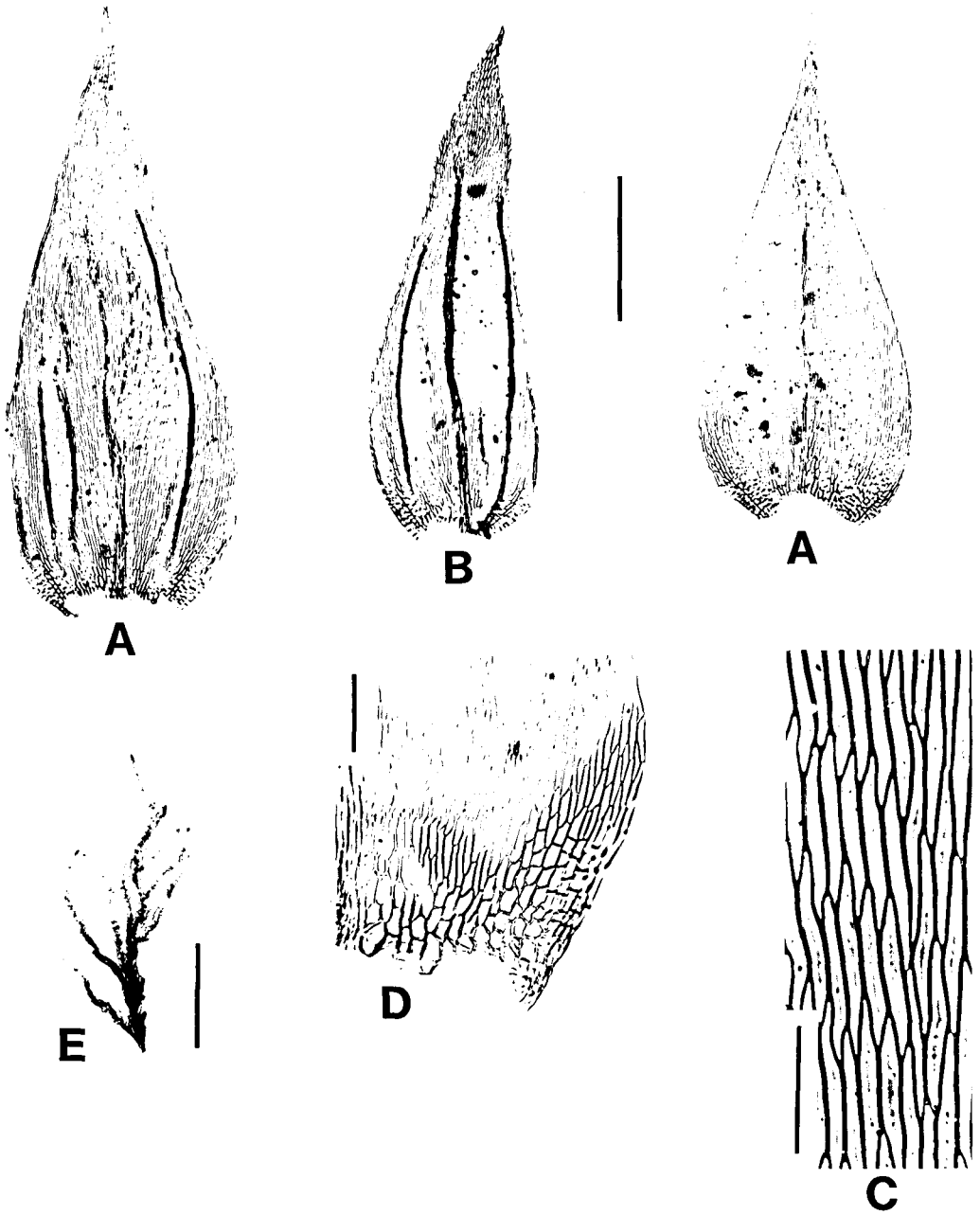
ILLUSTRATION: Sharp and Crum (unpublished) as (*Brachythecium salebrosum*); (**Fig. 22**).

COMMENTS: This species is restricted to the eastern escarpment of the central plateau of Mexico. It is distinguishable by its medium size, distinct group of thin-walled alar cells, polyoicous condition, and single row of enlarged annulus cells. In McFarland (in Sharp and Crum, unpublished), Crum (1951, p. 486) and Thériot (1931, p. 36), this species is reported as *Brachythecium salebrosum* (Web. & Mohr) B.S.G. and/or *B. salebrosum* var. *polyoicum* Thér. Even though gametophytes of this species strongly resemble those of *B. salebrosum*, it is, however, distinct (as discussed in the type study, p. 397) and all specimens previously reported as either of the above taxa are referred to *B. polyoicum* or other species. Hence, I exclude *B. salebrosum* from Mexico (p. 221).

Brachythecium polyoicum is differentiated from the following sympatric taxa in that they are all dioicous: *B. conostomum, B. frigidum, B. oxycladon*, and *B. stereopoma*. Sympatric synoicous taxa can be differentiated from *B. polyoicum* as follows: *B. occidentale* by its more delicate growth form, leaves more slender and curved, erect to spreading, alar cells smaller and incrassate, setae smooth or rarely with low papillae, two rows of enlarged or inflated annulus cells; and *B. plumosum* by its darker green color, ± homomallous leaves, blunt leaf apices, setae strongly papillose above, two rows of small annulus cells.

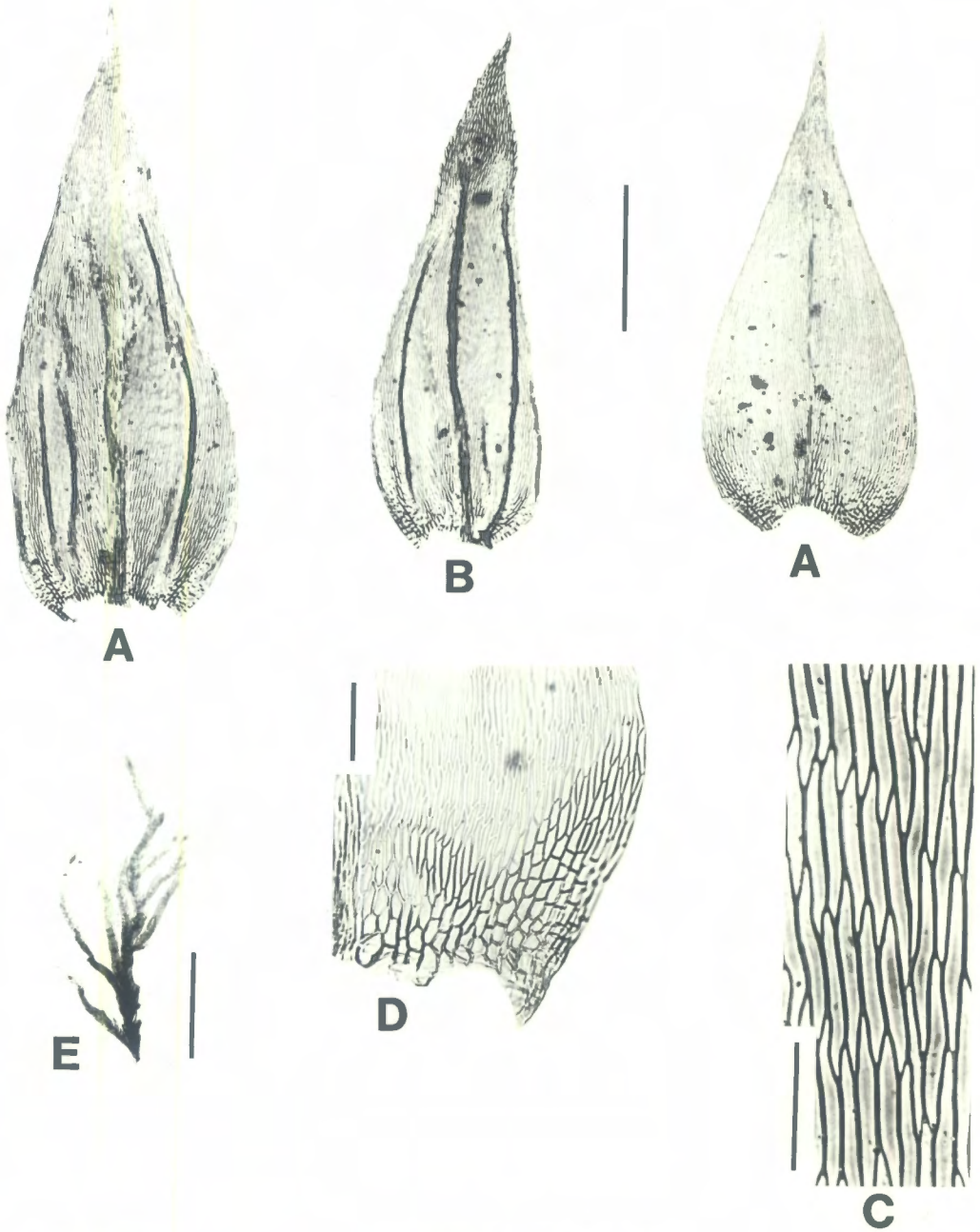


FIGURE 21. Distribution of *B. polyoicum*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 22. Illustrations of *B. polyoicum*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 μm; D = 100 μm; E = 1.0 cm

FIGURE 22. Illustrations of *B. polyoicum*

The relationship of this taxon to *Brachythecium chocayae* Herz. is not well understood. Characters in common are the setae (with low papillae), leaf shape, and areolation. However, the specimens of *B. chocayae* that I have examined are strictly autoicous, larger in size, and restricted to the high elevation of Colombia, Ecuador, Peru, and Bolivia. I believe *B. chocayae* is more closely related to *Brachythecium rutabulum* whereas *B. polyoicum* is closer to *B. salebrosum*.

* * *

Section *Subplicata* McFarland, *sect. nov.*

Folia caulina late ovata, abrupte acuminata, apices longi et recti. Autoicus; setae laeves; capsula horizontalia, annulus compositus ex duabus seriebus accrescentium cellularum, cilia nodosa vel subappendiculata, opercula conico-apiculata.

Plants soft, large-sized. Leaves deeply concave, decurrencies short ± auriculate, not to weakly plicate, broadly obovate, abruptly acuminate, apices long and straight. Autoicous; seta smooth; capsule horizontal, annulus differentiated, two rows of large cells, cilia nodose to subappendiculate, operculum conic-apiculate.

* * *

Brachythecium subplicatum (Hamp. *in* C. Müll.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 333. 1878. (Ad. 2: 390).
= [*Hypnum rutabulum* var. 5 Hook. *f. et* Wils., Flora Antarct. I. p. 418. 1847. *nom. illeg.*] [!]

Basionym: *Hypnum subplicatum* Hamp. *in* C. Müll., Syn. Mus. Frond. 2: 363. 1851. [!]

= [*Brachythecium cuspidarioides* Dus., Rep. Princeton Univ. Exp. Patag. 8: 125. 1903. *nom. nud.*] [!]

= [*Brachythecium turgens* Dus., Rep. Princeton Univ. Exp. Patag. 8: 125. 1903. *nom. nud.*] [!]

= *Brachythecium cuspidarioides* Dus., Bot. Not. 1905: 308. 1905. *fide* Cardot, 1908 p. 169. [!]

= *Brachythecium turgens* Dus., Bot. Not. 1905: 308. 1905. *fide* Seki, 1974 p. 72. [!]

= *Brachythecium subplicatum* var. *dilaceratum* Card., Bull. Herb. Boiss. ser. 2. 5: 1010. 1905. [!]

= *Brachythecium subplicatum* var. *minus* Card. *et* Broth., Kongl. Svenska Vetenskapsakad. Handl. 63(10): 68. 1923. [!]

= *Calliergon joveti-asti* Hébrard, Rev. Bryol. Lichénol., N.S., 37, Fasc. 1, 135-62. 1970. *fide* Newton, 1979 p. 126. [*non vidi*]

Plants robust, green to yellow-green above, brown below, forming large, deep tufts, occasionally forming mats. Stems generally erect, occasionally decumbent, densely foliate above ± eroded below, julaceous to tumid, tips blunt, infrequently and irregularly branched; branches erect, julaceous, tips blunt; pseudoparaphyllia elongate-ovate acute ± apiculate. Leaves 2.4-3.1 (x=2.8) X 1.0-1.7 (x=1.3) mm, imbricate to erect when dry, little changed when moist, densely compacted and tightly overlapping at stem and branch tips, deeply concave (cochleariform), decurrencies short ± auriculate, not to weakly plicate, broadly obovate, apices rounded abruptly acuminate, occasionally gradually tapering long-acuminate, apices 0.1-0.6 (x=0.3) mm long, straight; margins reflexed at base, plane above, involuted at base of acumination, entire,

occasionally with a few, large, irregularly formed teeth on rounded shoulders at base of apices; costae broad at base, tapering, slender above, ± with short lateral spurs, ending above middle (60%). Median leaf cells linear to linear-rhomboidal 64.9-150.4 (x=102.1) X 6.8-12.5 (x=8.3) μm; apical cells shorter 39.9-91.2 (x=63.4) X 5.7-11.4 (x=7.6) μm; basal cells lax rectangular, walls pitted 45.6-96.2 (x=68.8) X 13.7-28.5 (x=19.7) μm; alar cells rectangular, enlarged to inflated in auricles and into decurrencies, 22.8-85.5 (x=53.1) X 13.7-36.5 (x=26.5) μm. Branch leaves 1.5-2.8 (x=2.3) X 0.7-1.3 (x=0.9) mm, narrower, ovate gradually acuminate. Autoicous. Setae 18.0-34.0 (x=24.1) mm long, red-brown, smooth. Capsules 1.2-2.5 (x=1.9) X 0.4-1.0 (x=0.7) mm, horizontal, oblong-ovoid to cylindrical, curved, red-brown; cilia 1-2, nodose to subappendiculate; annulus 2 rows of enlarged cells; operculum 0.6 X 0.6 mm, conic-apiculate. Spores 18.7-22.0 (x=20.5) μm, finely papillose, n=13 (Newton, 1979).

HABITAT AND DISTRIBUTION: Known from alpine and tundra regions, in open exposed areas on moist humus, wet or submerged rock. In western and southern Patagonia and Tierra del Fuego near glaciers: Chubut, Rio Negro, Santa Cruz, and Tierra del Fuego, **Argentina** (300 m); Aisén, Cautín, Llanquihue, Magallanes, and Ñuble, **Chile** (1900 m); **Crozet Islands**; East and West **Falkland Islands (Malvinas)**; **Kerguelen Islands**; Marion Island, **Prince Edward Islands**; Westland **New Zealand**; and **South Georgia** (**Fig. 23**).

ILLUSTRATIONS: Hébrard, 1970. Planche VI (as *Calliergon joveti-asti*); (**Fig. 24**).

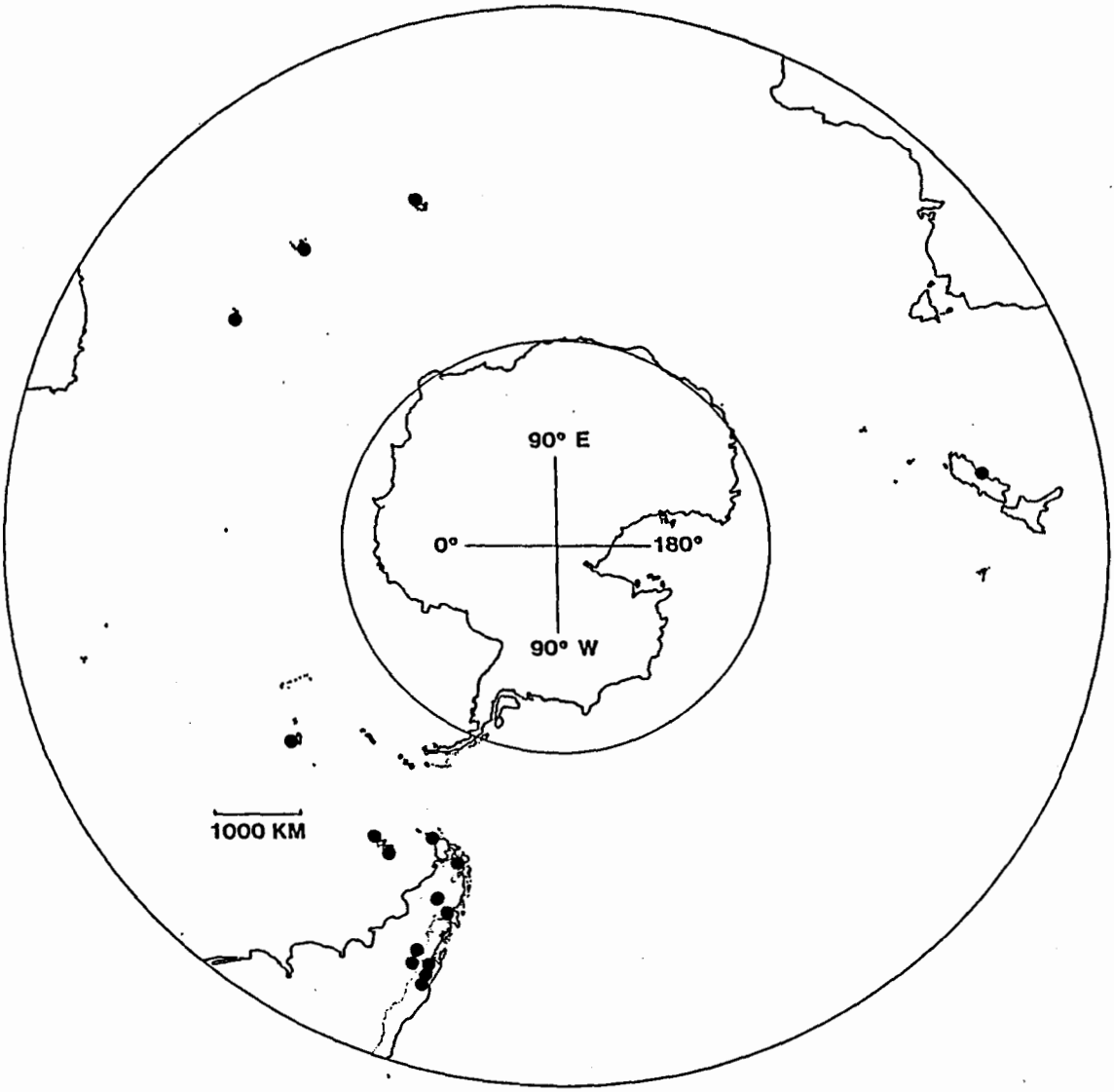
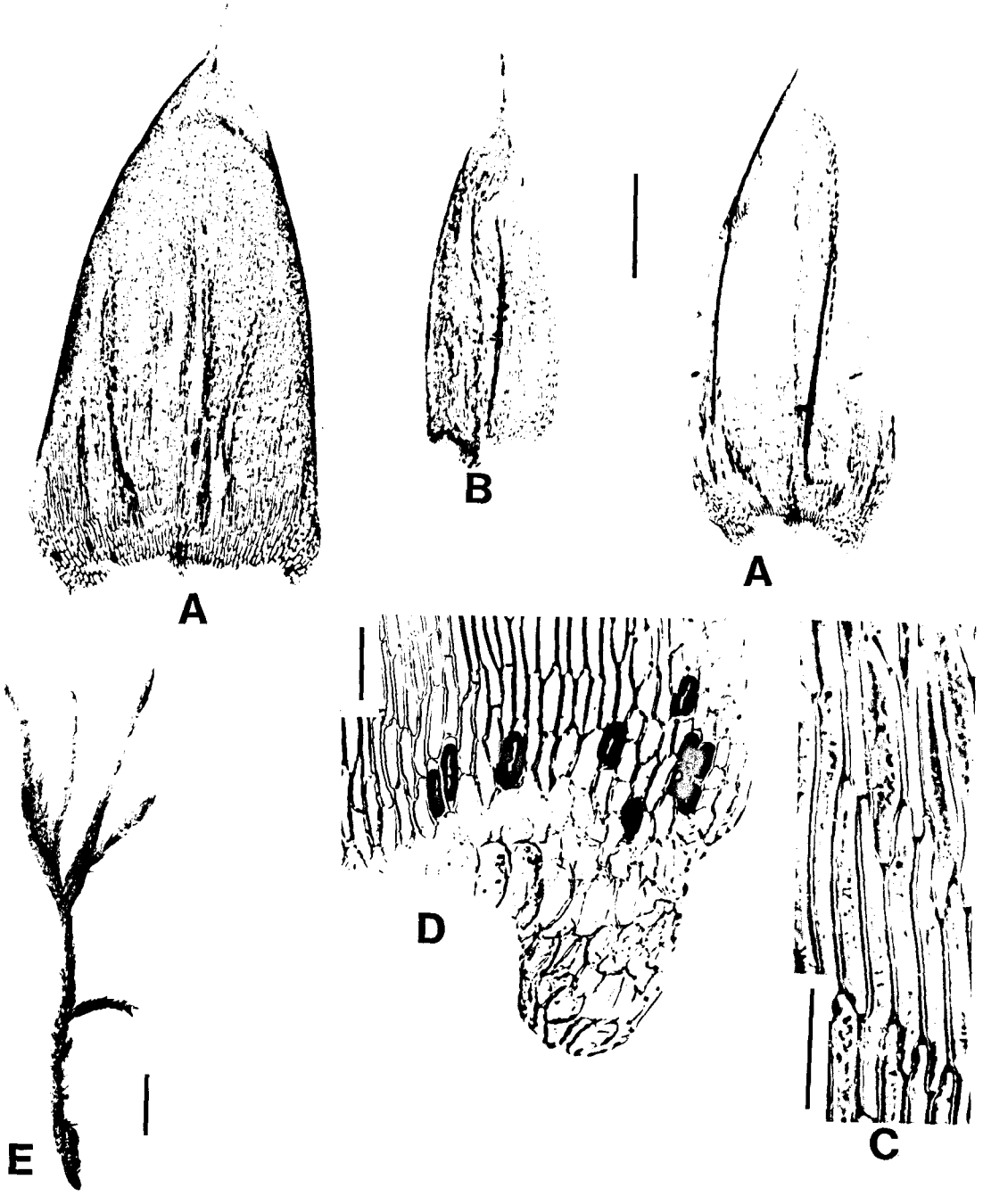
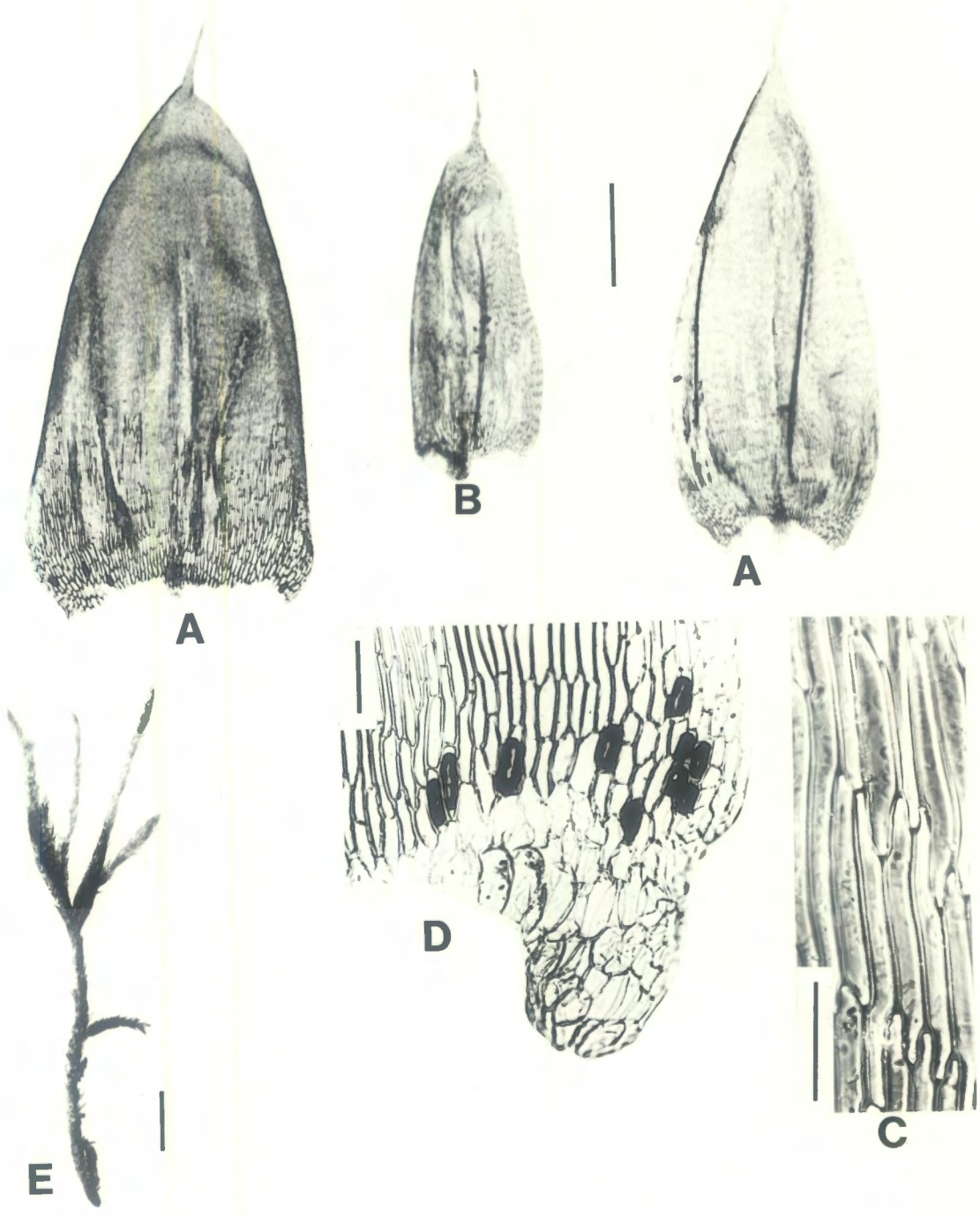


FIGURE 23. Distribution of *B. subplicatum*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 24. Illustrations of *B. subplicatum*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 24. Illustrations of *B. subplicatum*

COMMENTS: This species has a circum-subantarctic distribution from Patagonia to New Zealand. It is distinguished by the large, erect, tufted growth form, few branches, the oblong-ovate deeply concave leaves with abruptly long, slender apices, and rounded auricles with decurrent base and inflated alar cells.

Brachythecium subplicatum is undoubtedly the most distinctive of all *Brachythecium* occurring in southern South America. Historically, growth form and size of this species have created some confusion with sympatric species *B. austro-salebrosum*, and *B. majusculum*. The former species is distinguished from *B. subplicatum* by its less concave leaves, and lack of piliferous apices and inflated alar cells. The later species is distinguished from *B. subplicatum* by its more rigid stems, stouter costae, papillose setae, longer decurrencies, and lack of inflated alar cells.

This species' distribution is similar to *B. paradoxum*. Both extend from Patagonia to New Zealand, but are absent from Antarctica. However, the habitat of *B. subplicatum* is similar to other *Brachythecium* from this region which also occur in Antarctica. Thus, it also might be expected to occur in Antarctica. Undoubtedly, if it does occur in Antarctica, it will be dwarfed as is known for other *Brachythecium* there, and may not be readily recognized.

Mitten (1869, p. 565) considered *Hypnum subplicatum* (=*Brachythecium subplicatum*) to be synonymous with *Hypnum subpilosum* Hook. *f. et* Wils. [=*Brachythecium subpilosum*], whereas Müller (1885, p. 426), Cardot (1908, pp. 169, 172), and later authorities (including myself) have recognized these two as distinct taxa.

The growth form and leaf morphology of *B. subplicatum* is unusual for this genus, yet superficially resembles the genus *Cirriphyllum* Grout. Unlike *Brachythecium*, *Cirriphyllum* is a more artificial genus defined only by its gametophytic characteristics, but contains a mix of species with both conic-apiculate and rostrate opercula. I emphasize this point since operculum characters have traditionally been used to separate most other genera in this family (i.e., *Brachythecium*). *Brachythecium subplicatum* can be excluded from *Cirriphyllum* based on sexuality since *Cirriphyllum* is described as dioicous and this species is autoicous. Yet, I do not give sexuality much value at the generic level. Dioicy in *Cirriphyllum* is more of a taxonomic view created by the assemblage of species included in *sensu auct. pl.* [a case in point can be seen in Loeske (1907, p. 22) where he amended the genus (*sensu* Grout) to include several additional species some of which were autoicous, i.e., *Cirriphyllum plumosum* (Hedw.) Loesk. *et* Fleisch. = *Brachythecium plumosum auct. non.*, that most recent authors have not followed.] The sporophyte of *B. subplicatum* is very typically brachytheceoid, as is the case for other *Brachythecium* from Patagonia having a *Cirriphyllum*-like leaf form (e.g., *B. majusculum, B. subpilosum* and *B. filirepens*). Thus, while I hesitate to include this species in *Cirriphyllum*, I cannot accept Robinson's extreme view (1962, p. 115) which combines *Cirriphyllum* and *Brachythecium*, creating a generic concept based upon taxa with both rostrate and conic opercula.

Brachythecium subplicatum is similar to *Cirriphyllum cirrosum* (Schwaegr. *in* Schultes) Grout., a circumboreal species, in habitat,

growth form, leaf shape, and operculum, yet, differs from *B. subplicatum* by the smaller alar cells, dioicous conditions, and roughened setae.

Although I have not seen the type specimen of *Calliergon jovetiasti* Hébrard, I am satisfied with Newton's (1979, p. 126) synonymy based on the description and illustration of the protologue.

* * *

Section *Albicans* Nyholm *ex* McFarland *sect. nov.*

Basionym: [Section *Albicans*, Moss Flora Fennoscand. II(5): 451-452. 1965. *nom. nud.*]

Folia caulina anguste ovata vel ovate-lanceolata, longo-acuminata. Autoicus aut dioicus; setae laeves vel leniter papillosae; capsula inclinata vel horizontalia, annulus compositus ex duabus seriebus accrescentium cellularum, cilia nodosa vel subappendiculata, opercula conico-apiculata.

Plants soft, medium-sized. Leaves concave, ± long decurrent, strongly plicate, narrowly ovate to ovate-lanceolate, long-acuminate. Autoicous or dioicous; seta smooth to weakly papillose; capsule inclined to horizontal, annulus differentiated, two rows of inflated cells, cilia nodose, operculum conic-apiculate.

* * *

Brachythecium albicans (Neck. *ex* Hedw.) B.S.G., Bryol. Eur. 6(54): 19. 1853.

Basionym: *Hypnum albicans* Neck. *ex* Hedw., Spec. Musc. p 251. 1801.

≡ *Chamberlainia albicans* (Hedw.) Robins., Bryologist 65(2): 112. 1962.

= *Brachythecium spurio-albicans* C. Müll., Hedwigia 36: 127. 1897 [!]

= [*Brachythecium sericeo-nitens* Dus., Rep. Princeton Univ. Exp. Patag. 8(1): 28. 1903. *nom. nud.*] [!] *p. p.*

Plants medium-sized to robust, in loose, light to whitish green mats. Stems long, decumbent, terete to julaceous, freely branched; branches slender, attenuate, terete or sometimes julaceous; pseudoparaphyllia ovate-acuminate. Leaves imbricate when dry, erect-spreading when moist. Stem leaves 2.0-3.0 (x=2.5) X 0.5-1.1 (x=0.9) mm, concave, long decurrent, plicate, ovate-lanceolate, gradually tapering into long acumina; margins recurved at base, plane above, entire or nearly so; costae broad at base, tapering above, ending at midleaf (52%); median cells fusiform to linear, 52.4-110.6 (x=78.0) X 5.7-11.4 (x=7.7) µm; apical cells similar 50.2-125.4 (x=77.8) X 5.7-9.1 (x=7.0) µm; basal cells shorter and broader, hexagonal to rectangular, walls ± pitted 30.8-100.3 (x=55.7) X 5.7-17.1 (x=12.0) µm; alar cells quadrate to rectangular, numerous in the decurrencies and extending up the margins in columns of 6-8 cells, 6.8-36.5 (x=21.8) X 11.4-27.4 (x=16.4) µm. Branch leaves 1.3-2.2 (x=1.8) X 0.2-0.7 (x=0.5) mm, smaller, lanceolate to ovate-lanceolate. Dioicous. Setae 12.0-15.0 mm long, red-brown, smooth rarely weakly papillose. Capsules 1.3-2.0 X 0.5-0.8 mm, inclined to horizontal, short-ovoid, curved-asymmetric, light red-brown; annulus of 1-2 layers of enlarged cells; operculum 0.6-0.8 X 0.5-0.6, conic-apiculate; cilia 2-3, nodose. Spores 12.1-14.3 (x=12.9) µm, papillose.

HABITAT AND DISTRIBUTION: On rocks and sandy soil, usually in dry and sometimes grassy places: Santa Cruz, **Argentina**; Aisén, Magallanes, Ñuble, and Santiago, **Chile**; West, **Falkland Islands** (Malvinas); Nuevo Leon, **Mexico**; northwestern United States and Alaska (Lawton, 1973, p. 290); eastern Canada (Crum and Anderson, 1981, p. 1040); Macaronesia, Caucasus, Greenland, Ontario, Australia and New Zealand (Tuomikoski *et al.*, 1973, p. 246); (**Fig. 25**).

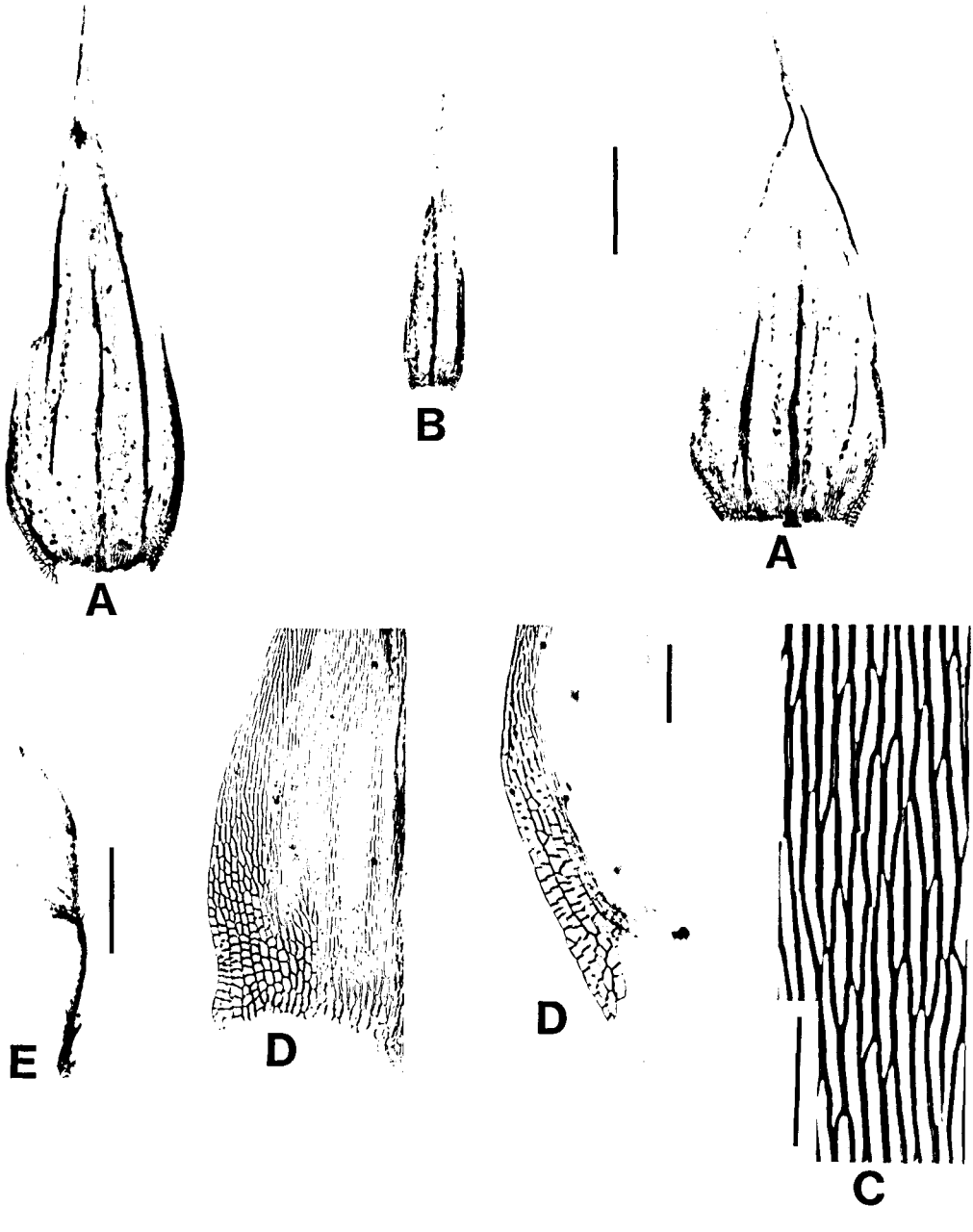
ILLUSTRATIONS: Dillenius, 1741. Pl. XLII. Fig. 63; Hedwig, 1792. Tab. V. Figs. 1-13; B.S.G., 1853. Pl 553. Roth, 1905. Tab. XLIII. Fig. 2 a-d; Warnstorf, 1906. Fig. 3 page 738; Robinson, 1962. Figs. 75-82; Nyholm, 1965. Fig. 355; Lawton, 1971. Pl. 159. Figs. 1-5; Flowers, 1973, Pl. 99, Figs. 1-7; Smith, 1978. Fig. 287. 1-4; Crum and Anderson, 1981. Fig. 509; Ireland, 1982. Pl. 314; Sharp and Crum, (unpublished); (**Fig. 26**).

COMMENTS: The northern Mexico specimens represent a range extension of the previous reported southern limit for North America (central California and Utah, Flowers, 1973 p. 438.). The South American specimens of this species represent a disjunction to the same latitude as populations in New Zealand. This southern hemisphere distributional pattern is similar to other *Brachythecium* that circumscribe a circum-subantarctic distribution (e.g., *B. subpilosum*, and *B. subplicatum*).

Brachythecium albicans is distinguished by its light-green to whitish color, julaceous stems and branches with tightly imbricate leaves, leaves which gradually narrow from decurrent base and form long apices, distinct groups of quadrate alar cells which form columns of

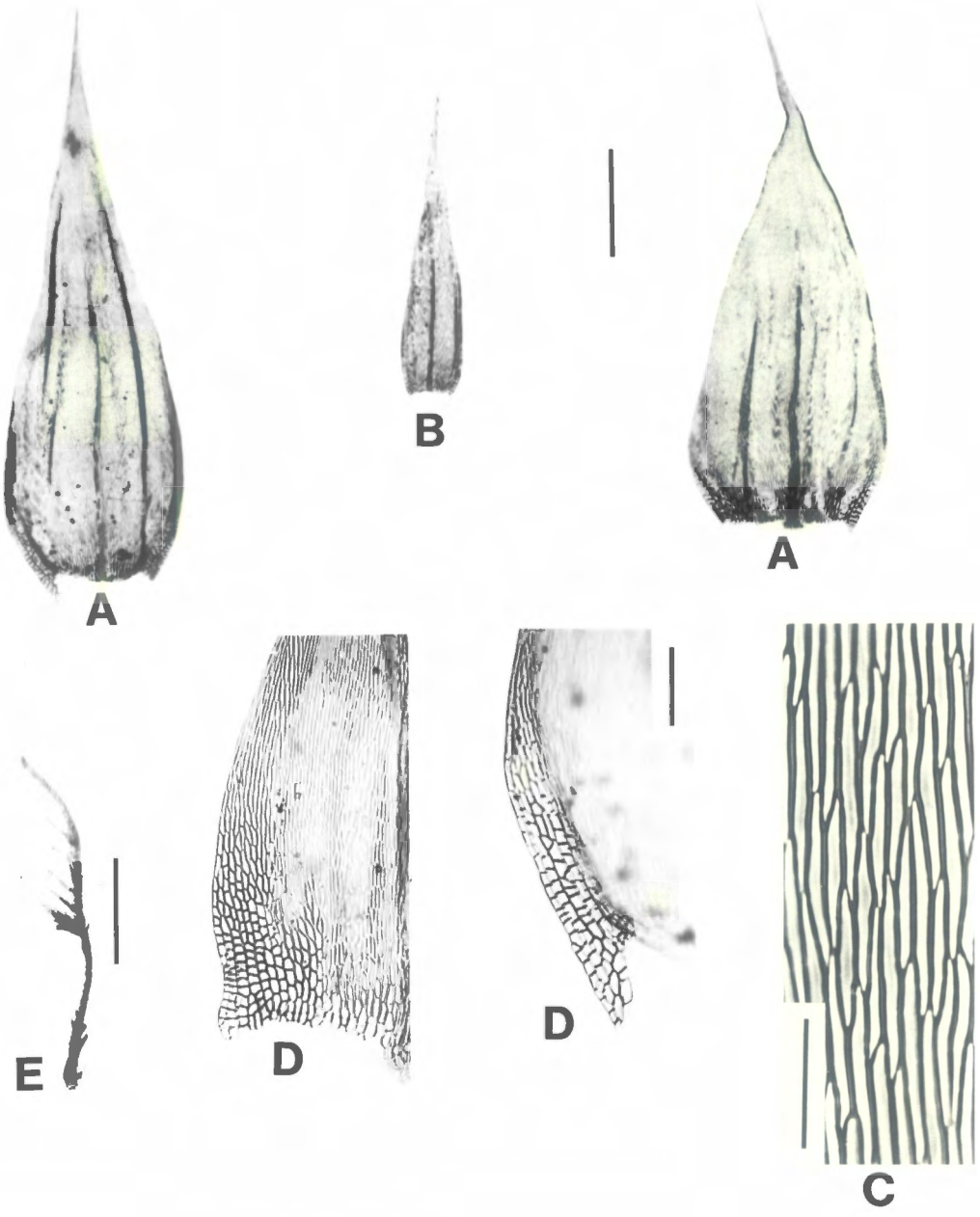


FIGURE 25. Distribution of *B. albicans*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 μm; D = 100 μm; E = 1.0 cm

FIGURE 26. Illustrations of *B. albicans*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 26. Illustrations of *B. albicans*

quadrate alar cells from the decurrencies up the leaf margin to several cells high, the dioicous condition, and smooth seta.

This species can be distinguished from the other Mexican sympatric *Brachythecium* species as follows: *B. fendleri* is smaller, less plicate, and synoicous; *B. stereopoma* is less julaceous in growth form, weaker plication, shorter leaf apices, and fewer alar cells, and erect capsules elongate conic operculum; and *B. oxycladon* has smaller leaves, shorter leaf apices, fewer, more incrassate and opaque alar cells, rounded leaf bases with shorter decurrencies.

The species is distinguishable from most other southern South American species of *Brachythecium* by its narrower leaves, lack of inflated cells, and lack of abruptly formed acumina. *Brachythecium collinum* and *B. microcollinum* differ by their smaller size and autoicous condition. *B. austro-glareosum* shares great similarity in leaf shape with *Brachythecium albicans* but can be distinguished by its short decurrencies, fewer alar cells, erect growth form, and autoicous condition.

* * *

Brachythecium austro-glareosum (C. Müll.) Kindb., Enum. Bry. Exot., Suppl. 2. p. 87. 1891.

Basionym: *Hypnum* (*Brachythecium*) *austro-glareosum* C. Müll., Bot. Jahrb. Syst. 5: 82. 1883. [!]

= *Brachythecium morenoi* C. Müll., Hedwigia 36:128. 1897. [!]

= [*Brachythecium sericeo-nitens* Dus., Rep. Princeton Univ. Exp. Patag. 8(1): 28. 1903. *nom. nud.*] *p. p.* [!]

= [*Brachythecium altarense* Broth. in Meyer, Hoch Anden Ecuador. 518. 1907. *nom. nud.*] [!]

= *Brachythecium austro-glareosum* var. *diffusum* Card., Rev. Bryol. Lichénol. 38(1): 126-127. 1911. *fide* Newton, 1979, p. 130. [!]

= *Brachythecium gramontii* Card., Bull. Mus. Hist. Nat. Paris 22: 341. 1916. *fide* Newton, 1979, p. 129. [*non vidi*]

= *Brachythecium patagonicum* Card. *et* Broth., Kongl. Svenska Vetenskapsakad. Handl. 63(10): 68. 1923. [!]

Plants small- to medium-sized, rarely robust-sized, pale yellow-green above becoming darker below, in loose or dense mats to dense erect tufts. Stems prostrate, decumbent to erect, julaceous, tips tapering, infrequently and irregularly branched; branches generally short, unequal in lengths, erect, julaceous, apices tapering; pseudoparaphyllia orbicular to ovate-acute to acuminate. Leaves 1.4-2.8 (x=2.4) X 0.4-0.9 (x=0.7) mm, erect-imbricate to erect-patent when dry, becoming more open when moist, slightly concave at base, short decurrent, long and deep plicate, ovate-lanceolate to elongate-triangular, gradually long-acuminate, apices slender and straight; margin reflexed at base and ± above, entire throughout or serrulate at apices; costae broad at base, gradually tapering, ending above middle (55%). Median leaf cells linear with slightly thickened and pitted walls 45.6-136.8 (x=79.8) X 4.6-11.4 (x=7.7) µm; apical cells similar and shorter 36.5-102.6 (x=69.9) X 5.7-9.1 (x=7.0) µm; basal cells elongate ovate to rectangular with thickened and pitted walls 22.8-68.4 (x=38.6) X 6.8-17.1 (x=12.5) µm; alar cells in distinct groups, forming columns 4-10 cells high between margins and plicae and extending into decurrencies, ± pitted 13.7-34.2 (x=21.7) X

11.4-18.2 (x=14.0) μm. Branch leaves 1.2-2.2 (x=1.7) X 0.3-0.6 (x=0.4) mm, slightly smaller and narrower. Autoicous. Setae 20.0-25.0 (x=21.6) mm long, smooth, red-brown. Capsules 1.4-1.6 (x=1.6) X 0.8-0.8 (x=0.8) mm, horizontal, oblong-ovate, curved, red-brown; cilia 1-2, nodose; annulus 2 rows of enlarged cells; operculum 0.5-0.8 (x=0.6) X 0.7-0.8 (x=0.7) mm conic-apiculate. Spores 12.5-19.4 (x=14.4) μm, finely papillose, n=13 (Newton 1979).

HABITAT AND DISTRIBUTION: Growing in tufts in open, wet, boggy areas, rock overhangs, moist soil, calcareous rocks and bases of trees: Graham Land and Palmer Land, **Antarctica** 80 m; Chubut, Santa Cruz, and Tierra del Fuego, **Argentina**; Aisén and Magallanes, **Chile** 25 m; Boyacá and Meta, **Colombia** 3300-4100 m; **Crozet Islands**; Pichincha, **Ecuador** 4000 m; East and West, **Falkland Islands** (Malvinas) 100 m; **Gough Island**; **Kerguelen** 100-400 m; Auckland, **New Zealand**; Cajamarca, **Peru** 3350 m; and **South Georgia** 6-300 m (**Fig. 27**).

ILLUSTRATIONS: **Figure 28.**

COMMENTS: The distribution of this species is circum-subantarctic and antarctic with disjunctions to Northern Peru, Ecuador, and Colombia, and the north island of New Zealand. It is distinguished by the autoicous condition, infrequent branching, julaceous stems and branches, imbricate, long, narrow, strongly plicae leaves with long, straight, entire apices, long narrow median cells that gradually broaden into basal cells, and small quadrate alar cells. One outstanding character of this species is the pitted walls of nearly all of the leaf cells. The plants are generally sterile and sporophytes rarely produced.

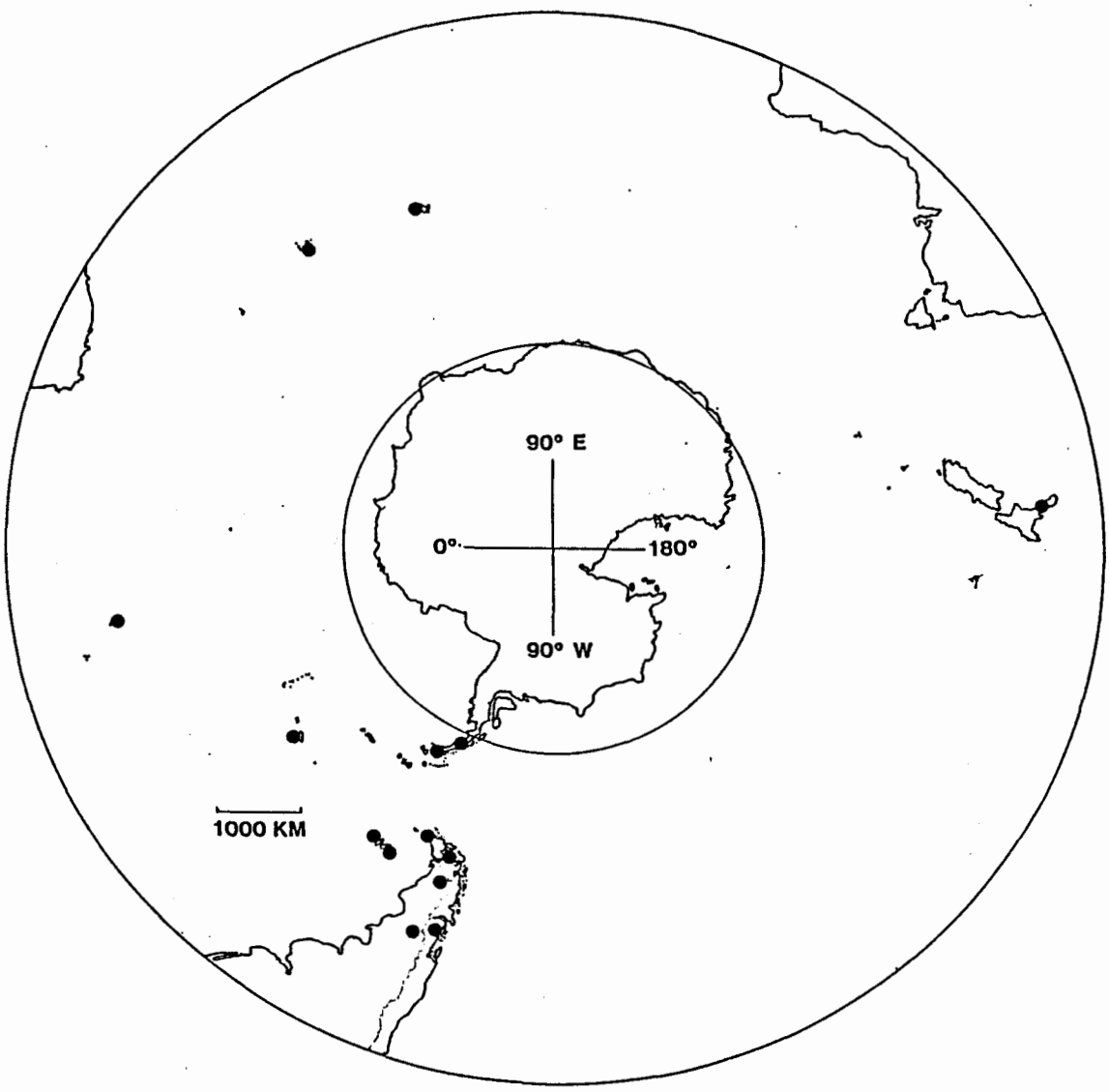
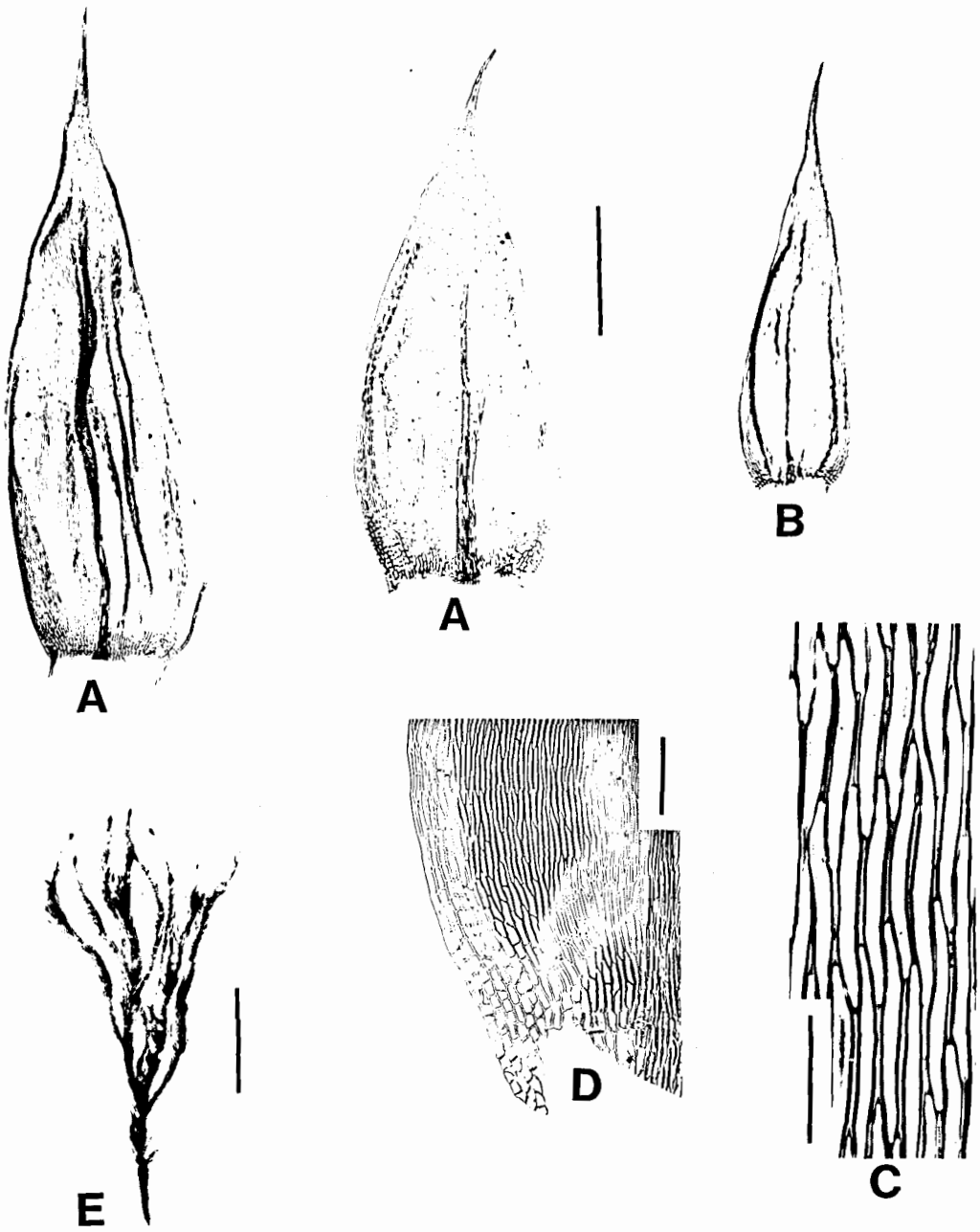


FIGURE 27. Distribution of *B. austro-glareosum*

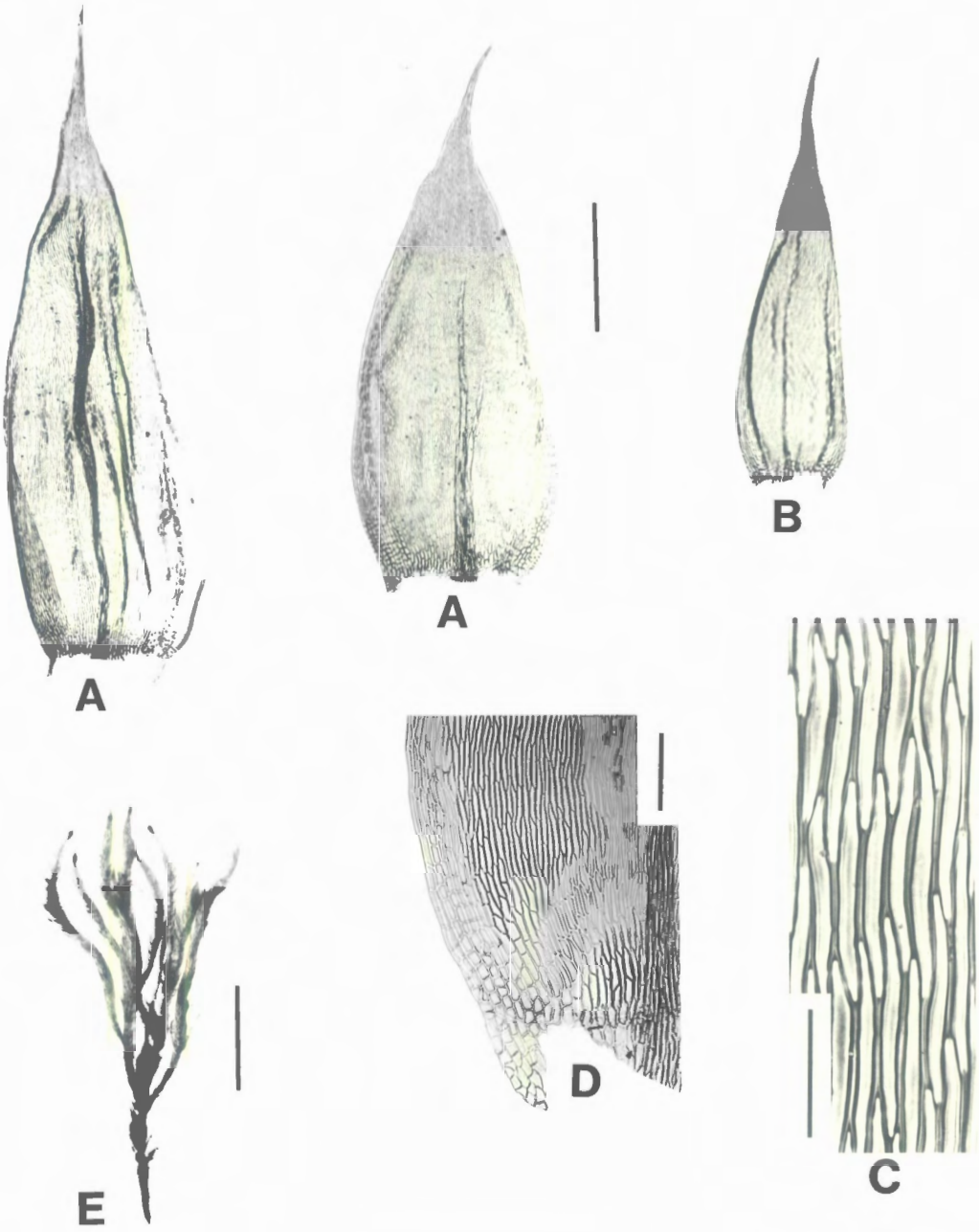


FIGURE 27. (Continued)



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 28. Illustrations of *B. austro-glareosum*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 28. Illustrations of *B. austro-glareosum*

In the protologue of *B. austro-glareosum* Müller compared this species to *Brachythecium glareosum* (Spruc.) B.S.G. [an Eurasian-North American species]; hence, its name. He considered this species to be distinct from *B. glareosum* by its smaller size, narrower and straighter leaves, stronger plicae and denser reticulation. A more certain distinction is the dioicous condition of *B. glareosum*.

Newton's (1979, p. 129-130) taxonomic treatment of *Brachythecium* for South Georgia, synonymized *B. gramontii* and *B. austro-glareosum* var. *diffusum* with this species based on examination of syntypic specimens. I agree and have lectotypified *B. austro-glareosum* var. *diffusum*. Although, I have not seen type material of *B. gramontii*, I include it in the synonymy based on Newton's comments.

Difficulty in separating this autoicous species from the dioicous *B. albicans* is only problematic in sterile specimens. *Brachythecium albicans* can be recognized by its less prominent plicae, leaves more rounded at base (widest just above alar region), alar cells more numerous and extending higher up the margins, longer decurrencies, and median and apical cells lacking pitted walls. Smaller expressions of this species that resemble *B. collinum* and *B. praelongum*, but can be distinguished by their reduced areolation, shorter apices, and prominently toothed leaf margins.

Brachythecium austro-glareosum is possibly conspecific with another species I know as *Brachythecium turgidum* (Hartm.) Kindb. *auct. div.*, a Eurasian-North American species. Both species share similar gametophytic and sporophytic characters, habitat preference, and growth

form. A broader study of *B. turgidum*, similar taxa, and types is needed before a final judgment can be rendered.

* * *

Section *Brachythecia* B.S.G., Bryol. Eur. 6: 5. 1853

(fasc. 52-54 Mon. 1)

Plants soft to rigid, medium- to large-sized. Leaves concave, elongate, ± broadly decurrent, ± plicate, ovate-deltoid, short and broadly to gradually long-acuminate. Autoicous or dioicous. Seta papillose, papillae low and scattered to tall and dense. Capsule suberect to horizontal, annulus differentiated, two rows of inflated cells, cilia nodose, operculum conic-apiculate.

* * *

Brachythecium chocayae Herz., Biblioth. Bot. 87: 160. 1916.

Plants medium- to large-sized, pale yellow and glossy. Stems decumbent, terete, densely foliate, rhizoids tufted where attached to substrate, irregularly branched; branches of unequal length, terete, tapering. Leaves 2.0-3.9 (x=2.9) X 0.8-1.5 (x=1.1) mm, erect when dry, becoming more open when moist, concave, slightly decurrent, and plicate, elongate-triangular to ovate-lanceolate acuminate, apices slender, ± half-twist; margins reflexed at decurrencies, plane above, serrulate to serrate above, entire below; costae broad at base, tapering above, ending above the middle (53%), ± ending in a minute inconspicuous dorsal spine; branch leaves 1.5-2.4 (x=2.1) X 0.4-0.9 (x=0.9) mm, smaller, narrower, and more serrate in upper margins. Median leaf cells linear, 74.1-131.1 (x=100.5) X 6.8-9.1 (x=7.8) μm; apical cells smaller 52.4-

125.4 (x=89.6) X 5.7-8.0 (x=6.9) μm; basal cells rectangular to hexagonal with slightly pitted walls 29.6-114.0 (x=59.5) X 9.1-28.5 (x=14.5) μm; alar cells forming distinct clusters of quadrate to rectangular cells, 14.3-62.7 (x=30.2) X 11.4-25.1 (x=16.1) μm. Autoicous and synoicous. Setae 14.0-30.0 (x=22.0) mm, red-brown, with low, papillae scattered along the length. Capsules 0.6-2.5 (x=1.4) X 0.2-1.1 (x=0.6) mm, cylindrical and curved, inclined to horizontal, light brown; annulus consisting of 1-2 rows of small cells; cilia rudimentary or 1-3, nodose; operculum 0.3-1.1 (x=0.6) X 0.2-1.0 (x=0.6) mm, conic-apiculate, darkened apex. Spores 12.1-17.6 (x=15.0) μm, finely granular to nearly smooth.

HABITAT AND DISTRIBUTION: No specific habitat information: Cochabamba, **Bolivia** 2800-3100 m; Boyacá and Cumdinamarca, **Colombia** 3550 m; Chimborazo, Loja, and Pichincha, **Ecuador**; and Apurímac, Cuzco, and La Libertad, **Peru** 3200-3400 m (**Fig. 29**).

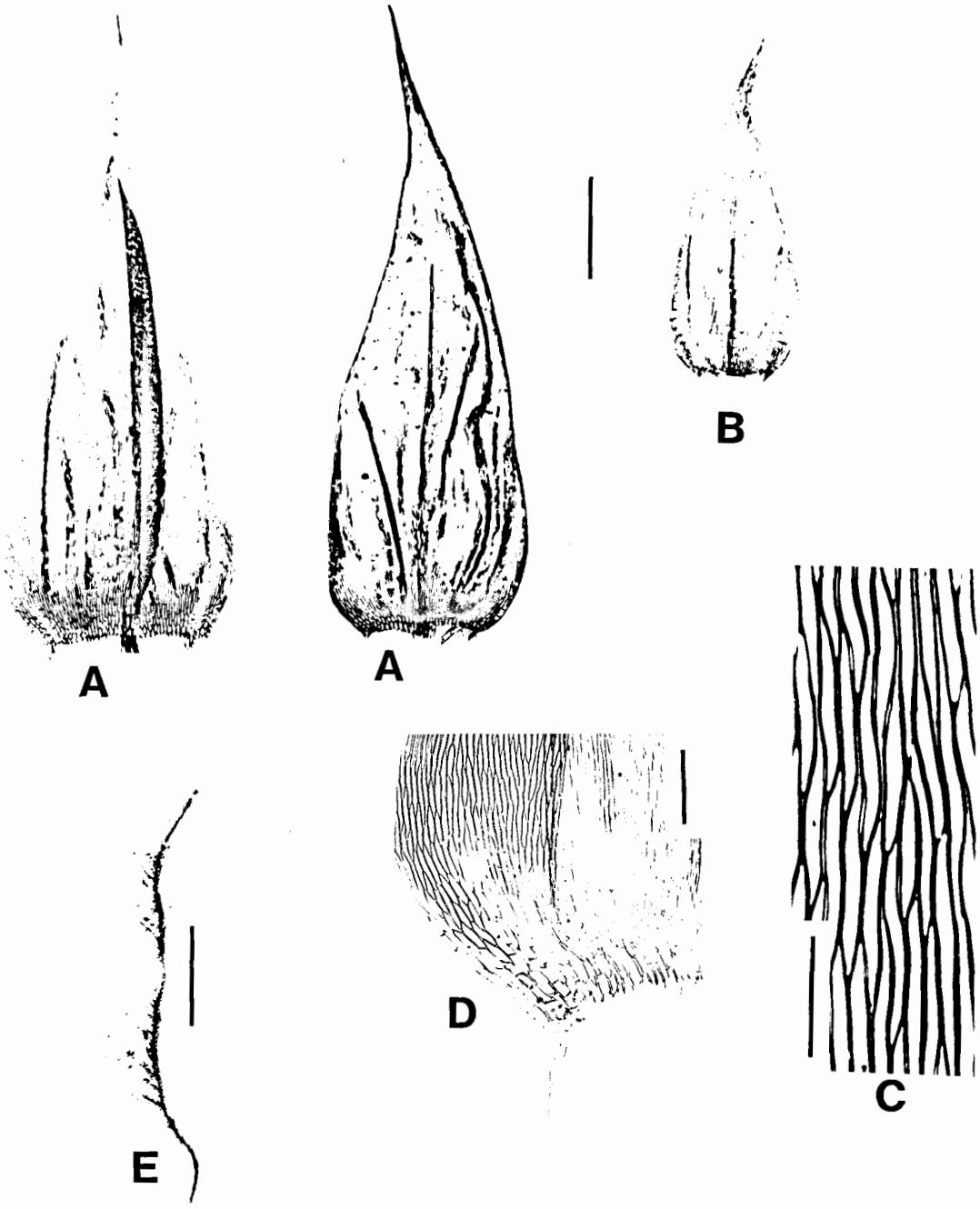
ILLUSTRATIONS: **Figure 30.**

OBSERVATIONS: This species is endemic to the higher elevations of the Andes Mountains of South America. It is distinguished by the plicate leaves with long, ± twisted acumina proportioned to the leaf size, relatively small basal-alar cells, autoicy, and low diffuse papillae on the seta.

This species is known from only a few specimens over its distributional range, which have been discovered under several other *Brachythecium* names. *Brachythecium chocayae* is most easily identified by its sporophyte characters. In sterile condition or even with sexual structures, it has often been confused with several other species of

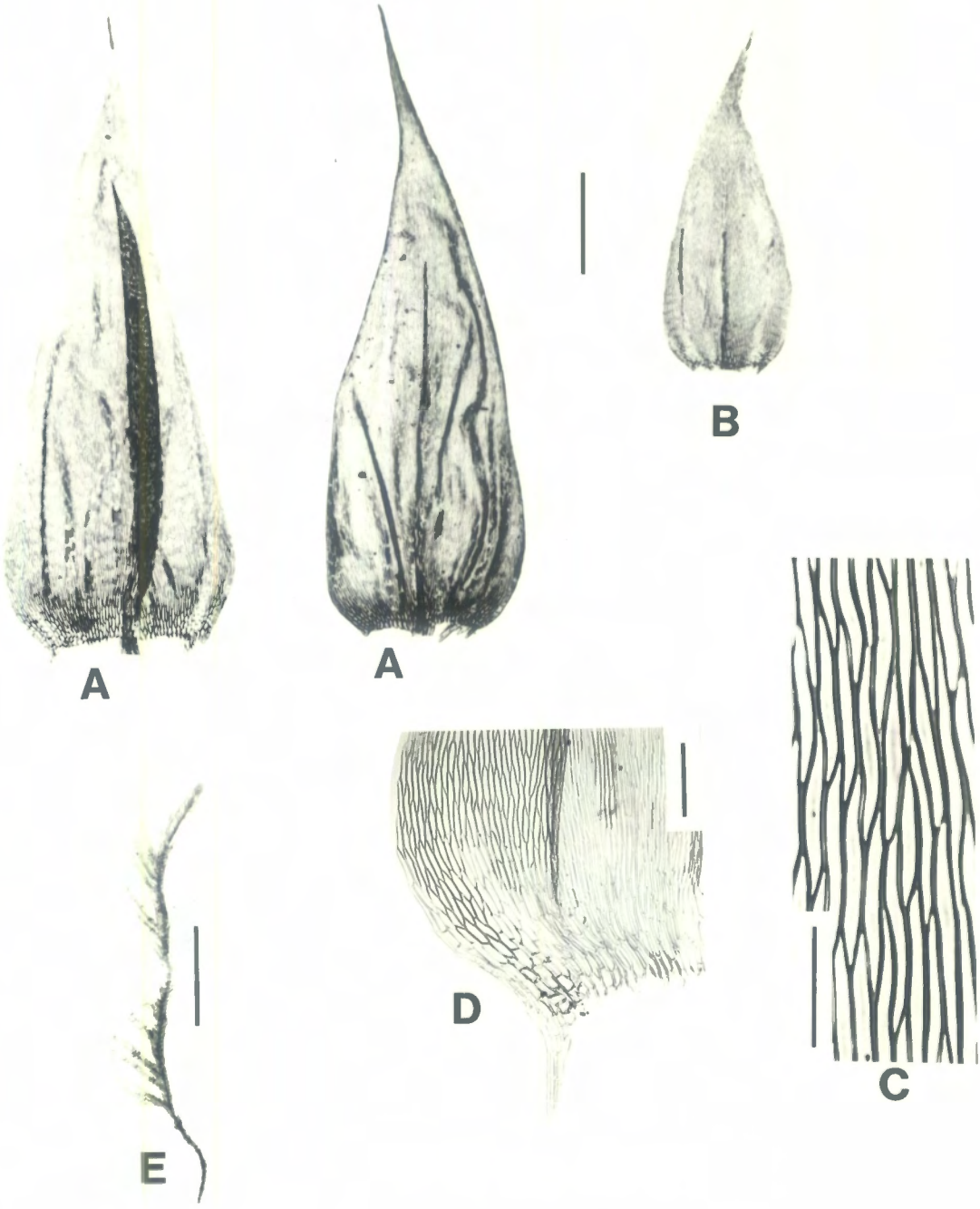


FIGURE 29. Distribution of *B. chocayae*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 30. Illustrations of *B. chocayae*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 30. Illustrations of *B. chocayae*

Brachythecium. Superficially this species resembles a robust form of *B. stereopoma*; however, *B. stereopoma* is generally smaller and dioicous, with more lax basal-alar areolation of the leaf, smoother leaf margins, more prominent leaf plication, and a smooth seta. Separation between this species and *B. rutabulum* can be very challenging. The sporophytes of both differ only in the latter species having taller and more dense papillae on the seta. Gametophytically, *B. rutabulum* is more slender, has tapering branches with a shiny appearance, and bears leaves less plicate, with shorter apices, stronger decurrent leaf bases and shorter costae.

Similarities to the circumboreal taxon *Brachythecium curtum* (Lindb.) Limpr. *sensu* Crum and Anderson (1981) [=*Brachythecium starkei* var. *explanatum* (Brid.) Moenk. *sensu* Lawton (1971) and Moenk. (1927)] can be noted in leaf shape, costa length, areolation, serrated margin of the leaf, and papillose seta. *Brachythecium curtum* differs from *B. chocayae* in being smaller with a more complanate growth form, larger, more numerous papillae on the seta, and appendiculate cilia.

* * *

Brachythecium frigidum (C. Müll.) Besch., Mém. Soc. Sc. Nat. Cherbourg 16: 248. 1872.

Basionym: *Hypnum frigidum* C. Müll., Bot. Zeitung (Berlin) 14: 456. 1856. [!]

Plants medium-sized to robust, yellow-green to green, forming open mats to erect, dense, deep cushions. Stems prostrate and ± stoloniform to erect-ascending, infrequently and irregularly to ± regularly pinnately branched; branches of various lengths, prostrate or erect,

terete, occasionally bent at tips; pseudoparaphyllia triangular to ovate-acuminate. Leaves 1.6-2.9 (x=2.3) X 0.5-1.3 (x=0.9) mm, erect-imbricate to spreading (appressed at tips of stems and branches) when dry, becoming more open to spreading when moist, concave, strongly plicate, strongly decurrent, occasionally auriculate, broadly ovate to ovate, gradually acuminate, or elongate-triangular, apices ± twisted; margins reflexed at base, plane above, serrulate to near base or only above, entire below; costae broad at base gradually tapering, narrower above, ending above middle (67%) ± with a dorsal spine. Median leaf cells long fusiform to linear 59.3-131.1 (x=98.0) X 5.7-11.4 (x=7.8) μm; apical cells shorter 34.2-114.0 (x=76.4) X 5.7-11.4 (x=7.5) μm; basal cells lax and pitted, irregularly rectangular or oblong, with a distinctive row of larger hyaline cells (slightly inflated) at stem insertion 36.5-102.6 (x=63.3) X 8.0-22.8 (x=14.6) μm; alar cells quadrate, becoming inflated-rectangular in decurrencies, hyaline 22.8-91.2 (x=48.7) X 10.3-30.8 (x=22.5) μm. Branch leaves 1.2-2.1 (x=1.6) X 0.4-0.9 (x=0.6) mm, smaller, narrower, less plicate, less decurrent and apices sharper serrate. Dioicous. Setae 18-33 mm long, red-brown, coarsely papillose. Capsules 1.4-2.5 X 0.6-1.2 mm ovoid to elongate-ovoid, curved, horizontal, constricted under mouth when dry; cilia 1-2, long, nodose or subappendiculate; annulus of 2 layers of inflated cells; operculum 0.5-1.2 X 0.7-0.9 mm, conic with a long, black apiculus when dry, high-conic when moist. Spores 12.1-19.8 μm, finely papillose.

HABITAT AND DISTRIBUTION: Growing on rocks or soil in moist or wet areas: Distrito Federal, Puebla, and Veracruz, **Mexico** 2000-4100 m;

Alaska and western **Canada**, northwestern **United States** (Lawton 1971, p. 292); (**Fig. 31**).

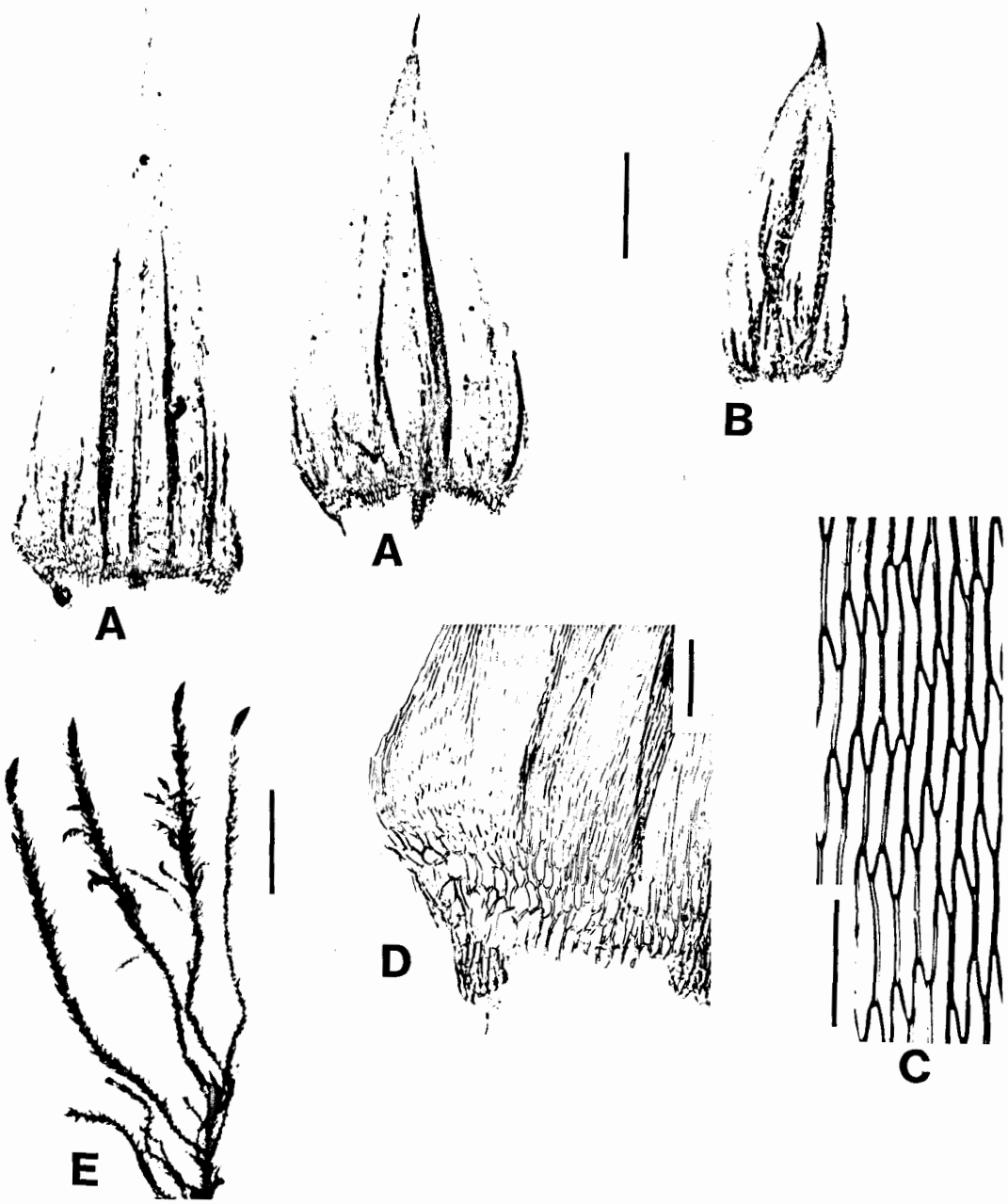
ILLUSTRATIONS: Grout, 1928, Plate 10, Figs. 1-7, 1a-1b, 8-12 (as *Brachythecium asperrimum*, *Brachythecium subasperrimum*, and *Brachythecium washingtonianum* respectively); Lawton, 1971, Plate 159, Figs. 6-14. (as *Brachythecium asperrimum*) and 162, Figs. 5-7; Flowers, 1973. Plate 108 (as *Brachythecium asperrimum*) and 109 (as *Brachythecium lamprochryseum*); Conard, 1979, Fig. 315; Hoisington, 1979, Figs. 12-18; 1979; Sharp and Crum (unpublished); (**Fig. 32**).

COMMENTS: The distribution of this species is centered in western North America and disjunct to the highlands of Mexico. It can be easily distinguished from other sympatric species of *Brachythecium* by its triangular, strongly plicate leaves with inflated alar cells, long decurrencies, papillose setae, horizontal, ovoid capsules with ± constriction under the mouth and a conic-apiculate operculum. From the other taxa of this section it is distinguished by the triangular leaf shape with strongly plicate leaves and large inflated alar cells.

Brachythecium frigidum has a long, complex taxonomic history in the literature for North America. Although described early in the literature of western North America and as the first *Brachythecium* described for Mexico, it remained mostly overlooked for more than 100 years. Additionally, several environmental forms have been described as species from the Pacific Northwest. All of these taxa belong to a complex that fall under *B. frigidum*. Grout (1928, pp. 39-41) reduced the number of taxa in this complex to four without considering *B. frigidum*. Not until Robinson (1963, pp. 136-138) (who neotypified this species

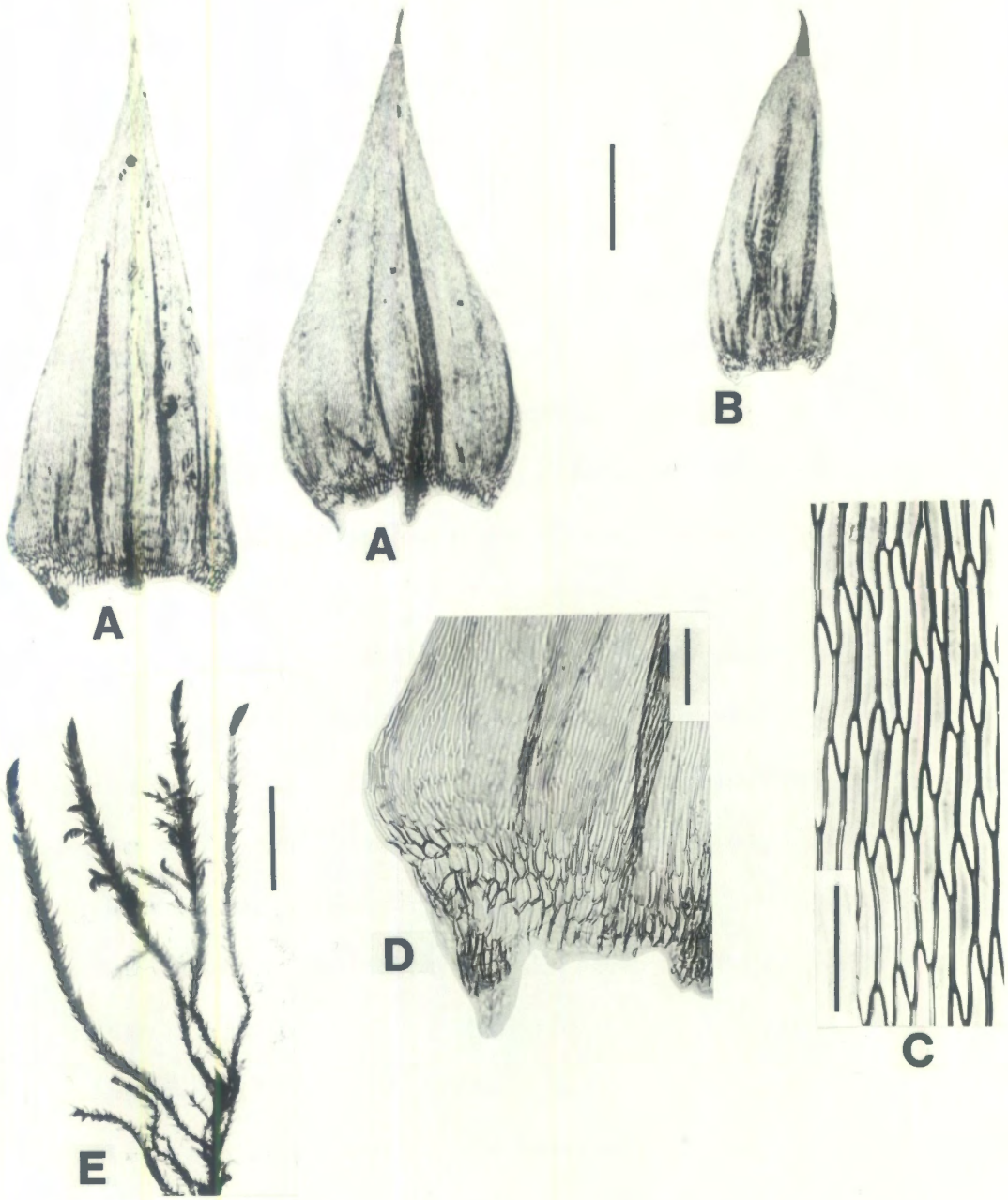


FIGURE 31. Distribution of *B. frigidum*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 32. Illustrations of *B. frigidum*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 32. Illustrations of *B. frigidum*

because of the loss of the C. Müller type at Berlin) recognized the similarity of this species to the northwestern species complex did *B. frigidum* resurface in the modern literature. Robinson's action synonymized all of the taxa of this species complex under the one species *B. frigidum*. Later, Lawton (1971, pp. 290, 292) resegregated *B. asperrimum* from *B. frigidum* based upon characteristics of growth form and habitat preferences. A similar view was followed by Flowers (1973, pp. 446-450) but he substituted the binomial *Brachythecium lamprochryseum* C. Müll. & Kindb. for *B. frigidum*. Owing to the record of ambiguities and discrepancies in the literature of this species complex, Hoisington (1979) conducted a taximetric study that re-evaluated the species. She concluded that *B. asperrimum* and *B. frigidum* occur in Alaska, Canada, and the northwestern U.S. with *B. frigidum* disjunct to Mexico. All Mexican specimens of *B. frigidum* have been collected from wet areas, consistent with the taxonomic criteria used by Lawton, Flowers and Hoisington.

The broad range in variation of this species (*B. frigidum sensu* Robinson 1963) is similar to that observed for many other taxa of *Brachythecium* for Latin America, which have large patterns of distribution and occur in diverse environments. Therefore, I am not convinced that morpho-biotypes of this species complex should be recognized as separate species.

* * *

Brachythecium rutabulum (Hedw.) B.S.G., Bryol. Eur. 6: 543. 1853 (fasc. 52-54 Mon. 11. 9. plate 11)

Basionym: *Hypnum rutabulum* L. *ex* Hedw., Sp. Musc. 276. 1801.

= *Brachythecium helvolum* (Mont.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 336. 1878. (Ad. 2: 402).

Basionym: *Leskea helvola* Mont., Syll. Gen. Spec. 19. 1858. [!]

= *Brachythecium rutabulum* var. *columbicum* De Not. Mem. Reale Accad. Sci. Torino ser. 2. 188: 439. 1859. [!]

= *Brachythecium pseudo-rutabulum* (Hamp.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 332. 1878. (Ad. 2: 398).

Basionym: (*Ptycho*) *Hypnum pseudo-rutabulum* Hamp., Linnaea 32: 160. 1863. [!]

= *Brachythecium scabripes* C. Müll., Nuovo Giorn. Bot. Ital. 4: 154. 1897. [!]

= *Brachythecium riparium* Schimp. *ex* C. Müll., Nuovo Giorn. Bot. Ital. n. ser. 4(2): 167. 1897. *nom. nud.*] [!]

= *Brachythecium rivulariforme* Schimp. *ex* C. Müll., Nuovo Giorn. Bot. Ital. n. ser. 4(2): 167. 1897. *nom. nud.*] [!]

= *Brachythecium hirtipes* (Schimp. *ex* C. Müll.) Par., Ind. Bryol. ed. 2, 1: 145. 1904. [!]

Basionym: *Rhynchostegium hirtipes* Schimp. *ex* C. Müll., Nuovo Giorn. Bot. Ital. n. ser. 4: 157. 1897. [!]

= *Brachythecium argyrocaulon* Dus. in Par., Ind. Bryol. ed. 2, 5: 148. 1906. *nom. nud.*] *p. p.* [!]

= *Brachythecium espinosae* Herz., Beih. Bot. Centralbl. 61B: 690. 1945. [!]

Plants medium- to robust-sized, pale yellow-green to bright green, ± glossy. Stems decumbent, terete, densely foliate, rhizoids in tufts at attachment to substrate, irregularly to subpinnately branched;

branches of unequal length, terete, tapering, ± flexuose at tips; pseudoparaphyllia orbicular to ovate-obtuse to apiculate. Leaves erect-imbricate to erect ± subcomplanate when dry, becoming more open when moist. Stem leaves 1.7-3.0 (x=2.3) X 0.8-1.8 (x=1.1) mm, concave, decurrent, slightly plicate, ovate to broadly ovate, gradually tapering, quickly ending in short twisted apices to long tapering with twisted apices; margins reflexed at base, plane above, distinctly serrate to serrulate in upper portion; costae broad at base, tapering, slender above, ending near middle (57%), ± ending in a minute inconspicuous dorsal spine. Median leaf cells fusiform to linear, 67.3-142.5 (x=91.3) X 5.7-10.3 (x=8.2) μm; apical cells slightly shorter 59.3-114.0 (x=82.4) X 4.6-10.3 (x=7.3) μm; basal cells rectangular to hexagonal, ± walls slightly pitted 30.8-108.3 (x=68.1) X 9.1-28.5 (x=15.6) μm; alar cells in an indistinct cluster of quadrate to rectangular, to distinctly lax, to inflated rectangular cells 17.1-62.7 (x=38.5) X 12.5-36.5 (x=20.3) μm. Branch leaves 1.0-2.1 (x=1.5) X 0.4-1.0 (x=0.7) mm, smaller, narrower, not to slightly decurrent, apices slender with a ± half-twist, upper margins more serrate. Autoicous. Setae 15.0-35.0 (x=23.6) mm, red-brown, densely papillose the entire length. Capsules 1.6-2.5 (x=2.0) X 0.5-1.3 (x=0.8) mm, cylindrical and curved, inclined to horizontal, light brown; annulus differentiated, 1-2 rows of inflated cells; cilia 2-4, nodose; operculum 0.6-1.2 (x=0.9) X 0.6-1.3 (x=0.8) mm, conic-apiculate with a darkened apex. Spores 12.1-18.7 (x=15.2) μm, finely papillose.

HABITAT AND DISTRIBUTION: On moist soil or humus beside lakes or streams, tree trunks, bushes, moist fallen logs, and moist rock:

Cochabamba, and LaPaz, **Bolivia** 2700-3400 m; Aisén, Cautín, Chiloé, Magallanes, Malleco, Ñuble, and Valdivia, **Chile** 200-700 m; Boyacá, Caldas, Cauca, Cundinamarca, Huila, and Valle del Cauca, **Colombia** 2400-4050 m; Carchi, Chimborazo, Cotopaxi, Napo, Pichincha, and Tungurahua, **Ecuador** 2400-3630 m; Cartago, **Costa Rica** 3200 m; Chimaltenango, Quezaltenango, Sacatepéquez, and San Marcos, **Guatemala** 2400-3800 m; **Kerguelen; New Zealand;** Marion Island, **Prince Edward Islands;** and Cuzco, **Peru** 3000 m; Eastern North America, most of Europe, throughout north and central Asia, Japan, Australia, Hawaii, Macaronesia, Algeria, and Tasmania (Crum and Anderson, 1987, p. 1053); (**Fig. 33**).

ILLUSTRATIONS: Morison, 1699. Tab. VI. Fig. 18 and 29 (as *Muscus denticulatus minor sericeus nostras, capitulis adianti*); Vaillant, 1727. Tab XXIII. Fig. 2 and Tab XXVII Fig. 8 (as *Muscus myosuroides rutabuli fructu*); Dillenius, 1741. Pl. XXXVIII. Fig. 29 (as *Hypnum dentatum vulgatissimum, operculis obtusis*); Hedwig, 1792. Tab. XII Figs. 1-16; B.S.G., 1853. Tab. XI; Dixon and Jameson, 1904. Pl. LII. Fig. K; Limpricht, 1904. Fig. 370; Roth, 1904. Pl. XLIV. Fig. 11; Warnstorf, 1906. page 748. Fig. 2; Jennings, 1913. Pl. L; Monkemeyer, 1927. Fig. 190. d; Bartram, 1933. Fig. 156; Bartram 1949a. Fig. 158 a-c; Sakurai, 1954. Pl. 54. Fig. b; Takaki, 1955. Figs. 15-23; Robinson, 1962. Figs. 135-142; Nyholm, 1965. Fig. 361; Allison and Child, 1971. Pl. XXXI; Lawton, 1971. Pl. 166. Figs. 1-4; Crum, 1973. Fig. 830; Scott and Stone, 1976. Pl 83; Gangulee, 1978. Fig. 862; Smith, 1978. Fig. 288, 9-12; Crum and Anderson, 1981. Fig. 516; Ireland, 1982. Pl. 321; Crum, 1983. Fig. 121 e; (**Fig. 34**).



FIGURE 33. Distribution of *B. rutabulum*

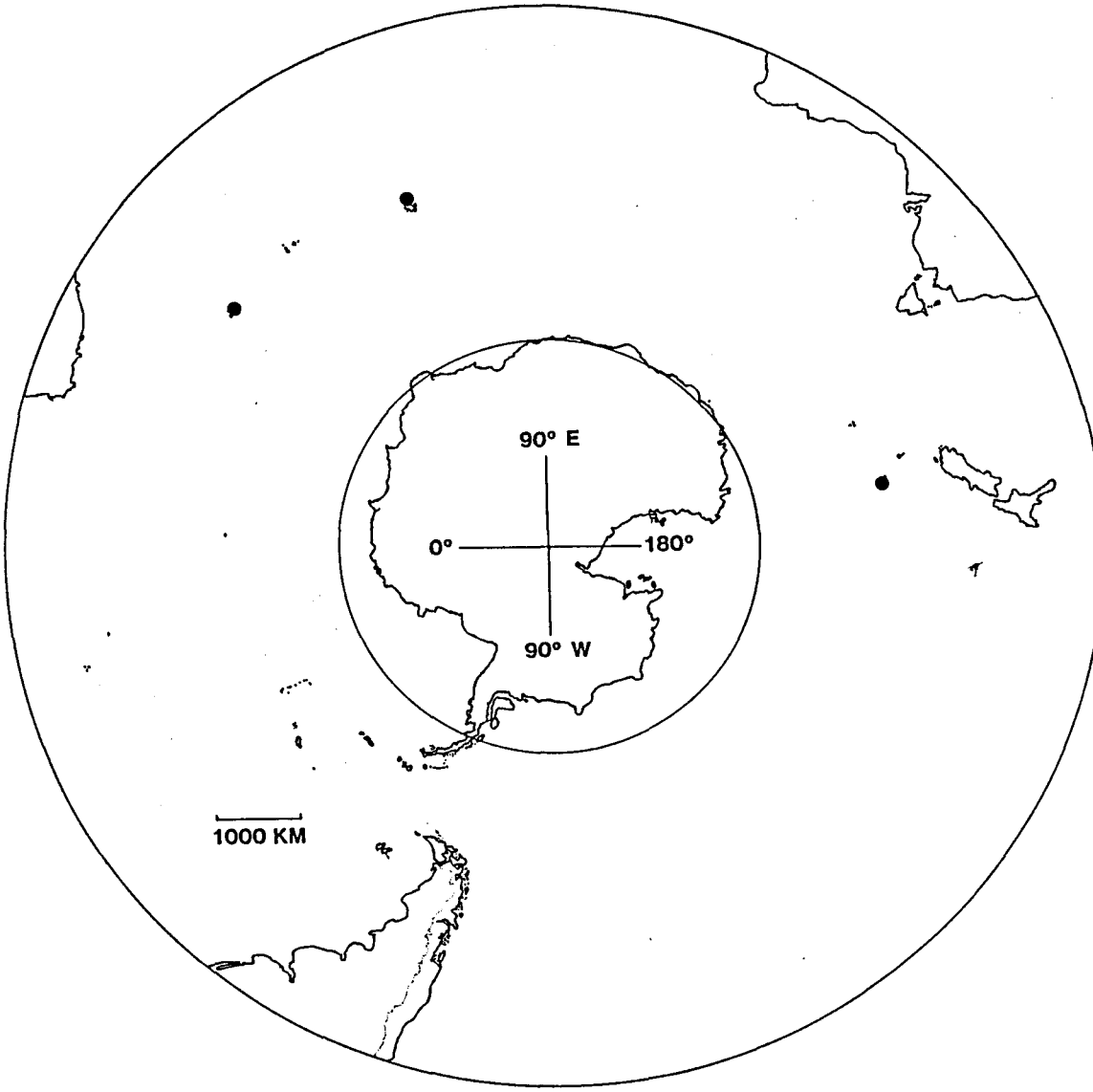
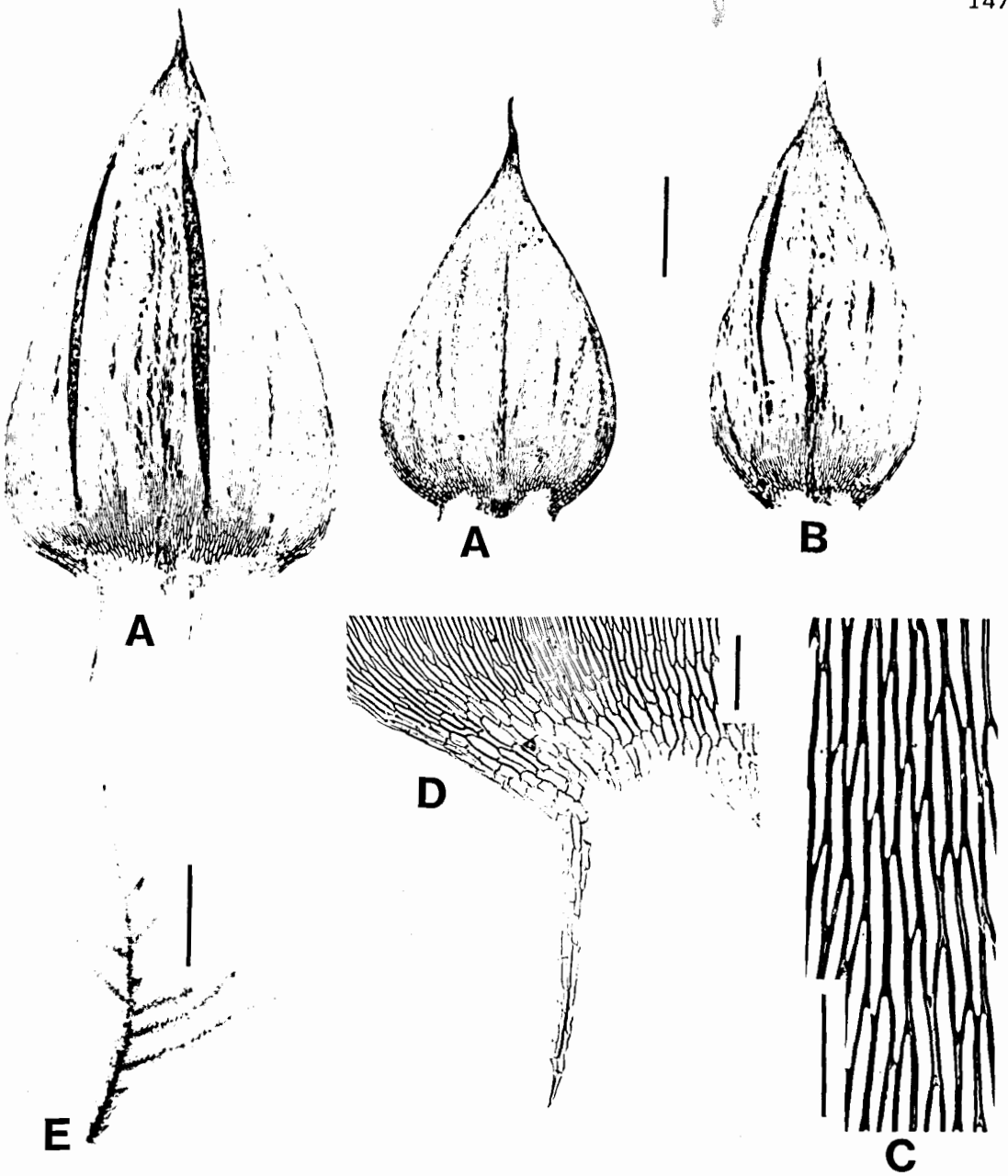
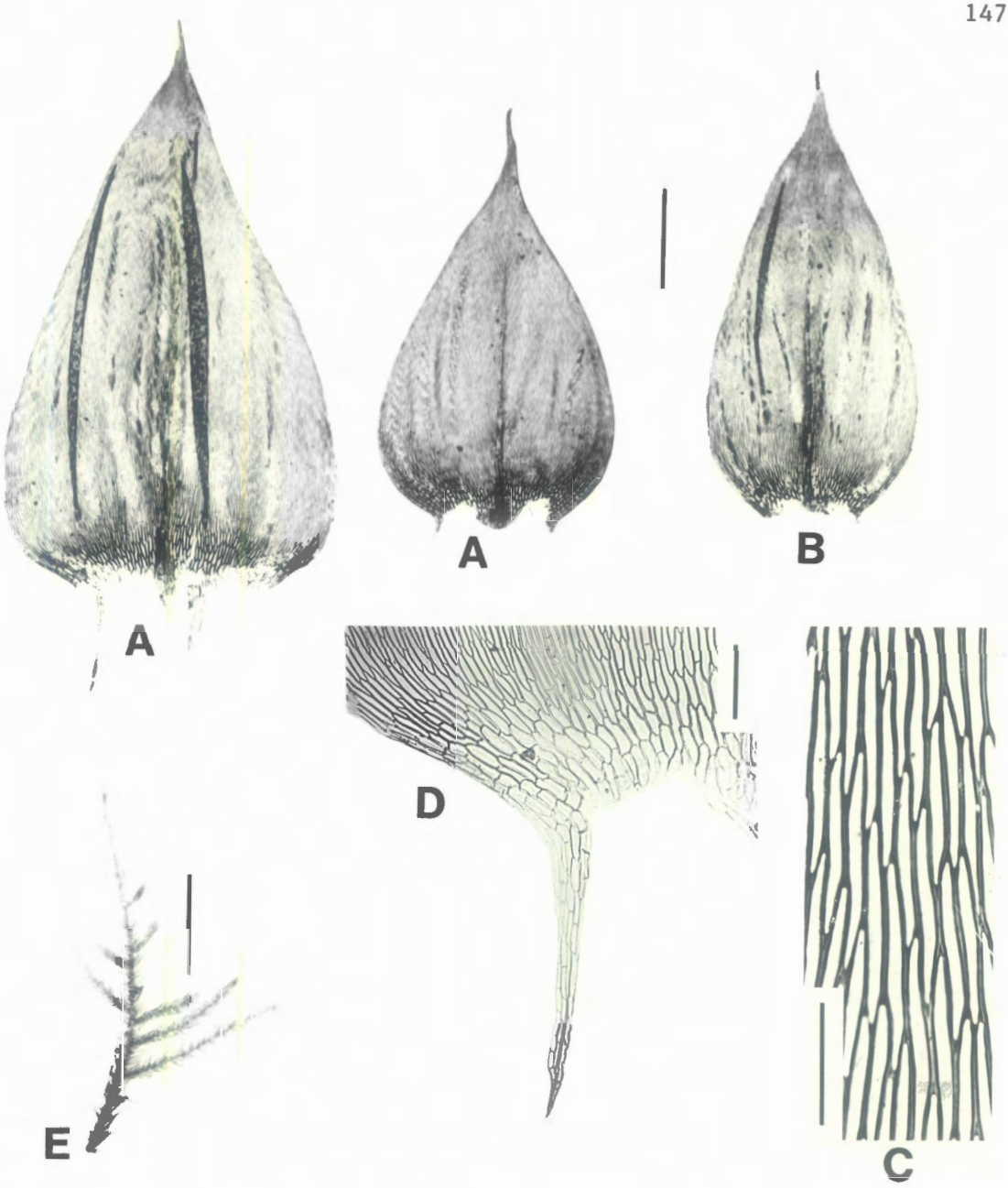


FIGURE 33. (Continued)



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 μm; D = 100 μm; E = 1.0 cm

FIGURE 34. Illustrations of *B. rutabulum*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 34. Illustrations of *B. rutabulum*

COMMENTS: This species is cosmopolitan in distribution and extremely variable throughout its range. According to Hedwig (1801, p. 276) this species was first published in 1699 by Morison (p. 626) as "*Muscus denticulatus minor sericeus nostras, capitulis adianti*," but its binomial epithet proposed by Linnaeus (1762, p. 1590) was derived from Vaillant's (1727, p. 138) "*Muscus myosuroides rutabuli fructu.*" Historically, as with many earlier named mosses, the taxonomic concept of *B. rutabulum* has changed from one of strict (narrow) morphological interpretation in the early 19th century, to variants being treated as either separate species or varieties. More recently a broader taxonomic interpretation has been adopted in most modern floras where geographic species are either synonymized with *B. rutabulum* or reduced to varietal status.

In Latin America *B. rutabulum* is distinguished by its autoicous condition, larger size, broadly ovate leaves with short half-twisted apices, upper margins serrate, linear median cells, lax-rectangular to inflated alar cells, and setae with dense, sharp papillae throughout.

Given the cosmopolitan distribution of *Brachythecium rutabulum* it is well-represented in Latin America (Guatemala and south). Its apparent absence from Mexico is a continuation of its distributional void south from the Rocky Mountain region. Interestingly, several other Latin American species of this genus reach their northern limits in Mexico.

The morphological variation in the growth form, length of the leaf apices, and the size of the alar cells in the Latin American specimens of *B. rutabulum* parallels that of populations examined from other parts

of the world. In addition, the morphological variations within a population of this species have been well-documented experimentally by Wigh (1975a and 1975b). Thus, morphological and geographical species and varieties are taxonomically treated here in a broad interpretation of the species.

In Latin America *B. rutabulum* overlaps the distribution of most of the other taxa of *Brachythecium* with few exceptions. Its suite of characters, as discussed above, makes it distinctive among several of the sympatric taxa, excepting the following taxa which can be distinguished from *B. rutabulum* as follows: *B. austro-glareosum* having a tufted habit, julaceous stems and branches, more linear leaf shape, stronger plication, short decurrencies, smaller basal and alar cells, and smooth setae; *B. austro-salebrosum* having a tufted habit, julaceous stems and branches, more rounded leaves, slight decurrencies with small rounded auricles, apices more cuspidate and not twisted, and smooth setae; *B. chocayae* having leaves less rounded and more gradually formed into long acumina, slight decurrencies, alar cells in discrete clusters, not inflated, and setae with low scattered papillae; *B. conostomum* having plants more compact, leaves deeply concave and more gradually acuminate, smaller decurrencies, costae shorter with lateral spurs, and smooth setae; *B. filirepens* having plants wiry, leaves deltoid, abruptly acuminate, costae subpercurrent, and setae with low scattered papillae; *B. majusculum* having plants more rigid, leaf apices long-aerostat, costae stouter, and alar cells more numerous and not as lax; and *B. praelongum* plants smaller, leaves slightly decurrent and strongly plicate, areolation smaller and not as lax, polygamous, and setae with

low scattered papillae; *B. subpilosum* having plants more rigid, leaves deltoid abruptly acuminate, slight decurrencies, basal and alar cells smaller, and setae with low scattered papillae; *B. subplicatum* having plants tufted, stems and branches julaceous, leaves deeply concave with abruptly aristate straight apices, slightly auriculate decurrencies, basal and alar cells more lax, and setae smooth.

* * *

Section *Reflexa* (Limpr.) Broth. Nat. Pfl. 1(3): 1145. 1908.

Basionym: [Group *Reflexa* Limpr., Laubm. 3: 62. 1895. *illeg. subdivisio*].

Plants rigid, small- to large-sized. Leaves concave, not to weakly plicate, short to long with broad decurrencies, broadly ovate to deltoid, abruptly ± long-acuminate. Autoicous or dioicous; seta densely papillose, capsule suberect, annulus differentiated, two rows of inflated cells, cilia nodose with appendiculate, operculum conic-apiculate.

* * *

Brachythecium cirriphylloides McFarland, *sp. nov.*

Type specimen (holotype) MICH: "Mexico, Mexico, Popocatepetl, on slopes ca. 2,900 m.s.m., March 4, 1932, *H. Froferstrom et E. Hultén s.n.* [!]

Caules sive decumbentes sive erecti, teretes. Folia sive erecta-imbricata sive reclusa sive incipientia reclusa fieri, profunde concava, longa, late decurrentia, leviter plicata, sive ovata-lanceolata sive late ovata, sive incipientia ovata fieri, et aut gradatim contracta ad

longos apices aut late ovata et abrupte constricta ad longos filiformes apices, cum nervo tenui ultra medium foliorum; cellulae alares, ab aliis cellulae non distinctae, sive quadratae sive rectangulares, extendentes ad decurrentia. Dioicus. Setae dense papillosae; capsula horizontalia, annulus compositus ex duabus seriebus accrescentium cellularum, cilia nodosa vel appendiculata. Cetera ignota.

Plants medium-sized to robust, loosely to densely matted. Stems decumbent to erect, terete, infrequently and irregularly to subpinnately branched; branches terete, ± tapering at tips; pseudoparaphyllia orbicular, long apiculate. Leaves 1.6-2.7 (x=2.1) X 0.7-1.4 (x=1.0) mm, erect-imbricate to open erect and ± crumpled when dry, becoming more open and straight when moist, deeply concave, slightly to strongly decurrent, slightly plicate, broadly ovate or broadly cordate-ovate, abruptly constricted into long filiform apices, or ovate-lanceolate and gradually tapering into long apices 0.4-0.8 (x=0.6) mm long; margins recurved at base, plane above, serrulate to serrate in apices, serrulate to nearly entire below; costae broad at base quickly tapering above and ending near middle (50%) ± in an inconspicuous spine. Median leaf cells fusiform to linear 53.6-102.6 (x=75.7) X 5.7-11.4 (x=7.0) μm; apical cells similar 42.2-115.1 (x=68.7) X 5.7-8.0 (x=6.2) μm; basal cells slightly broader, rectangular, pitted 34.2-108.3 (x=53.4) X 8.0-19.4 (x=11.9) μm; alar cells not distinctly differentiated, quadrate to rectangular, extending into decurrencies 12.5-47.9 (x=28.0) X 8.0-20.5 (x=12.8) μm. Branch leaves 1.2-1.9 (x=1.6) X 0.4-0.9 (x=0.6) mm, concave, slightly decurrent, not plicate, ovate-lanceolate, acuminate; margins serrate. Dioicous. Setae 15.0-20.0 mm long, densely papillose

throughout, dark red-brown. Capsules 2.0 X 1.0 mm, horizontal, short oblong-ovoid, curved, dark red-brown; cilia 1-2, nodose to appendiculate; annulus of two rows of inflated cells. Spores 9.9-16.5 (x=13.2), finely papillose. The rest unknown.

HABITAT AND DISTRIBUTION: On moist, shaded soil, tree trunks, and rock: Bayacá and Cundinamarca, **Colombia** 3100-3620 m; Quezaltenango and Sacatepequez, **Guatemala** 2200-3000 m; Mexico, Michoacan, and Veracruz, **Mexico** 1524-3000 m; and Merida, **Venezuela** 2900 m (**Fig. 35**).

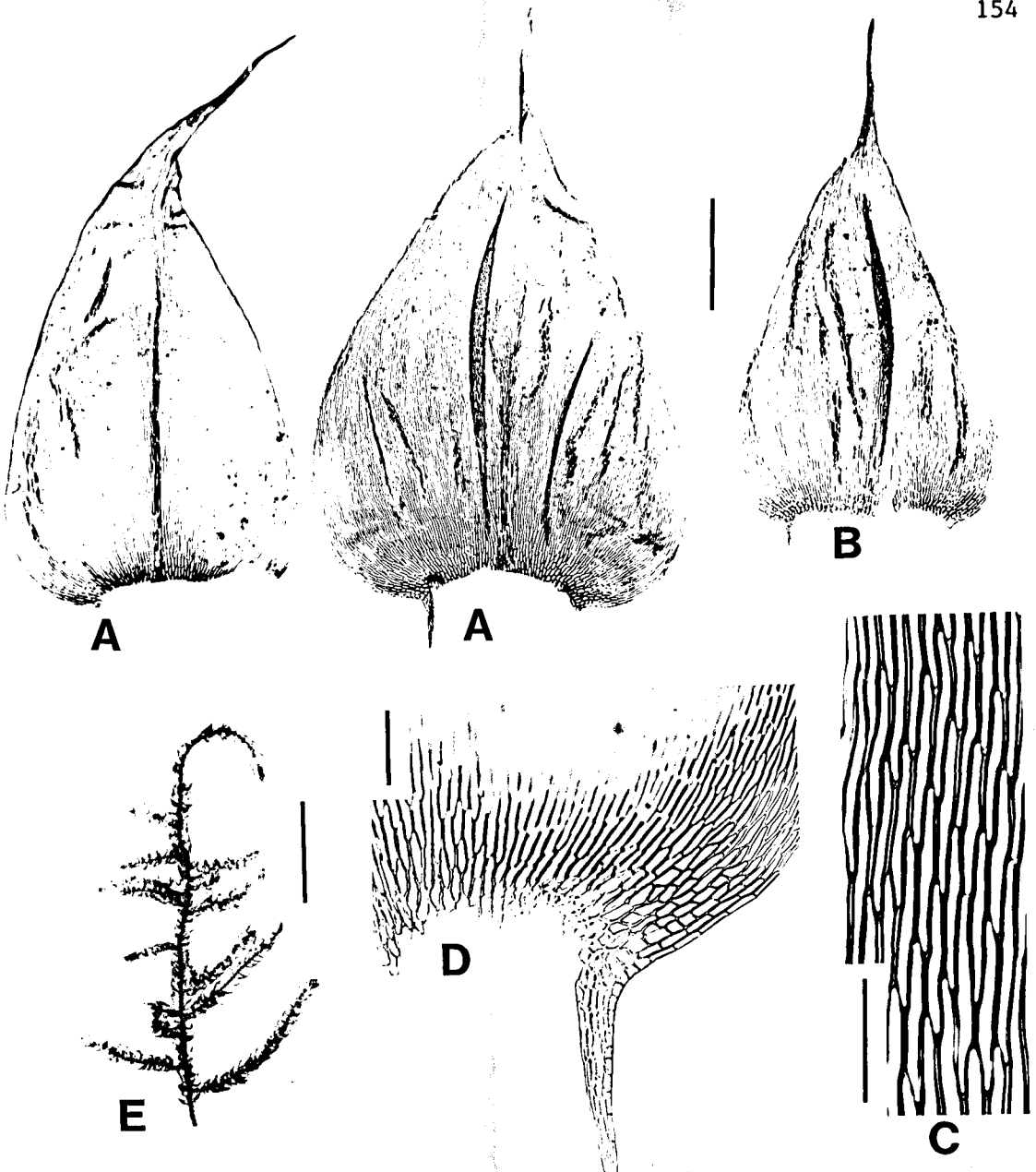
ILLUSTRATIONS: Sharp and Crum (unpublished); (**Fig. 36**).

COMMENTS: This species is endemic to Central America and northern South America, distributed in the high mountain ranges from Mexico to Colombia and Venezuela. It is distinguished by its robust size, dioicous condition, leaves that are broadly cordate-ovate with abruptly formed long apices, small basal and alar cells, and papillose setae.

This species remained anonymous in the literature and herbarium specimens because it was either left unnamed or misnamed as *Brachythecium alboflavens auct. div.*, *Brachythecium flexiventrosum auct. div.*, and *Brachythecium rutabulum auct. div.* Failure to recognize this species was complicated further by its typically sterile condition and marked resemblance to other sympatric species. *Brachythecium cirriphylloides* resembles *B. chocayae* in size, growth form, and general leaf shape and areolation. *Brachythecium chocayae* differs in being autoicous, having setae with low papillae, leaves not as broadly ovate, and lacking abruptly formed apices. *Brachythecium conostomum* has similar leaf form and dioicous condition, but is smaller with more lax leaf areolation and a smooth setae. *Brachythecium rutabulum* is similar

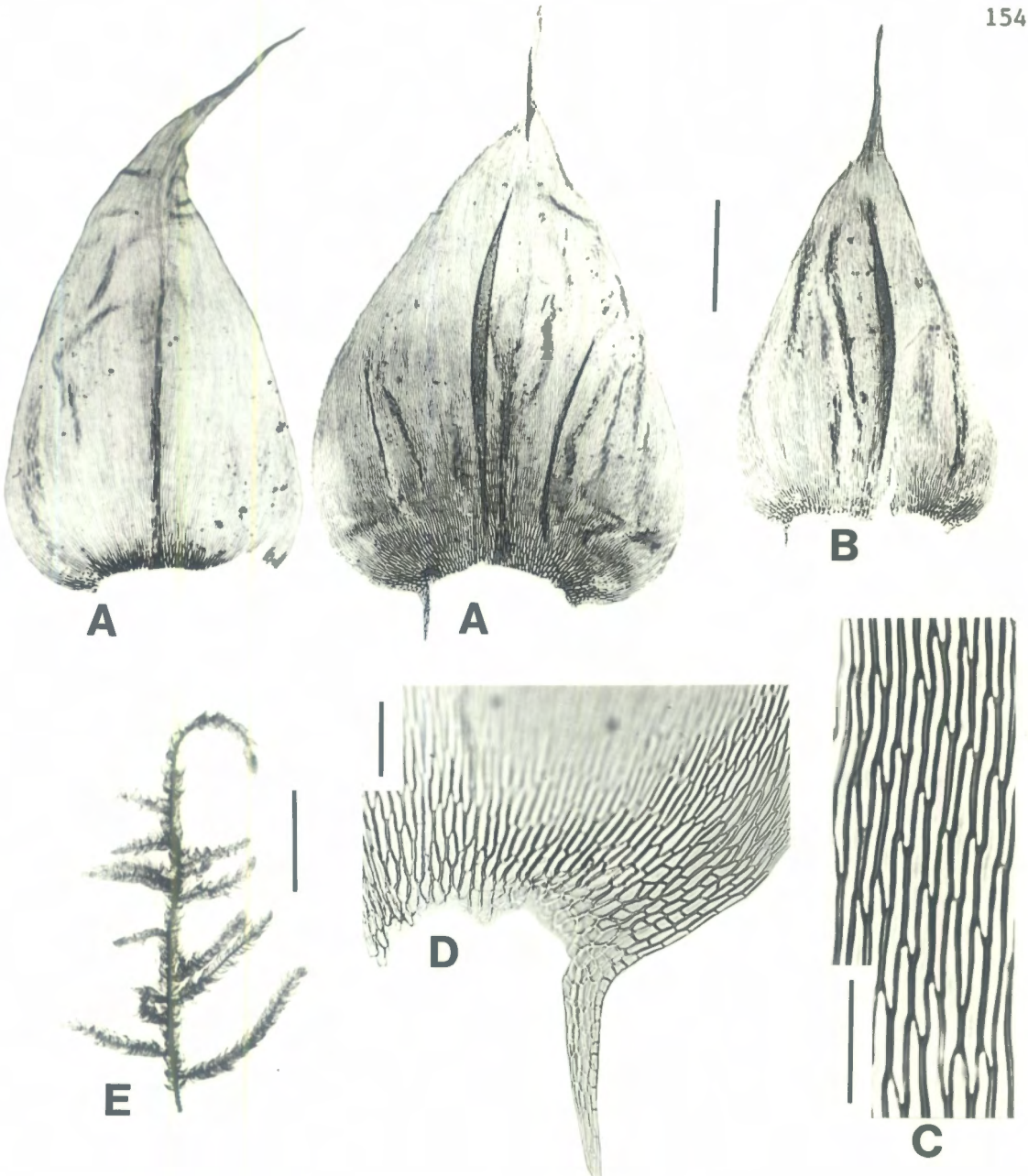


FIGURE 35. Distribution of *B. cirriphylloides*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 36. Illustrations of *B. cirriphylloides*



A: Stem leaves
B: Branch leaf
C: Median cells, stem leaf
D: Alar cells, stem leaf
E: Habit
Bar Scales A and B = 0.5 mm; C = 50 µm; D = 100 µm; E = 1.0 cm

FIGURE 36. Illustrations of *B. cirriphylloides*

in its growth form, size, papillose seta, and general leaf shape, but differs in being autoicous, having lax basal cells, lax to inflated alar cells, less broadly ovate leaves, and much shorter apices. Robust specimens of *B. stereopoma* are similar in dioicy, and general leaf form, but differ in the more compact growth form, narrower leaves, shorter apices, more lax basal and alar cells, and smooth setae.

Brachythecium cirriphylloides bears some resemblance to *B. curtum* (Lindb.) Limpr. a circumboreal-north temperate species, in the general leaf form, papillose seta, and appendiculate cilia; however, *B. curtum* has shorter apices, more lax cells in the basal and alar region, and it is autoicous. It would be of some value to study these two more closely.

The dioicy, papillose seta, plant size, growth form, and concave broadly ovate leaves with filiform apices of *B. cirriphylloides* give it a superficial resemblance to some of the taxa in *Cirriphyllum sensu* Grout. The shape of the operculum is unknown; however, if a rostrate operculum is produced, then a transfer to *Cirriphyllum* could be argued.

* * *

Brachythecium filirepens Dus., Bot. Not. 1905: 309. 1905.

= [*Brachythecium subtilicaule* Dus., Rep. Princeton Univ. Exp. Patag. 8: 125. 1903. *nom. nud.*]

= *Brachythecium longidecurrens* Bartr., Farlowia 2(3): 318. 1946.

Plants small- to large-sized, yellow-green, ± shiny, forming a open intricate mat. Stems terete, loosely foliate, prostrate ± with tufts of rhizoids at attachment to substrate, subpinnately to irregularly branched; branches short or long, tapering, ± arcuate, distinctly

smaller and more densely foliate than stems, prostrate to ascending; pseudoparaphyllia orbicular to ovate-acute. Leaves appressed when dry becoming more erect when moist. Stem leaves 0.9-1.3 (x=1.1) X 0.6-1.1 (x=0.8) mm, concave, long broad decurrencies, not to slightly plicate, from a broad and strongly decurrent base, deltoid to cordate-ovate, abruptly long-acuminate, or broadly ovate gradually acuminate, apices 0.2-0.4 (x= 0.3) mm, ± twisted and secund (not reflexed); margins reflexed at base, plane above serrulate to serrate in upper half, smooth to subserrulate below; costae stout and subpercurrent, gradually tapering and ± serrate at end, ending in an spine (75%). Median leaf cells rhomboidal to linear, ± porose 36.5-82.1 (x=54.7) X 4.6-6.8 (x=5.7) µm; apical cells slightly shorter, ± porose 25.1-57.0 (x=42.1) X 4.6-6.8 (x=6.1) µm; basal cells rectangular to irregular rectangular, ± lax, pitted 22.8-59.3 (x=38.9) X 6.8-17.1 (x=10.3) µm; alar cells in a large group, lax quadrate to rectangular alar cells becoming inflated in decurrencies, subdecurrency cells long and narrow 17.1-45.6 (x=30.4) X 11.4-26.2 (x=16.3) µm. Branch leaves smaller and narrower 0.5-1.0 (x=0.8) X 0.3-0.6 (x=0.5) mm, decurrencies not as prominent, cordate-ovate to broadly ovate-acuminate, apices secund. Autoicous. Setae 15.0-29.0 (x=20.9) mm, long, red brown, with scattered low papillae to near base. Capsules 1.1-2.0 (x=1.4) X 0.6-1.2 (x=0.8) mm, inclined to horizontal, short ovoid to cylindrical, curved, dark red-brown; cilia 1-3, nodose and appendiculate, with scattered papillae. Spores 13.2-18.7 (x=15.3) µm finely papillose. Annulus and operculum not observed.

HABITAT AND DISTRIBUTION: On decaying humus over soil in river valley: Aisén, Magallanes, and Valdivia, **Chile**; (**Fig. 37**).

CHAPTER IV

TYPE STUDIES

It has been necessary to devote a special section to the study of the original literature and type specimens to develop an accurate baseline of taxonomic and nomenclatural information. This information has been essential for defining *Brachythecium* taxa for Latin America. Type studies have served a number of functions: 1) to confirm the nomenclatural legitimacy and status of each specific and infraspecific name as defined by International Code of Botanical Nomenclature (ICBN); 2) to evaluate or effect typification of each legitimate name; 3) to identify the herbarium location(s) of type specimens; 4) to give a complete description of the type specimen(s) of each nomenclaturally legitimate specific and infraspecific name; 5) to taxonomically assess specimens representing nomenclaturally illegitimate; and 6) to address the taxonomic status of each nomenclaturally legitimate specific and subspecific name in view of the taxonomic concepts developed from taxonomic studies.

Species and infraspecific taxa of *Brachythecium* reported in the literature for Latin America, whose topotypes are extralimital to the defined geographical range of this revision are not treated in the type studies. These taxa are, however, treated in the taxonomic section or are discussed in the section on rejected or excluded taxa.

The lack of type studies statements for seven taxa reflects the loss of (apparently all) type specimens form the Adalbert Geheeb and

Carl Müller herbaria as the tragic consequence of the bombing of the Berlin Museum during World War II (Stafleu and Cowan, 1981, p. 644).

Type descriptions are arranged alphabetically by the specific epithet followed by any infraspecific epithets. Where gametophyte or sporophyte materials were limited in the type collection, preservation of the plant material has precluded dissection of internal structures for observations.

A synonymic listing of the taxa included in this chapter and herbarium names (*in sched.*) are located at the end of this chapter.

* * *

Brachythecium alboflavens Card., Rev. Bryol. Lichénol. 37: 68. 1910.

Type specimen (lectotype *des. mihi*) S: "Mexique, Etat de Hidalgo, Cuzamaloza, 1908, Herb. J. Cardot, *C. Pringle 15246*." [!]

Plants medium-sized, yellow-green. Stems to 2.0 cm long, prostrate, terete, densely foliate, irregularly to subpinnately branched; branches to 0.7 cm long, terete, ± tapering at tips, older branches becoming caulidiform; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 1.3-1.7 (x=1.4) X 0.5-0.7 (x=0.6) mm, erect, ± imbricate when dry, erect to patent when moist, concave, slightly decurrent, plicate, elongate triangular to ovate-lanceolate, long-acuminate; margins recurved at base, plane above, serrulate in upper 2/3, smooth below; costae broad at base, tapering and ending near middle (50%). Median leaf cells fusiform to linear 45.6-79.8 (x=63.7) X 5.7-6.8 (x=6.3) μm; apical cells similar 36.5-82.1 (x=66.5) X 5.7-6.8 .pa

(x=6.2) μm; basal cells irregularly rectangular 27.4-57.0 (x=36.0) X 8.0-13.7 (x=10.3) μm; alar cells lax, forming rows of quadrate to rectangular cells, extending into decurrencies 17.1-31.9 (x=22.5) X 11.4-19.4 (x=14.4) μm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate, long-acuminate, inner leaves longer, slender-acuminate, apices squarrose; margins plane, entire, and bordered by a single row of rectangular cells below. Perigonia not observed. Setae 14.0 mm long, red-brown, smooth. Capsules 1.6-2.1 X 0.6-0.8 mm, suberect, cylindrical, curved; exothecial cells rectangular, in vertical rows, uniformly incrassate; annulus not differentiated. Operculum 0.7-0.8 X 0.6-0.6 mm conic-apiculate. The rest unknown.

TYPIFICATION: The type of this species is represented by three isotypic Pringle "Plantae Mexicanae" specimens, "Etat de Hidalgo, Cuzamaloza, 1908, *15246*," one each in the herbaria at FH, S, and VT. No specimen of this species was made available to me from the author's herbarium at PC. I designate the specimen at S as the lectotype since it fits the protologue and came from Cardot's herbarium. Duplicate specimens at FH and VT are considered isolectotypes.

COMMENTS: Bartram's (1949a, p. 354-355) interpretation of this species has been misleading. A single specimen he cited (*Steyermark 50047*) neither conforms to the protologue description nor compares favorably to the isotypes of the species. In addition, his comments on the similarity of this specimen to *B. flexiventrosum* are irrelevant since his concept of *B. flexiventrosum* neither conforms to its protologue description nor isotype specimen (see comments for *B.*

flexiventrosum on pages 180 and 297). The *Steyermark 50047* specimen cited by Bartram for this species is referred to *Brachythecium guatemalense*.

Sporophyte morphology, dioicous condition, leaf morphology, areolation, and growth form of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium alboviride Besch. *ex* Card., Rev. Bryol. Lichénol. 37: 69. 1910.

Type specimen (lectotype *des. mihi*) BM: *"Mexico, 1868, L. Hahn" s.n.* [!]

Plants slender, small-sized, yellow-green. Stems to 6.0 cm long, prostrate, terete, densely foliate, irregularly to subpinnately branched; branches to 0.8 cm long, terete ± tapering; central strand narrow; inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 0.9-1.4 (x=1.2) X 0.3-0.7 (x=0.5) mm, erect-imbricate when dry, erect to patent when moist, slightly concave and decurrent, not plicate, ovate to ovate-lanceolate, acuminate with apices ± twisted; margins reflexed at base, plane above, serrate at apices serrulate to near base; costae broad at base, tapering above and ending near middle (55%). Median leaf cells rhomboidal to linear 45.6-85.5 (x=64.6) X 5.7-8.0 (x=6.8) μm; apical cells similar 22.8-68.4 (x=49.8) X 4.6-11.4 (x=7.0) μm; basal cells irregularly rectangular 22.8-45.6 (x=35.2) X 8.0-14.8 (x=11.7) μm; alar cells lax, quadrate to rectangular and extending into decurrencies 17.1-34.2

(x=26.2) X 11.4-19.4 (x=13.7) μm. Dioicous. Perichaetia not observed. Perigonia pyriform, leaves ecostate, sheathing at base, outer leaves ovate-acute, inner leaves ovate and long-acuminate; margins plane, ± bordered by single row of rectangular cells in lower half. The rest unknown.

TYPIFICATION: The type of this species is an originally labeled specimen at BM and a presumed kleptotype at NY. An implicit holotype is not considered because of the lack of the cited specimen in Cardot's herbarium. I designate the specimen at BM as the lectotype because it fits the protologue and is most substantial. The specimen at NY is considered an isolectotype.

COMMENTS: The dioicous condition, leaf form, and areolation of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium albulum Besch. *ex* Card., Rev. Bryol. Lichénol. 37: 66. 1910.

Type specimen (lectotype *des. mihi*) PC: *"Mexico, Environs de Mexico herb. Bescherelle, L. Hahn" s.n.* [!]

Plants slender, medium-sized. Stems to 2.0 cm long, decumbent to erect, terete, densely foliate, irregularly branched; branches to 0.7 cm long, erect, terete, densely foliate; central strand narrow, inner cortex cells large and thin-walled, outer 2-3 layers of cells smaller and thick-walled; pseudoparaphyllia ovate-acuminate. Leaves 1.1-1.5 (x=1.3) X 0.6-0.8 (x=0.7) mm, erect-imbricate when dry, little change when moist, deeply concave, slightly decurrent, plicate, broadly ovate

to ovate, short acuminate with apices ± bent to one side; margins recurved at base, plane above, serrulate to serrate in upper portion smooth below; costae broad at base quickly tapering above and ending near middle (56%) in an inconspicuous spine. Median leaf cells fusiform to rhomboidal 35.3-68.4 (x=51.9) X 5.7-10.3 (x=7.0) μm; apical cells similar, fusiform 34.2-57.0 (x=47.0) X 4.6-6.8 (x=5.6) μm; basal cells lax, irregularly rectangular 28.5-54.7 (x=42.2) X 8.0-12.5 (x=10.9) μm; alar cells quadrate to rectangular, ± in rows, forming discrete groups 10.3-36.5 (x=21.8) X 12.5-18.2 (x=15.2) μm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate acuminate, inner leaves longer, slender long-acuminate; margins plane, entire and ± bordered by a single row of rectangular cells below. Perigonia not observed. Setae 7.0-11.0 (x=9.6) mm long, smooth, red-brown. Capsules 1.4-2.3 (x=1.7) X 0.5-0.7 (x= 0.6) mm, erect to slightly inclined, cylindrical, ± slightly curved, red-brown; exothecial cells rectangular, in rows, uniformly incrassate; annulus not differentiated; cilia not observed. Operculum 0.6-0.7 (x=0.6) X 0.5-0.6 (x=0.6) mm, conic, ± apiculate. Spores 14.3-17.6 (x=15.7) μm, finely papillose.

TYPIFICATION: The type of this species comprises four isotypic specimens, *"Mexico, Environs de Mexico, herb. Bescherelle, L. Hahn,"* one each in the herbaria at BM, FI, and NY, and two at PC. I designate one of the PC specimens as the lectotype because it fits the protologue description and is from Cardot's herbarium. Duplicate specimens at BM, FI, NY, and PC are considered isolectotypes.

COMMENTS: Brotherus (1925, p. 360) indicated that Cardot considered *Brachythecium tenuinerve* Card., *Brachythecium albulum* Besch. *ex* Card., and *Brachythecium lanceolifolium* Card., as synonyms of *Brachythecium acuminatum* (Hedw.) Aust. I interpret these three taxa as being synonymous with *Brachythecium stereopoma* (Spruce *ex* Mitt.) Jaeg. I consider the relationship of *B. stereopoma* to *B. acuminatum* to be tenuous since the former taxa differ from *B. acuminatum* in having cilia on the inner endostome, larger leaf cells, and much more slender costae.

The growth form, leaf morphology, and areolation and sporophyte characters of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium altarense Broth. *in* Meyer, Hoch Anden Ecuador. 518. 1907. *nom. nud.*

Cited specimen: "Ecuador, Altar, alt. 4000. Type."

COMMENTS: This binomial was published by Meyer in a list of his specimens identified by Brotherus. Although effectively published (ICBN 30.1), it is not validly published since it lacks a description (ICBN 32.1). Hence, *Brachythecium altarense* Broth. *in* Meyer is considered to be a *nom. nud.*

The four specimens I have seen of this taxon, from FI(2) and JE(2), are all from the same collection, "El Altar, Paramo-region. bei 4000 m, Seehole, July 1903, Herb. Theodor Herzog, *Hans Meyer 5430*." I refer these specimens to *Brachythecium austro-glareosum* (C. Müll.) Kindb., since their growth form, leaf morphology, areolation, autoicous

condition, and sporophyte characteristics fit within the range of variation I know for this species.

* * *

Brachythecium amazonicum C. Müll. *ex* Kindb., Enum. Bry. Exot., Suppl. 2. p. 97. 1891. *nom. nud.*

COMMENTS: This binomial was effectively published by Kindberg (ICBN 30.1), yet was never validly published for lack of a description (ICBN 32.1). Hence, *Brachythecium amazonicum* C. Müll. *ex* Kindb., is considered to be a *nom. nud.* Whereas several of Müller's binomials that appeared in Kindberg's "Enumeratio Bryinearum exoticarum" were later validly published, this binomial has never been validated. Since I have neither seen nor know of specimens of it, I have no concept for *Brachythecium amazonicum*. It must remain a *nom. nud. et nom. obsc.* for lack of any description or specimen reference material.

* * *

Brachythecium andrieuxii (Mont.) Besch., J. Bot. (Morot) 15: 385. 1901.

Cited specimens: "Entre Santa Lucia et San Mateo, 24 aout 1890, *P. Maury 3858*." [*non vidi*]

COMMENTS: In 1872 (p. 48) Bescherelle proposed the new combination *Rozea andrieuii* from *Hypnum andrieuxii* C. Müll. (Syn. 2: 348. 1851.) and *Isothecium andrieuxii* (C. Müll.) Mont. all of which are based on the same type, "Mexico, Oajaca, *Andrieux" s.n.* Later in 1901 (p. 385), Bescherelle noted that in the Montagne herbarium the *Isothecium andrieuxii* specimens were composed of two different elements. He considered one element to be the same as his previously published *Rozea* and the other element to be the same as the specimen which Müller (1851,

p. 348) had named *Hypnum andrieuxii* and Mitten (1869, p. 560) later called *Hypnum (Brachythecium) andrieuxii*. It was this latter element which inspired Bescherelle to propose the new combination *Brachythecium andrieuxii* based on "*Isothecium (Entodon) andrieuxii* Mont. *e parte; Hypnum andrieuxii* Müll., Syn. II p. 348 *ep.; Hypnum (Brachythecium) andrieuxii* Mitt." which he typified with a specimen different from the basionym.

In 1913 (p. 40) Cardot re-evaluated and commented on the confusion addressed by Bescherelle. Cardot implied that this situation was caused by a misidentification of specimens in the Montagne herbarium. It was from this misidentification that Bescherelle proposed the new name *B. andrieuxii*. Cardot considered Bescherelle's *B. andrieuxii* to be a "*nomen nudum*" since the basionym *Hypnum andrieuxii* C. Müll. should have been applied to *Rozea*, and since the protologue description was compatible with it, and not with *Brachythecium*. He also considered those specimens named *Hypnum (Brachythecium) andrieuxii* Mitt., and *Brachythecium andrieuxii* Besch. to be the same as his *Brachythecium tenuinerve* Card.

I have not seen any of the specimens involved in this controversy since PC (the herbaria of Cardot, Bescherelle, and Montagne) failed to send them to me. However, I have seen five specimens of the Andrieux collection from Oaxaca, Mexico, in the herbaria at BM(4) and G(1). One of the specimens from BM and the specimen from G are correctly labeled *Rozea andrieuxii*. The other three specimens from BM are labeled *Brachythecium andrieuxii*, which I consider to be *Brachythecium stereopoma* (Spruce *ex* Mitt.) Jaeg. (=*Brachythecium tenuinerve sensu*

Cardot). It is obvious that there are two elements to be found among the Andrieux's specimens from the type location for this species. Thus, the situation discovered by Bescherelle and discussed by Cardot is plausible. However, since Bescherelle based this new name on a previously valid description, he failed to typify it on an element (an Andrieux's specimen from Oaxaca, Mexico) from that description and is, therefore, in contravention to ICBN 32.1. Thus, *Brachythecium andrieuxii* Besch. is considered to be a *nom. nud.*

In their revision of the Genus *Rozea*, Buck and Crum (1976, p. 413) lectotypified *Hypnum andrieuxii* C. Müll. from an Andrieux specimen in the herbarium at NY. They used this name to propose *Rozea chrysea* var. *chrysea* f. *andrieuxii*. However, they did not comment on *Brachythecium andrieuxii* Besch. nor did they receive any specimens of this species from PC.

* * *

Brachythecium antarcticum Card., Rev. Bryol. Lichénol. 27: 6. 1900.

Type Specimen (lectotype *des. mihi*) PC: "Antarctique, Canal de la Belgica, XIeme debarquement, sur les corniches dela falaisa, 1 Feverier 1898, Herb J. Cardot. *Racovitza 232a.*" [!]

Plants medium-sized, yellow-green above, becoming darker below, densely tufted. Stems to 4.0 cm long, erect, terete, densely foliate above, becoming denuded and degenerate below, infrequently and irregularly branched. Branches to 2.0 cm long, erect, terete; central strand narrow, inner cortex cells large and thin-walled becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovoid ± erose. Leaves 2.3-2.8 (x=2.5) X 0.8-1.3 (x=1.1) mm, erect to

erect imbricate becoming more open and ± tumid when moist, concave, slightly decurrent ± with rounded auricles, not plicate, broadly ovate-cuspidate to ovate-lanceolate, short-acuminate, usually with abruptly constricted short apices; margins reflexed at base, plane above, ± serrulate in apices; costae broad at base gradually tapering and ending above middle (61%). Median leaf cells fusiform 62.7-96.9 (x=74.7) X 10.3-12.5 (x=11.4) μm; apical cells similar 57.0-91.2 (x=67.2) X 8.0-13.7 (x=11.2) μm; basal cells rectangular, ± pitted 45.6-102.6 (x=72.1) X 12.5-22.8 (x=18.24) μm; alar cells quadrate, forming distinct groups 13.7-30.8 (x=24.1) X 17.1-34.2 (x=21.3) μm. The rest unknown.

TYPIFICATION: The type of this species is represented by 10 syntypic specimens "Antarctique, Belge, detroit de Gerlache, XIme, *Racovitza" [230a, 232a, 232c, 233c, 234c*] in the herbaria at BR, FI, and H-BR, S(3), and PC(5). Cardot apparently favored *Racovitza* specimen 232a, since it was the only Racovitza specimen in his herbarium originally labeled *Brachythecium antarcticum* and distributed to other herbaria. The other four Racovitza specimens (230a, 233c, 232c, 234c) in his herbarium were originally named *Brachythecium georgico-glareosum*, a name marked out by a black ink line and replaced by the binomial *Brachythecium antarcticum*. I designate the *Racovitza 232a* specimen at PC as the lectotype since it fits the protologue description, is in the author's herbarium, and is most likely the original specimen first named by the author. Duplicates of this specimen in BR, FI, H-BR, and S(3) are considered isolectotypes. Racovitza 230a, 233c, 232c, 234c in Cardot's herbarium at PC are considered paratypes.

A *Racovitza 232a* specimen in Cardot's herbarium at PC labeled *Brachythecium antarcticum* var. *cavifolium* Card. is not considered a syntype of this species. It represents a paratype of *Brachythecium antarcticum* var. *cavifolium* (see typification of *B. antarcticum* var. *cavifolium*, below).

COMMENTS: In the protologue Cardot distinguished this taxon from *Brachythecium georgico-glareosum* (C. Müll.) Par., [=*Brachythecium austro-salebrosum* (C. Müll.) Par.] by its leaves being more lax and robust, less imbricate, with entire to slightly denticulate apices, and a more lax areolation. Newton (1979, p. 127) synonymized *B. antarcticum* Card. with *B. austro-salebrosum* (C. Müll.) Par. She considered the lax leaf areolation of *B. antarcticum* to be associated with its shorter leaves and more compact growth form; all of which fell within the range of variation she observed among specimens of *B. austro-salebrosum* from South Georgia. I concur with Newton's (*op. cit.*) assessment of this species and thus consider *B. antarcticum* Card. to be a synonym of *B. austro-salebrosum*.

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Brachythecium antarcticum var. ***cavifolium*** Card., Rev. Bryol. Lichénol. 27: 46. 1900.

Type Specimen (lectotype *des. mihi*): PC: "Antarctique, Canal de Gerlache, Voyage de la Belgica, Ier debarquement a la surface de l'argile milee de guano, 26 Janvier 1898, Herb. J. Cardot, *Racovitza 215a*." [!]

Plants small- to medium-sized, yellow-green, densely tufted. Stems 2.5 cm long, erect, densely foliate, terete, infrequently and

irregularly branched; branches to 0.5 cm long, erect, terete; central strand narrow, inner cortex cells large and thin-walled becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovoid ± erose. Leaves 1.8-2.6 (x=2.3) X 1.2-1.4 (x=1.3) mm, erect and imbricate when dry becoming more open and ± tumid when moist, deeply concave, slightly decurrent with ± small round auricles, not plicate, broadly ovate-cuspidate to broadly ovate and gradually acuminate, with ± short apices; margins reflexed at base, plane above, ± serrulate at apices; costae broad at base, gradually tapering, and ending above the middle (60%). Median leaf cells fusiform 57.0-91.2 (x=75.8) X 10.3-14.8 (x=12.3) μm; apical cells similar but shorter 45.6-68.4 (x=55.0) X 9.1-16.0 (x=12.5) μm; basal cells rectangular, ± pitted 39.9-85.5 (x=68.7) X 12.5-22.8 (x=18.4) μm; alar cells quadrate, forming distinct groups, 17.1-39.9 (x=25.4) X 17.1-28.5 (x=21.3) μm. The rest unknown.

TYPIFICATION: The type of this species is represented by 13 syntypic specimens "Antarctique, Belgica, detroit de Gerlache, Ier [*Racovitza 215a*], IXme [*Racovitza 151a, 205d*], et XIme [*Racovitza 232a*] debarquements" distributed at FI, H-BR, S(2), BR(4), and PC(5). I designate one of the two *Racovitza 215a* specimens in the Cardot herbarium at PC (distinguishable by being the smaller packet, 5.5 cm X 6.5 cm) as the lectotype since this specimen fits the protologue description, has more plant material, is in the author's herbarium, and was distributed from Cardot's herbarium to other herbaria. Duplicates of this specimen at BR, FI, H-BR, PC, and S(2) are considered to be isolectotypes. The other *Racovitza 151a, 205d, 232a* specimens at BR and PC are considered to be paratypes.

A sixth Racovitza specimen in Cardot's herbarium at PC (from Antarctica Canal Belgica) is not considered to be original material because the label lacks "debarquement" and a collection number.

Racovitza 232a specimens have been labeled and distributed under two names, *Brachythecium antarcticum* Card., and *Brachythecium antarcticum* var. *cavifolium* Card. The plant material in all packets I have examined is morphologically similar and compares favorably with the protologue description and syntypic specimens of *B. antarcticum*. However, a nomenclatural separation among these specimens is maintained, since Cardot named and labeled all of these specimens (labels are handwritten in Cardot's handwriting). Those specimens labeled *B. antarcticum* Card. represent the lectotype and isolectotypes of the autonomic variety and discussed in the typification of that taxon. Those specimens labeled *B. antarcticum* var. *cavifolium* Card., are considered paratypes of said variety.

COMMENTS: The growth form, leaf morphology, and areolation of this specimen fits within the accepted range of variation for *B. austro-salebrosum*. I concur with Newton (1979, p. 127) in considering *B. antarcticum* var. *cavifolium* Card., as a synonym of *B. austro-salebrosum*.

* * *

Brachythecium arenarium Card. et Broth., Kongl. Svenska Vetenskapsakad. Handl. 63(10): 68. 1923.

Type specimen (lectotype *des. mihi*) PC: "Patagonia, Territoria Santa Cruz, lieun sablonneux pres. du Rio Tarde, 1908. *T. Halle 829.*" [!]

Plants small-sized, soft, densely caespitose. Stems to 3.0 cm long, slender, prostrate to ascending, julaceous, irregularly branched; branches to 0.6 cm long, prostrate to ascending, unequal, julaceous; central strand narrow, inner cortex cells large, gradually becoming smaller and thick-walled toward stem surface; pseudoparaphyllia ovate. Leaves 0.7-1.6 (x=1.2) X 0.3-0.5 (x=0.4) mm, erect-imbricate when dry, erect-patent when moist, concave, slightly and shortly decurrent, not plicate, ovate-lanceolate, abruptly to gradually acuminate or elongate-triangular with long slender apices; branch leaves smaller and shorter, margins plane, sharply serrate above, serrate, serrulate or entire at base, teeth of longer leaves more distant; costae slender, ending near middle (52%). Median leaf cells fusiform 45.6-82.1 (x=63.2) X 4.6-9.1 (x=6.2) μm; apical cells similar 28.5-79.8 (x=50.2) X 4.6-9.1 (x=6.5) μm; basal cells irregular rectangular 12.5-34.2 (x=23.0) X 6.8-11.4 (x=8.3) μm; alar cells numerous, quadrate, forming several columns extending up the margins 6.8-17.1 (x=10.7) X 6.8-11.4 (x=9.3) μm. Autoicous. Perichaetia cylindrical, leaves ecostate, outer leaves short, ovate-acuminate, inner leaves longer, ovate, abruptly long-acuminate; margins plane, sharply serrate and ± bordered by a single row of rectangular cells. Perigonia pyriform, leaves ecostate, ovate-acuminate, margins plane, serrate and bordered by a single row of rectangular cells. The rest unknown.

TYPIFICATION: In the protologue two syntypic specimens are cited "Patagonia andies: Territ. Sta. Cruz. ad fl. Rio Tarde [829]; Lago San Martin, Cancha Rayada." The former specimen was collected by T. Halle and the latter specimen was collected by Skottsberg, number 428. I have

examined four duplicates of the former specimen, one each at PC and UPS and two at S, and one specimen of the latter collection from the herbarium at S. I designate the specimen at PC as the lectotype since it fits the protologue description and is from Cardot's herbarium. The other *Halle 829* specimens at S and UPS are considered isolectotypes. *Skottsberg 438* at S is considered a paratype.

COMMENTS: Cardot and Brotherus considered this species to be part of the section *Julacea*, with which I agree. Even though the lectotype and isolectotypes lack sporophytes, the autoicous condition, leaf morphology and growth form of this specimen are distinct, and fit within the accepted range of variation for *B. collinum*.

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Brachythecium argyrocaulon Dus. in Par., Ind. Bryol. ed. 2, 5: 148. 1906. *nom. nud.*

Cited specimen (Exsiccate): "Dusén M. Amer. austr. n. 426. Terr. Am. merid.: W. Patagon." [!]

COMMENTS: This binomial was effectively published since specimens were distributed with printed labels and the name was cited in Paris (1906, p. 148) (ICBN 23.1). However, the name was never validly published since it lacks a description (ICBN 32.1) and is, therefore, a *nom. nud.*

The 11 *Dusén 426* specimens labeled "Patagonia occ. in valle fl. Aysen in terra." represent two different elements. Exsiccate specimens at GB, JE, M(2), PC, S(3) and US collected on "Jan. 11 a. 1897," are all referred to *Brachythecium rutabulum*. All of these specimens have printed exsiccate labels except the one at US, which has a Müller

herbarium label. Two additional specimens (one *sine numero*), deposited at S, collected "Jan. 5, 1897," are referred to *Brachythecium subplicatum*. Both of these latter specimens have handwritten labels; the one with 426 is written in Dusén's cursive style. Given the above information, and the present faded colored condition of all the specimens, it is difficult to know what Dusén saw as "*argyrocaulon*" (silvery stems). Validation of this name by either of the two elements represented in the cited exsiccate would serve no purpose since it would create a taxonomically superfluous name that would immediately become a synonym.

* * *

Brachythecium asperulum (Hamp.) Jaeg., Ber. Thätigk. St. Gallischen. Naturwiss. Ges. 1876-77: 332. 1878. (Ad. 2: 398.)

Basionym: *(Ptycho) Hypnum asperulum* Hamp., Linnaea 32: 159. 1863.

Type specimen (lectotype *des. mihi*) BM: "Nova Granada, Bogota Los Lache ad rip. feau. 2800 meters, June 1860, Herb. Hampe-1881, *Lindig 2077*. [!]

Plants medium-sized forming dense mats, olive-green in younger portions becoming brownish in older portions. Stems to 3.0 cm long, prostrate to ascending or erect, terete, infrequently and irregularly branched, branches 2.0 cm long, erect, terete; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller and thick-walled toward stem surface; pseudoparaphyllia not observed. Leaves 1.3-1.7 (x=1.5) X 0.5-1.0 (x=0.7) mm, imbricate to erect when dry, patent when moist, secund in younger portions, concave, with short decurrencies, not plicate, ovate, short-acuminate, or acute and

apiculate or lanceolate-acuminate, rounded at base to insertion; margins reflexed at base, plane above, entire; costae broad at base, gradually tapering above with occasionally short, lateral spurs, ending above midleaf (63%). Median leaf cells fusiform to linear 45.6-77.5 (x=61.8) X 5.7-8.0 (x=6.4) μm; apical cells shorter and fusiform 34.2-52.4 (x=39.8) X 5.7-11.4 (x=7.4) μm; basal cells gradually becoming lax, fusiform to rectangular 34.2-57.0 (x=43.8) X 6.8-16.0 (x=10.9) μm; alar cells quadrate to rectangular in inconspicuous groups, 14.8-29.6 (x=22.7) X 11.4-18.2 (x=13.9) μm. Autoicous. Perichaetia cylindrical, leaves sheathing at base, ecostate, outer leaves appressed, acute to short-acuminate, inner leaves long-acuminate, margins plane, not bordered. Perigonia cylindrical, leaves ecostate, outer leaves ovate, inner leaves ovate, apiculate to short-acuminate; margins plane, bordered with a singled row of cells along lower portions. Setae 17.0-19.0 (x=17.6) mm long, dark red-brown with low, dense papillae above, gradually becoming nearly smooth at base. Capsules 1.5-1.9 (x=1.7) X 0.6-1.0 (x=0.9) mm, suberect to horizontal, oblong-ovoid, red-brown; exothecial cells in vertical rows, quadrate to rectangular, walls uniformly thickened; annulus of 1-2 rows of narrow cells; cilia nodose to appendiculae, 1-3; operculum 0.9 mm long, conic, acute. Spores 16.0-22.8 (x=19.4) μm, smooth.

TYPIFICATION: The type of this species is represented by 14 syntypic specimens "Nova Grande, Bogota Chapinero et Los Lanches ad rivulos, 2700-2800 metr, Jun-October, *Dr. Alexandro Lindigio 2048 and 2077*," one syntype at FH, H-BR, M, MPU, PC, S, US, two at GOET, and five at BM. These specimens are marked with the collection numbers 2048, or

2077, or have both 2048 and 2077 on the label. In the author's herbarium at BM eight specimens are glued to a single herbarium sheet. Five are syntypic. I designate the Lindig specimen 2077 (from BM) at the bottom left corner of this herbarium sheet as the lectotype since it is from the author's herbarium, fits the protologue description, and has adequate gametophytic and sporophytic plant material. Duplicates of this specimen at BM(2), as well as the specimens with the dual collection numbers 2048 and 2077 at BM, FH, GOET(2), M, PC, and US, are considered isolectotypes. Specimens of *Lindig 2048* at BM, H-BR, MPU, and S are considered paratypes.

COMMENTS: The lectotype specimen consists of two elements *Rhynchostegium (Eurhynchium) riparioides* (Hedw.) Card. and *Brachythecium asperulum*. All of the sporophytes and the bulk of the gametophytic material in this specimen belong to the latter species.

The species epithet *asperulum* has been widely used in naming specimens from Colombia, Ecuador, Peru, and Tristan de Cunha. The growth form, the leave shape and areolation, and sporophytic characters of this specimen fall with in the accepted range of variation for *B. plumosum sensu lato*. I concur with Mitten (1869, p. 565) in considering *B. asperulum* synonymous with *B. plumosum*.

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Brachythecium austro-glareosum (C. Müll.) Kindb., Enum. Bry. Exot., Suppl. 2. p. 87. 1891.

Basionym: *Hypnum* (*Brachythecium*) *austro-glareosum* C. Müll., Bot. Jahrb. Syst. 5: 82. 1883.

Type specimen (lectotype *des. mihi*) H-BR: "Kerguelen Islands, Dec. 1874, *Naumann*" *s.n.* [!]

Plants medium- to robust-sized, pale yellow-green above brownish below. Stems to 6.5 cm long, erect, julaceous, apices tapering, irregularly branched; branches to 4.0 cm long, erect, julaceous, apices tapering; central strand narrow, inner cortex cells large and thin-walled, becoming smaller with slightly thickened walls at stem surface; pseudoparaphyllia orbicular. Leaves 1.7-2.7 (x=2.5) X 0.5-0.8 (x=0.7) mm, erect-imbricate to erect-patent when dry, becoming more open when moist, slightly concave and decurrent, strongly plicate, triangular to lanceolate long-acuminate; margin reflexed at base, plane above, serrulate in upper half, smooth below; costae broad at base, gradually tapering, ending above middle (61%). Median leaf cells linear with slightly thickened and pitted walls 74.1-116.3 (x=93.1) X 6.8-9.1 (x=7.6) μm; apical cells similar and shorter 62.7-96.9 (x=80.0) X 5.7-9.1 (x=7.2) μm; basal cells elongate ovate to rectangular, with thickened and pitted walls 22.8-59.3 (x=42.4) X 9.1-18.2 (x=13.7) μm; alar cells in a distinct group, forming columns 4-10 cells high between margins and plicae 13.7-26.2 (x=19.5) X 10.3-17.1 (x=12.9) μm. Autoicous. Perichaetia cylindrical, leaves ecostate, outer leaves ovate-acute, inner leaves longer acuminate; margins plane, not bordered. Perigonia pyriform, leaves ecostate, outer leaves orbicular, inner leaves ovate-acute to abruptly long-acuminate; margins plane, not bordered. The rest unknown.

TYPIFICATION: Because of the brevity of information given by the protologue, "Kerguelen Islands, *Naumann*" and from labels of the six type

specimens (one specimen each in the herbaria at BM, G, H-BR, JE, and WU and two at S) made available to me, it cannot be determined if they are from the same collection or from a series of collections. I have treated them as syntypes. With the loss of C. Müller's original herbarium at B, I designate the specimen at H-BR as the lectotype since this specimen fits the protologue description and has the largest portion of plant material. Other specimens at BM, G, S(2), and WU are considered to be paratypes. The specimen at JE is referred to the *Amblystegiaceae*.

COMMENTS: In the protologue Müller contrasted this species to *Brachythecium glareosum* (Spruc.) B.S.G., hence, its name. He considered this species to be distinct from *B. glareosum* by its smaller size, narrower and straighter leaves, stronger plicae, and denser reticulation. The two species also differ in *B. glareosum* being dioicous and this species being autoicous. The growth form, leaf morphology, and areolation are similar to that found in other species of the section *Albicans*, of which I consider it to be a member.

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Brachythecium austro-glareosum var. ***diffusum*** Card., Rev. Bryol. Lichéol 38(1): 127. 1911.

Type specimen (lectotype *des. mihi*) H-BR: "Antarctique, Baie Marguerite. Ile Jenny, dans une grotte humide, alt. 80 m., 2^{ieme} Chariot, 30/1/1909, *Gain 249*." [!]

Plants small- to medium-sized, dull yellow-green, densely tufted. Stems to 4.0 cm long, erect, terete with tapered apices, irregularly branched; branches to 0.6 cm long, erect, terete with tapered apices;

central strand narrow, inner cortex cells large and thin-walled, becoming smaller with slightly thickened walls at stem surface; pseudoparaphyllia ovate-acute. Leaves 1.3-2.4 (x=2.0) X 0.6-0.9 (x=0.8) mm, erect-imbricate to erect-patent when dry, becoming more open when moist, slightly concave, decurrent, ± plicate, ovate-lanceolate to lanceolate, long-acuminate; margins reflexed at base and ± in apices, plane above, entire; costae broad at base, gradually tapering and ending above middle (60%), ± keeled. Median leaf cells fusiform to linear 68.4-93.5 (x=79.9) X 5.7-11.4 (x=8.2) μm; apical cells similar and shorter 57.0-91.2 (x=73.5) X 5.7-9.1 (x=7.3) μm; basal cells elongate, ovate to rectangular with thickened and pitted walls 29.6-68.4 (x=42.3) X 11.4-20.5 (x=15.7) μm; alar cells in a distinct groups, in columns of 4-10 cells high between the margins and outer plicae 11.4-47.9 (x=21.4) X 8.0-19.4 (x=14.1) μm. The rest unknown.

TYPIFICATION: The type of this species is represented by 10 isotypic specimens "Antarctique, Baie Marguerite, ile Jenny *Gain*" in the herbaria at H-BR, S, PC(3), and BM(5). I designate one of the specimens (packet is 11.2 X 10.8 cm, and has "Herb. J. Card." rubber-stamped in black ink at the front bottom right) in the herbarium at PC as the lectotype, since it fits the protologue description and is from Cardot's herbarium. All other duplicates of this specimen are considered to be isolectotypes.

COMMENTS: The growth form, leaf morphology and areolation of this specimen fit within the accepted range of variation for *B. austro-glareosum*. I concur with Newton (1979, p. 130) in considering *B.*

austro-glareosum var. *diffusum* to be a taxonomic synonym of *B. austro-glareosum*.

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Brachythecium austro-salebrosum (C. Müll.) Kindb., Enum. Bry. Exot., Suppl. 2. p. 97. 1891.

Basionym: *Hypnum (Brachythecium) austro-salebrosum* C. Müll., Bot. Jahrb. Syst. 5: 82. 1883.

Type specimen (lectotype *des. mihi*) WU: "Kerguelen Island, 1875, *Naumann*" *s.n.* [!]

Plants medium-sized, pale yellow-green to light green, in loose intertwined mats. Stems to 4.0 cm long, terete, densely foliate in younger portions, leaves becoming more distant and denuded in in older portion, prostrate or decumbent, with tufted rhizoids where attached to substrate, apices tapering, subpinnately to irregularly branched; branches to 2.0 cm long, erect, julaceous, apices tapering; central strand narrow, inner cortex cells large and thin-walled, becoming smaller with thickened walls at stem surface; pseudoparaphyllia ovate-acute. Leaves 1.9-2.4 (x=2.2) X 0.9-1.0 (x=1.0) mm, erect to erect-patent when dry, becoming more open when moist, tightly appressed-imbricate at stem and branch apices, concave, slightly decurrent and ± with small round auricles, weakly plicate, ovate to ovate-lanceolate, abruptly or gradually short-acuminate; margins reflexed at base, plane above, entire; costae broad at base, narrower and gradually tapering above, ending near middle (56%). Median leaf cells fusiform to long rhomboidal 74.1-125.4 (x=97.1) X 8.0-12.5 (x=9.8) µm; apical cells similar and shorter 47.9-82.1 (x=67.7) X 8.0-11.4 (x=9.8) µm; basal

cells rectangular, with thickened and pitted walls 22.8-68.4 (x=56.2) X 13.7-22.8 (x=17.2) µm; alar cells quadrate to rectangular, in weakly defined groups, 17.1-34.2 (x=26.7) X 11.4-22.8 (x=18.6) µm. The rest unknown.

TYPIFICATION: The information given in the protologue, "Kerguelen Islands, *Naumann*," is too brief to positively determine if one or more of the six specimens BM, JE, S(3), WU are isotypes from Müller's herbarium at B. Since there are two collection dates for these specimens and slight variations in the growth forms among them, I have treated them as syntypes. Although several of the syntypes indicate they originated from the Berlin herbarium, these specimens are only scraps. I designate the specimen at WU (date, 1875) as the lectotype since it fits the protologue description and contains more plant material than any of the duplicate specimens. A duplicate of this specimen at S is considered an isolectotype. The three specimens collected in 1874 from BM and S(2) are considered to be paratypes. The specimen at JE, collected in 1875 (same year as the lectotype), differs slightly in growth form, and is regarded only as a paratype.

COMMENTS: In the protologue Müller compared this species with *Brachythecium salebrosum* (Web. *et* Mohr) B.S.G., hence, its name. He considered this species to be distinct from *B. salebrosum* by its larger compressed rigid stems with leaves having entire margins, short cuspidate apices and larger alar cells. The growth form, leaf morphology, and areolation are similar to that found in other species of the section *Salebrosa* of which I consider it to be a member.

* * *

Brachythecium bolivio-plumosum C. Müll., Nuovo Giorn. Bot. Ital. n. ser. 4(2): 154. 1897.

Type specimen (lectotype *des. mihi*) FI: "Bolivia, provinciae Cochabamba, prope Choquecamata, Jun 1889, *Germain 1155*." [!]

Plants medium-sized, yellow-brown in younger portions, becoming brownish in older portions. Stems to 7.0 cm long, prostrate to ascending, terete, irregularly branched; branches to 1.5 cm long, erect, terete; central strand narrow, inner cortex cells large and thin-walled, outer two layers of cells small and thick-walled; pseudoparaphyllia orbicular. Leaves, 1.4-1.9 (x=1.6) X 0.6-0.8 (x=0.6) mm, imbricately appressed to erect when dry, patent when moist, concave, short decurrent, not plicate, ovate to lanceolate, narrowly acute to short-acuminate, abruptly ending, older leaves broader at base and rounded into the insertion; margins reflexed at base, plane above, smooth to serrulate in apices; costae broad at base, gradually tapering, occasionally with short lateral spurs, ending above midleaf (69%). Median leaf cells fusiform to linear 45.6-115.1 (x=71.4) X 4.6-6.8 (x=6.3) µm; apical cells shorter fusiform 22.8-82.1 (x=41.2) X 4.6-9.1 (x=6.8) µm; basal cells becoming lax and fusiform to irregularly rectangular 25.1-51.3 (x=36.9) X 8.0-20.5 (x=13.5) µm; alar cells inconspicuous, quadrate to rectangular 8.0-37.6 (x=21.0) X 9.1-16.0 (x=12.5) µm. Autoicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves appressed, acute to short-acuminate, inner leaves long acuminate; margins bordered with single row of rectangular cells. Perigonia cylindrical, leaves ecostate, outer leaves ovate, inner leaves ovate-apiculate to short-acuminate; margins bordered

by a single row of rectangular cells in lower portions. Setae 14.0-19.0 (x=17.6) mm long, dark red-brown with low, dense papillae above, becoming nearly smooth at base. Capsules 1.3-1.6 (x=1.4) X 0.5-0.8 (x=0.7) mm, suberect to horizontal, oblong-ovoid red-brown; exothecial cells in ± vertical rows, irregularly quadrate and/or rectangular, walls uniformly thickened; annulus a single row of narrow cells; operculum 0.6-0.7 (x=0.6) X 0.5-0.9 (x=0.7) mm, conic-acute. Peristome and spores not observed.

TYPIFICATION: Müller's introduction (1897, fasc. I, p. 5) stated that specimens used to prepare descriptions were Germain collections from, "*Bolivia provincia Cochabamba prop. Choquecamata 1889*," in the Levier Herbarium at FI. With the loss of the Müller's herbarium at B, it is unknown if Müller retained the original specimens in his herbarium or if he returned them to FI.

The type of this species is represented by eight isotypic specimens, one each in the herbaria at FI, G, H, JE, M, NY, PC, and S. I designate the specimen at FI as the lectotype since it fits the protologue and is from Levier's herbarium. Duplicate specimens at G, H, JE, M, NY, PC, and S, all *ex.* herb. E. Levier, are considered isolectotypes.

COMMENTS: The growth form, leaf morphology, areolation and sporophyte characters of this specimen do not distinguish it from *B. plumosum sensu lato*.

* * *

Brachythecium brunneo-alar (C. Müll.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 321. 1878. (Ad. 2: 387.)

Basionym: *Hypnum* (*Brachythecium*) *brunneo-alar* Linnaea 38: 654-655. 1874.

Type specimen (lectotype *des. mihi*) NY: "Mexico, Im Magdalenenthal bei Mexico, 1869, *L. Hahn*" *s.n.* [!]

Plants medium-sized, yellow-brown in younger portions becoming brownish in older portions. Stems to 1.5 cm long, prostrate to ascending, terete, irregularly branched; branches to 0.5 cm long, erect, terete; central strand narrow, inner cortex cells large and thin-walled, outer two layers of cells small and thick-walled; pseudoparaphyllia orbicular. Leaves 0.9-1.3 (x=1.2) X 0.4-0.7 (x=0.5) mm, imbricately appressed to erect when dry, patent when moist, concave, short-decurrent, not plicate, ovate to lanceolate narrowly acute to short-acuminate, abruptly ending; margins reflexed at base, plane above, smooth to serrulate in apices; costae broad at base, gradually tapering above and ending above midleaf (54%), occasionally with short lateral spurs. Median leaf cells fusiform to linear 28.5-68.4 (x=46.4) X 5.7-6.8 (x=5.3) μm; apical cells similar 28.5-68.4 (x=36.8) X 5.7-8.0 (x=6.6) μm; basal cells fusiform to irregularly rectangular 20.5-47.9 (x=33.7) X 8.0-22.8 (x=15.7) μm; alar cells quadrate to rectangular, in an inconspicuous group 11.4-28.5 (x=19.3) X 8.0-17.1 (x=13.0) μm. Perichaetia present but for preservation not examined. Perigonia not observed. Setae 14.0 mm long, dark red-brown, with low, dense papillae above and becoming nearly smooth at base. Capsules 1.5 X 0.8 mm, horizontal, oblong-ovoid, red-brown; exothecial cells in ± vertical rows, irregularly quadrate and/or rectangular, walls uniformly thickened; annulus differentiated of 1 row of cells; operculum 0.8 X 0.8

mm, conic-acute; spores 13.6-18.2 (x=16.3) μm, finely papillose. Peristome not observed.

TYPIFICATION: The type of this species is represented by two isotypic specimens "Mexico, forsan in vicinia urbis Mexico, 1869, *L. Hahn*," one each in the herbarium at BM and NY. Each specimen has three plant fragments glued to a card. However, the three plant fragments at BM do not fit the protologue description and are referred to *Rhynchostegium riparioides* (Hedw.) Card., whereas, the three plant fragments at NY consist of two different elements, one which complies with the protologue description and the other which I refer to *Rhynchostegium riparioides* (Hedw.) Card. With the loss of Müller's herbarium at B, I designate the plant fragments (plant fragment on the left side and a portion of the plant fragment on the right side of the card to which they are glued) of the specimen at NY as the lectotype. The specimen at BM is of no type status since the plant fragments do not represent the protologue.

COMMENTS: In the protologue description, Müller indicated this species as monoicous. For purposes of preservation I did not attempt confirmation on the fragile plant remains of this type.

The growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. plumosum sensu lato*.

* * *

Brachythecium byssicladum *nom. inval. err. cit. pro.*

COMMENTS: Dusén originally published the binomial *Rhynchostegium byssicladum* (Rep. Princeton Univ. Exp. Patag. 8: 125. 1903) which has

been incorrectly listed in Index Muscorum (1959, vol. 1, p. 205) as "*Brachythecium byssicladum* Dus., Rep. Princeton Univ. Exp. Patag. 8: 125. 1903." Both binomials were effectively published (ICBN 30.1); however, neither one was validly published. *Brachythecium byssicladum* is in contravention to ICBN 34.1. *Rhynchostegium byssicladum* Dus. is in contravention to ICBN 32.1 since it lacks a description and is considered to be a *nom. nud.*

* * *

Brachythecium calerae (C. Müll.) Kindb., Enum. Bry. Exot. p. 7. 1888.

Basionym: *Hypnum (Brachythecium) calerae* C. Müll., Linnaea 42: 452. 1879.

Type specimen (lectotype *des. mihi*) NY: "Argentina Cordobensis, Sierra de Cordoba an der Calera, Sept. 1871, *P. G. Lorentz*" *s.n.* [!]

Plants slender, small-sized, yellow-green, forming a loose mat. Stems to 4.0 cm long, prostrate, terete, moderately foliate, subpinnately branched; branches to 0.5 cm long, unequal, terete, ± ascending, tapering; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 0.8-1.3 (x=1.0) X 0.4-0.7 (x=0.5) mm, erect-imbricate when dry, erect to patent when moist, concave, decurrent, plicate, ovate to ovate-lanceolate, acuminate; margins reflexed at base, plane above, serrulate in upper 2/3, older leaves nearly entire; costae broad at base, tapering above, ending near middle (56%). Median leaf cells rhomboidal to linear 39.9-57.0 (x=51.9) X 5.7-9.1 (x=7.0) μm; apical cells similar 41.0-62.7 (x=53.9) X 4.6-6.8 (x=6.4) μm; basal cells irregularly rectangular 22.8-

45.6 (x=34.5) X 9.1-17.1 (x=11.3) µm; alar cells lax, quadrate to rectangular 11.4-22.8 (x=18.7) X 11.4-17.1 (x=13.8) µm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate, long-acuminate, inner leaves longer, slenderly acuminate; margins plane, entire, and bordered by a single row of rectangular cells below. The rest unknown.

TYPIFICATION: The type of this species is represented by four isotypic specimens, "Argentinia Cordobensis, Sierra de Cordoba an der Calera, Sptbr. 1871 *Lorentz*," one in the herbarium at NY and three in the herbarium at S. With the loss of Müller's original herbarium at B, I designate the specimen at NY as the lectotype. This specimen best represents the species as a lectotype since it fits the protologue description, and was originally from the herbarium at B. Duplicate specimens at S(3) are considered isolectotypes.

COMMENTS: The growth form, leaf morphology, areolation and dioicous condition, of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium calliergonoides Broth. in Herz., Biblioth. Bot. 87: 161. 1916.

Type specimen (lectotype *des. mihi*) H-BR: "Laguna verde, uber Comarapa, alt. 2600 m, *Th. Herzog 4291*," Bolivia. [!]

Plants medium-sized, caespitose. Stems erect to ascending, to 8.0 cm long, terete, older portions light brown, 1 to 3 cm long densely foliate, younger portions light green, etiolated, loosely foliate; branches infrequent, unequal, terete up to 2 cm long; central strand

narrow, inner cortex cells large, gradually becoming smaller toward stem surface; pseudoparaphyllia orbicular. Leaves 2.2-2.5 (x=2.3) X 0.7-0.9 (x=0.8) mm, erect-imbricate when dry, becoming erect when moist, concave, slightly decurrent, not plicate, ovate to lanceolate, acuminate to a slender ± flexuose, ± half twisted 0.4-0.5 (x=0.5) apices; margins plane and entire throughout; costae, broad at base, rapidly tapering above, ± with occasional short lateral spurs and ending near midleaf (55%). Median leaf cells linear, 79.8-210.9 (x=134.2) X 5.7-11.4 (x=8.6) μm; apical cells slightly shorter, 62.7-114.0 (x=83.4) X 5.7-9.1 (x=7.6) μm, basal cells lax and rectangular, 57.0-125.4 (x=78.7) X 13.7-25.1 (x=17.2) μm; alar cells quadrate to rectangular, 17.1-62.7 (x=38.4) X 17.1-28.4 (x=22.6) μm. The rest unknown.

TYPIFICATION: This species is represented by nine isotypic specimens, "Bolivia, Laguna verde uber Comarapa, alt. 2600 m *Th. Herzog 4291*," one each from the herbaria at FH, FI, G, H-BR, JE, L, M, PC, and S. The label on the one specimen in Brotherus's herbarium (H-BR) is written in Herzog's cursive style and was originally labeled "*Brachythecium subplicatum* (Hpe.) Tayl." This name was lined-out and replaced with "*calliergonoides* Broth. *n. sp.*" written in Brotherus's cursive style. I assume Herzog sent this specimen to Brotherus, who then gave it his new name. However, I do not consider this specimen to be an implicit holotype since there is insufficient proof of it being the one specimen used by the author (ICBN 7.3). I designate this specimen as the lectotype since it fits the protologue and is found in Brotherus's herbarium. Duplicate specimens of this collection at FH, FI, G, JE, L, M, PC, and S are considered to be isolectotypes.

COMMENTS: Brotherus commented on the similarity in growth form of this species and that of slender forms of *Calliergon cordifolium* (Hedw.) Kindb., hence, the epithet of *B. calliergonoides*. I hesitate to give this species sectional placement in *Brachythecium* as discussed on page 211.

* * *

Brachythecium camptocladum Besch. in Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 333. 1878. (Ad. 2: 399) *nom. nud.*

Cited specimen: "America central., in regione Mexicens, 1868, *L. Hahn*" *s.n.* [!]

COMMENTS: This binomial is effectively published (ICBN 30.1), yet it is not validly published since it lacks a description (ICBN 32.1). *Brachythecium camptocladum* is considered to be *nom. nud.*

Specimens of *L. Hahn s.n.* that I have seen under this name in the following herbaria are all referred to as *Brachythecium plumosum* (Hedw.) B.S.G. *sensu lato*: BM(2), FI, NY, and PC.

* * *

Brachythecium cavifolium Herz., Biblioth. Bot. 87: 159. 1916.

Type specimen (lectotype *des. mihi*) JE: "An nassen Granitfelsen im Hochtal von Choquecota chico, ca. 4600 m, Oktober 1911, *Th. Herzog 3175*." [!]

Plants medium-sized, caespitose, pale yellow to yellow-green, sun-exposed portion of leaves with a reddish gold tinge. Stems prostrate or ascending, julaceous and turgid, densely foliate to 3.0 cm long, bluntly tipped, infrequently and irregularly branched; branches to 1.5 cm long, erect, julaceous; central strand narrow, inner cortex cells large,

gradually becoming smaller and thick-walled toward stem surface; pseudoparaphyllia orbicular. Leaves 1.3-1.8 (x=1.6) X 0.5-0.9 (x=0.8) mm, imbricate when dry, patent when moist, concave to cochleariform with prominent decurrencies, not plicate, ovate-acute, apiculate to ovate, short-acuminate, apices 0.25-0.2 (x=0.22) mm long ± reflexed, ± twisted, and margins reflexed at base, plane above, entire; costae broad at base, tapering and having occasional short lateral spurs, ending near apices (70%). Median leaf cells fusiform to linear 68.4-114.0 (x=82.2) X 6.8-12.5 (x=9.8) µm; apical cells becoming gradually shorter 30.8-68.4 (x=51.2) X 6.8-11.4 (x=9.2) µm; basal cells hexagonal to rectangular, walls ± pitted 45.6-79.8 (x=62.1) X 14.8-26.2 (x=19.7) µm; alar cells quadrate to rectangular, extending into decurrencies, 28.5-51.3 (x=37.6) X 11.4-25.1 (x=19.7). The rest unknown.

TYPIFICATION: The type of this species consists of five isotypic specimens, "An nassen Granitfelsen im Hochtal von Choquecote chico (Quimzacruz), ca. 4600 m, *Herzog 3175*," one each in the herbaria at H, JE, L, M, and S. I designate the single specimen in Herzog's herbarium (JE) as the lectotype since it fits the protologue description and is from the author's herbarium. Duplicates of this specimen at H, L, M, and S are considered isolectotypes.

COMMENTS: This taxon is only known from its type specimen. Because of its unusual morphology and lack of sporophyte characters, its sectional placement in *Brachythecium* is uncertain. Further comments on this species can be found on page 214.

* * *

Brachythecium chocayae Herz., Biblioth. Bot. 87: 160. 1916.

Type specimen (lectotype *des. mihi*) JE: "Bolivia, Im unteren Chocayatal, ca. 1300m, *Herzog 3616*." [!]

Plants medium-sized, pale yellow and glossy. Stems to 5.5 cm long, decumbent, terete, densely foliate, rhizoids tufted, irregularly branched; branches to 2 cm long, of unequal length, tapering, terete; central strand narrow, inner cortex cells large, gradually becoming smaller and thick-walled toward stem surface; pseudoparaphyllia ovate-acuminate. Leaves 2.0-2.8 (x=2.3) X 0.7-1.3 (x=1.0) mm, erect when dry, becoming more open when moist, concave, slightly decurrent, plicate, ovate-acuminate, apices slender, ± half-twisted; margins reflexed at decurrencies, plane and serrulate to serrate above, entire below; costae broad at base, tapering above, ending above the middle (63%) ± in an inconspicuous dorsal spine; branch leaves similar but smaller, narrower, and more serrate along upper margins. Median leaf cells linear, 79.8-114.0 (x=93.9) X 6.8-10.3 (x=7.9) μm; apical cells smaller 52.4-108.3 (x=77.1) X 5.7-9.1 (x=7.4) μm; basal cells rectangular to hexagonal with slightly pitted walls 28.5-62.7 (x=46.5) X 11.4-22.8 (x=13.7) μm; alar cells forming distinct clusters of quadrate to rectangular cells 11.4-36.5 (x=25.4) X 13.7-30.8 (x=19.6) μm. Autoicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate-acute, inner leaves longer, slenderly acuminate, apices ± reflexed; margins plane and entire, lower portions bordered by a single row of rectangular cells. Perigonia ovoid, leaves similar to perichaetial leaves but shorter. Setae red-brown with low, rounded papillae scattered along the length, 14.0-20.0 (x=18.3) mm. Capsules 1.7-2.3

(x=2.1) X 0.6-0.9 (x=0.7) mm, cylindrical and inclined to horizontal, light brown; exothecial cells arranged in vertical rows, rectangular to quadrate with lateral walls thicker than end walls; annulus differentiated, in 1-2 rows of cells; operculum conic-apiculate with a darkened apex, 0.7-0.9 (x=0.8) X 0.6-0.8 (x=0.75) mm; cilia rudimentary or 1-3, nodose. Spores 12.5-16.0 (x=14.5) μm, finely granular to nearly smooth.

TYPIFICATION: The type of this species is represented by eight syntypic specimens, one each of "Bolivia, Im unter Chocayatal, ca. 3100 m, *Herzog 3616*" at FH, H, JE, M, PC, and WU, and one of "Bolivia, in der Quebraba de Pocona, ca. 2800 m, *Herzog 3468*" at JE. I designate the Herzog specimen 3616 at JE as the lectotype since it fits the protologue description, is in the Herzog herbarium, has the greater number of complete sporophytes, and is the specimen Herzog distributed to other herbaria to represent the species. Duplicates of 3616 at FH, H, M, L, PC, and WU are considered to be isolectotypes and specimen 3468 at JE represents a paratype.

COMMENTS: The growth form, leaf morphology, areolation, and sporophyte characters of this specimen greatly resemble *Brachythecium rutabulum* (Hedw.) B.S.G. However, the long-twisted acumina, the lack of the lax basal and alar cells, and the low dispersed papillae of the setae make it distinct. Hence, I concur with Herzog (1916, p. 87) in placing this species in the section *Brachythecia* (=section *Rutabula fide* Herzog).

* * *

Brachythecium chrysocladon (Hamp.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 338. 1878. (Ad. 2: 404).

Basionym: *Hypnum chrysocladon* Hamp., Ann. Sci. Nat. Bot. ser. 5, 5: 341. 1866.

Type specimen (lectotype, *des. mihi*): BM: "Nova Granada Bogota, Hampe Herb." *sine collector et numero*. [!]

Plants medium-sized, yellow-golden to yellow-green, ± shiny, in dense mats. Stems prostrate, 1.0-5.0 cm long, terete, with tufted rhizoids, subpinnately branched; branches to 1.0 cm long, prostrate, terete; central strand narrow, outer cortex cells narrow, walls thickened; pseudoparaphyllia ovate. Leaves 1.1-1.7 (x=1.4) X 0.4-1.0 (x=0.6) mm; older leaves distant, erect, concave, slightly decurrent, not plicate, ovate-acuminate with short abruptly ending apices; younger leaves densely foliate, appressed-imbricate, lanceolate and narrowly acute to acuminate; margins plane, ± serrulate at apex; costae broad at base, tapering above, disappearing near middle (58%); median cells fusiform to rhomboidal, occasionally becoming linear, 22.8-68.4 (x=47.3) X 4.6-6.8 (x=6.4) µm; apical cells shorter, 22.8-45.6 (x=37.4) X 5.7-9.1 (x=7.3) µm; basal cells linear to rectangular, ± pitted, 25.1-59.3 (x=40.9) X 9.1-19.4 (x=12.5) µm; alar cells rectangular, in a distinct group, 17.1-51.3 (x=25.3) X 6.8-13.7 (x=10.3) µm. The rest unknown.

TYPIFICATION: In the protologue Hampe cited a specimen "Bogotam, 2600 met, sterile leg. Cuervo." In Hampe's herbarium (BM) there is only one specimen of this taxon. The label data on this specimen includes three taxonomic names. The first, *Hypnum aurescens*, has the species epithet crossed-out and a second epithet *chrysocladon* written above it.

The third name, *Hypnum duriusculum* Schp. and the location "Nova Granada Bogota," is handwritten on a separate piece of paper and glued to the sheet above the other two names. In addition, a handwritten description (presumably Hampe's), worded much like the protologue description, is attached to the specimen sheet. The cursive style of the handwritten description and the specimen label are similar. I suspect this specimen was used by Hampe, but because there is no type designation in the protologue nor on this specimen, I designate it the lectotype.

COMMENTS: The leaf shape and areolation of this specimen fit within the accepted range of variation for *B. plumosum sensu lato.*

* * *

Brachythecium cirriphylloides McFarland, *sp. nov.*

Type specimen (holotype) MICH: "Mexico, Mexico, Popocatepetl, on slopes ca. 2900 m.s.m., March 4, 1932, *H. Froferstrom et E. Hultén s.n.* [!]

Plants medium-sized to robust, densely matted. Stems to 5.0 cm long, decumbent to erect, terete, infrequently and irregularly branched; branches to 0.8 cm long, terete, ± tapering at tips; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller towards stem surface; pseudoparaphyllia orbicular, long apiculate. Leaves 2.0-2.5 (x=2.2) X 0.7-1.5 (x=1.1) mm, erect-imbricate when dry becoming more open when moist, deeply concave, long decurrent, slightly plicate, ovate-lanceolate to broadly ovate gradually tapering into long apices or broadly ovate and abruptly constricted into long filiform apices 0.5-0.8 (x=0.7) mm long; margins recurved at base, plane above, serrulate to serrate in acumina serrulate to nearly smooth below;

costae broad at base, quickly tapering above, ending near middle (48%) ± in an inconspicuous spine. Median leaf cells fusiform to linear 53.6-91.2 (x=71.3) X 5.7-8.0 (x=6.8) μm; apical cells similar 51.3-91.2 (x=73.6) X 5.7-8.0 (x=6.6) μm; basal cells slightly broader, rectangular, pitted 28.5-85.5 (x=53.7) X 9.1-19.4 (x=12.3) μm; alar cells not distinctly differentiated, quadrate to rectangular, extending into decurrencies 11.4-34.2 (x=25.4) X 11.4-18.2 (x=13.9) μm. Dioicous. Setae densely papillose throughout, dark red-brown. Perichaetia cylindrical to conical, leaves ecostate, sheathing at base, outer leaves ovate, gradually or abruptly acuminate, inner leaves long-acuminate; margins plane, entire and ± bordered by a single row of rectangular cells in lower portions. Perigonia not observed. The rest unknown.

COMMENTS: The name of this species is derived from the shape of its leaves. I place this specimen in the section *Reflexa*.

* * *

Brachythecium cladoneuron (C. Müll.) Par., Ind. Bryol. 132. 1894.

≡ *Hypnum* (*Brachythecium*) *cladoneuron* C. Müll., Linnaea 38: 652-653. 1874.

Type specimen (lectotype *des. mihi*) PC: "Mexico, Im Magdalenen Thal bei Mexico, 1868, *L. Hahn. s.n.*" [!]

Plants medium-sized, pale yellow-green. Stems to 3.0 cm long, prostrate, terete, densely foliate with tufted rhizoids in older portions, freely branched; branches to 1.3 cm long, terete, ± tapering at the ends; central strand narrow, inner and outer stem cells similar in size with moderately thickened walls; pseudoparaphyllia triangular. Leaves 1.5-2.0 (x=1.7) X 0.7-1.1 (x=0.8) mm, erect to patent when dry,

becoming more open when moist, concave, with narrow decurrencies, not to slightly plicate, ovate, gradually acuminate to abruptly acuminate, then forming 0.3-0.6 (x=0.46) mm long, slender, ± flexuose, half-twisted acumina; margins reflexed at base, plane above, completely entire or serrulate above; costae broad at base, tapering above with one or more short lateral spurs, ending near midleaf (52%) ± in an inconspicuous spine. Median leaf cells lax, fusiform 59.3-85.5 (x=71.3) X 9.1-12.5 (x=10.9) μm; apical cells similar 39.9-71.8 (x=54.2) X 6.8-11.4 (x=10.0) μm; basal cells rectangular 45.6-91.2 (x=64.4) X 14.8-28.5 (x=22.3) μm; alar cells weakly defined, quadrate to rectangular 25.1-45.6 (x=38.2) X 17.1-28.5 (x=21.2) μm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate, acute; inner leaves longer, slenderly acuminate; margins plane, entire, ± bordered by a single row of long, thin-walled, rectangular cells. Perigonia not observed. Setae smooth, red-brown, 10.0-13.0 (x=10.6) mm long. Capsules 1.9-2.5 (x=2.1) X 0.5-0.8 (x=0.72) mm erect to slightly inclined, cylindrical and slightly curved, yellowish brown; exothecial cells rectangular, ± in vertical rows with lateral walls thicker than end walls; annulus undifferentiated; operculum conic-apiculate 0.7-0.9 (x=0.81) X 0.6-0.8(x=0.67) mm; cilia nodose and appendiculate, 1-3. Spores 14.8-18.2 (x=16.3) μm, finely papillose.

TYPIFICATION: Müller gave no specific location or collection number for the type specimen listed in the protologue "Mexico, sine loco natal: *L. Hahn, 1868*." Yet, the label information on the four isotypic specimens made available to me (BM, FI, NY, and PC) included the location "Magdalenethale bei Mexico." Such specific location

information is unusual among L. Hahn collections I have seen; however, I do not find this sufficient cause to reject these specimens as isotypic representatives. Thus, with the loss of Müller's original herbarium at B, I designate the specimen at PC as the lectotype. This specimen best represents the species as a lectotype since it fits the protologue description and has a handwritten label in Müller's cursive style. Duplicate specimens at BM, FI, and NY are considered isolectotypes.

COMMENTS: The growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. conostomum*.

* * *

Brachythecium cochleare C. Müll. Nuovo Giorn. Bot. Ital. n. ser. 4 :155. 1897.

Type specimen (lectotype *des. mihi*) FI: "Bolivia provincia Cochabamba prop. Choquecamata, 1889, *Germain 1169*." [!]

Plants medium-sized, pale yellow to yellow-green. Stems to 3.0 cm long, prostrate, terete, frequently and irregularly branched; branches to 1.1 cm, long, erect, terete, of unequal length, longer branches with short secondary branches, densely foliate; central strand narrow, inner cortex cells large, gradually becoming smaller and thick-walled toward stem surface; pseudoparaphyllia orbicular. Leaves 1.1-1.5 (x=1.2) X 0.5-0.8 (x=0.6) mm, imbricate when dry, patent when moist, concave to cochleariform with prominent decurrencies, not plicate, ovate-acute to triangular, older stems leaves ovate-acuminate; margins reflexed at base, plane above, serrulate to serrate in apices, entire below; costae broad at base, tapering above with occasional short lateral spurs,

ending near apices (75%) ± in a inconspicuous dorsal spine. Median leaf cells fusiform to linear 34.2-68.4 (x=59.2) X 4.6-6.8 (x=5.8) μm; apical cells shorter 17.1-45.6 (x=29.4) X 5.7-9.1 (x=7.2) μm; basal cells hexagonal to rectangular 25.1-57.0 (x=40.0) X 8.0-17.1 (x=11.1); alar cells quadrate to rectangular, forming distinct clusters, and extending into decurrencies 13.7-39.9 (x=25.2) X 8.0-22.8 (x=11.9). Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves lanceolate-acute, inner leaves longer and acuminate; margins plane, entire to serrulate at apices. Perigonia not observed. Setae 18.0-20.0 mm long, red-brown, densely papillose above, gradually becoming smooth toward base. Capsule 1.5 mm long, cylindrical, and curved, inclined to horizontal, greenish brown; exothecial cells rectangular or irregular, ± in vertical rows, walls uniformly incrassate; annulus of 1-2 rows of small cells; operculum conic 0.9 mm long. Peristome and spores not examined.

TYPIFICATION: In his introduction to a series of papers on the "Prodromus Bryologiae Bolivianae" Müller (1897, fasc. I, p. 5) stated that Germain specimens "Bolivia provincia Cochabamba prop. Choquecamata, 1889," in the Levier Herbarium at FI, were used to prepare many new descriptions. I have seen only one specimen of *Germain 1169* from Levier Herb. FI. With the loss of the Müller's herbarium at B, it is unknown if Müller described this species from a portion of the original specimen retained in his herbarium or if he returned it to FI. Therefore, I consider the specimen at FI to be isotypic and designate it as the lectotype.

COMMENTS: The lectotype specimen is a portion of a single plant with two complete sporophytes. To preserve the specimen, internal examination of the sporophytes was not made. Similarly, sexuality was not determined because of insufficient plant material.

The growth form, leaf morphology, areolation of the leaves, and sporophyte characters of this specimen fit within the accepted range of variation for *B. plumosum sensu lato*.

* * *

Brachythecium comtifolium (C. Müll.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1879-77: 321. 1871. (Ad. 2: 387).

Basionym: *Hypnum (Brachythecium) comtifolium* C. Müll., Linnaea 38: 653.1874.

Cited specimen: "Mexico, *sine loco natali, forsan ex vicinia urbis*, Mexico, 1867. *L. Hahn*." *s.n.* [*non vidi*]

COMMENTS: No type material of this species was made available to me. Three Marius Saint-Pierre specimens labeled "*Brachythecium comtifolium* Bro. Amable 1238 Vallie de Mexico, desierto, 18 IX 1924" at FH and S, and "7280 Vallie de Mexico; San Rafail, January 1, 1925" at BM originally from the Thériot's herbarium and probably named by him, were examined. All three of these specimens belong to *Brachythecium stereopoma* (Spruce *ex* Mitt.) Jaeg. *sensu lato*.

Without a distinctive diagnosis and authentic type material of *B. comtifolium*, it is impossible to maintain this species, and I therefore declare it to be a *nom. obsc.*

* * *

Brachythecium condensatissimum C. Müll., Hedwigia 40: 75. 1901.

Type specimen (lectotype *des. mihi*) R: "Brazil, Minas-Gerais, Narejino de Paranahiba, em terra, Junho de 1892 *L. Ule 1604*." [!]

Plants medium-sized, yellow, forming a loose mat. Stems to 2.0 cm long, prostrate, terete, densely foliate, subpinnately branched; branches to 0.5 cm long, of unequal length, terete, ± ascending, tapering; central strand narrow; inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 1.2-1.8 (x=1.5) X 0.4-0.8 (x=0.5) mm, erect-imbricate when dry, erect to patent when moist, concave, decurrent, plicate, ovate-lanceolate, acuminate to elongate-triangular; margins reflexed at base, plane above, serrulate in upper 2/3, older leaves nearly entire; costae broad at base, tapering above and ending near middle (51%). Median leaf cells fusiform to linear 47.9-91.2 (x=65.8) X 5.7-6.8 (x=6.6) μm; apical cells shorter 39.9-79.8 (x=64.4) X 5.7-6.8 (x=6.3) μm; basal cells irregularly rectangular 25.1-51.3 (x=40.1) X 8.0-17.1 (x=12.0) μm; alar cells lax, quadrate to rectangular 13.7-45.6 (x=20.7) X 11.4-17.1 (x=14.5) μm. Dioicous. Perigonia pyriform, leaves ecostate, sheathing at base, outer leaves lanceolate, inner leaves ovate-lanceolate, acuminate; margins plane, lower margins bordered by a single row of elongate-rectangular cells. The rest unknown.

TYPIFICATION: The type of this species is represented by two isotypic specimens, "Brasilia, Minas Geruës, in terra region is fluminis Paranahyba, Junio 1892: E. Ule, Coll. No. 1604," one each in the herbarium at HBG and R. With the loss of Müller's original herbarium at

B, I designate the specimen at R as the lectotype. This specimen best fits the protologue description and has more plant material. The duplicate specimen at HBG is considered an isolectotype.

COMMENTS: The growth form leaf morphology and areolation of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium conostomum (Tayl.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77 :326. 1878 (Ad. 2: 392).

Basionym: *Hypnum conostomum* Tayl., London J. Bot. 7: 194. 1848.

Type specimen (neotype *des. mihi*) BR: "Pichincha, *Jameson 74*." [!]

Plants medium-sized, pale yellow to pale yellow-green (specimen badly faded), forming thick intertwined mats. Stems to 2.3 cm long, prostrate, terete, densely foliate, with tufted rhizoids in older portions, freely branched; branches terete, to 1.3 cm long, ± tapering at the ends; central strand narrow, inner and outer stem cells similar in size, with moderately thickened walls; pseudoparaphyllia triangular. Leaves 2.1-2.7 (x=2.4) X 0.8-1.1 (x=1.0) mm, erect to patent, concave, narrowly decurrent, not to slightly plicate, ovate, abruptly or gradually tapering into long slender acumina, apices 0.5-0.7 (x=0.7) mm long, ± flexuose, half-twisted; margins recurved at base, plane above, entire to serrulate above, entire below; costae broad at base, tapering above and ending near midleaf (45%), with one or more short lateral spurs. Median leaf cells fusiform, 43.3-96.9 (x=69.7) X 6.8-13.7 (x=11.5) μm; apical cells linear 74.1-110.6 (x=94.3) X 6.8-10.3 (x=7.8) μm; basal cells rectangular, walls ± slightly pitted 51.3-91.2 (x=68.7)

X 14.8-25.1 (x=18.7) μm; alar cells weakly defined, quadrate to rectangular 16.0-43.3 (x=29.0) X 13.7-25.1 (x=18.6) μm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate, acute; inner leaves longer, slenderly acuminate; margins plane, entire, ± bordered by a single row of long, thin-walled rectangular cells. Perigonia not observed. Setae 14.0-18.0 (x=15.5) mm long, smooth, red-brown. Capsules 1.8-2.5 (x=2.2) X 0.8-1.1 (x=0.92) mm, erect to slightly inclined, cylindrical, slightly curved, light brown; exothecial cells ± in vertical rows, lateral walls ± thicker than end walls; annulus undifferentiated; operculum conic-apiculate 0.7-0.8 (x=0.85) X 0.8-1.1 (x=0.92) mm; cilia nodose, 1-3. Spores finely papillose 13-19 (x=16) μm.

TYPIFICATION: The implicit holotype "On pichincha, *Prof. W. Jameson*. May, 1847" could not be found in Taylor's herbarium at FH. In addition, because of inconsistencies among label information of Jameson specimens from BM(4), BR, FH(2), and NY that I examined, none could be declared as isotypes. My choice has been the selection of a new type specimen (neotype). The reference number 74 appears on the labels of the Jameson specimens in BR-Jameson and BM-Wilson, whether they are labeled Pichincha or with no location, and/or dated 1847 or 1848 or no date. However, since Taylor did not give a reference number to the type specimen in his protologue, I have discounted the value of this number in selecting the type specimen.

I designate the Jameson specimen at BR as the neotype based on the presence of sufficient gametophytic and sporophytic material which best represents the protologue description.

COMMENTS: The gametophytic and sporophytic characters of this specimen are similar to other species of the section *Stereopoma* of which I consider it to be a member.

* * *

Brachythecium corbierei Card., Rev. Bryol. Lichénol 38: 42. 1911.

Type specimen (lectotype *des. mihi*) PC: "Mexico, District Fédéral, Cuajimalpa, forêt du Desierto, trones le sapins, vers 300 m, 1910. Ex herb. Corbièri. *G. Lapie*" *s.n.* [!]

Plants small- to medium-sized, green, in loose mats. Stems to 5.5 cm long, prostrate, densely foliate, irregularly to subpinnately branched; branches to 1 cm long, short, of unequal length, attenuate, straight or decurved; central strand narrow; inner cortex cells large, gradually becoming smaller and thick-walled toward stem surface; pseudoparaphyllia ovate-acuminate. Leaves 1.2-1.9 (x=1.5) X 0.4-0.8 (x=0.6) mm, erect-imbricate, straight or circinate, falcate-secund at stem and branch apices, slightly concave and plicate at leaf base, not to slightly decurrent, ovate-lanceolate to lanceolate, acuminate, twisted at apices; margins reflexed at base, plane above, serrate in apices, serrulate to base; costae broad at base, tapering above, ending above middle (60%) in a dorsal spine. Median leaf cells long rhomboidal, in older leaves becoming linear 39.9-75.2 (x=57.6) X 4.6-5.7 (x=5.1) µm; slightly shorter in apex 30.8-57.0 (x=42.9) X 3.4-5.7 (x=5.4) µm; basal cells shorter, rectangular to hexagonal, ± pitted 22.8-57.0 (x=36.9) X 5.7-12.5 (x=9.3) µm; alar cells forming small weakly defined groups, quadrate to irregularly quadrate 13.7-29.6 (x=23.6) X 5.7-11.4 (x=9.8) µm. Autoicous. Perichaetia cylindrical,

leaves ecostate, sheathing at base, outer leaves short ovate-acuminate, inner leaves longer, ovate, long and slenderly acuminate; margins plane, entire and ± bordered by a single row of rectangular cells in lower portion. Perigonia pyriform, leaves ecostate, ovate, long-acuminate; margins plane, ± serrate at apices, entire below and ± bordered by a single row of rectangular cells. Setae 12.0-16.0 (x=14.8) mm long, red-brown, smooth to weakly papillose below. Capsules 1 X 0.4 mm, horizontal, cylindrical and curved, constricted below mouth, red-brown; exothecial cells rectangular, uniformly incrassate. The rest unknown.

TYPIFICATION: The type of this species consists of three isotypic specimens "Mexico, District fédéral, Cuajimalpa, forêt du Desierto, sur 1' écorce des sapins vers, 3000m., associé à *Entodon subsecundus, E. brevipes, Brachythecium tenuinerve et B. laxireticulatum* (G. Lapie. 1910; ad amico Corbièri comm.)" all in Cardot's herbarium at PC. I designate the specimen with the printed title "Herb. J. Cardot" and handwritten label information as the lectotype. The two duplicate specimens with handwritten label information, neither with a printed title (one a photocopy of the other), are considered isolectotypes.

COMMENTS: The growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. occidentale*.

* * *

Brachythecium costaricense Ren. *et* Card., Bull. Soc. Roy. Bot. Belgique. 41(1): 123. 1905.

Type specimen (lectotype *des. mihi*) PC: "Costa Rica, La Verbena pres Alajuelita, Aous 1894, *H. Pittier 5730.*" [!]

Plants medium-sized, yellow, forming loose spreading mats. Stems to 6.0 cm long, prostrate, terete, densely foliate, irregularly to subpinnately branched; branches to 1.0 cm long, terete, ± tapering at tips, lower branches becoming stemlike and irregularly rebranched; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 1.5-1.9 (x=1.7) X 0.6-0.9 (x=0.8) mm, erect ± imbricate when dry, erect to patent when moist, concave, slightly decurrent, plicate, broadly ovate to ovate-lanceolate, long and narrowly acuminate to broadly ovate, long narrowly acuminate; margins recurved at base, plane above, serrulate in upper 2/3, smooth below; costae broad at base, tapering above and ending near middle (54%). Median leaf cells fusiform or rhomboidal to linear 45.6-88.9 (x=67.0) X 5.7-9.1 (x=7.5) μm; apical cells similar 37.6-82.1 (x=64.3) X 6.8-8.0 (x=7.5) μm; basal cells lax, irregularly rectangular 31.9-70.7 (x=47.5) X 9.1-17.1 (x=11.4) μm; alar cells lax, quadrate to rectangular extending into decurrencies 13.7-31.9 (x=24.9) X 11.4-19.4 (x=15.2) μm. Dioicous. Perigonia pyriform, leaves ecostate, sheathing at base, outer leaves ovate and short-acuminate, inner leaves longer acuminate; margins plane, entire, and bordered by a single row of rectangular cells. The rest unknown.

TYPIFICATION: The type of this species is represented by eight isotypic specimens, "Musci Costaricenses, La Verbena pres Alajuelita, *Pittier 5730*," one each in the herbaria at BM, FI, H-BR, NY, S, and US, and two in the herbarium at PC. I designate one of the specimens at PC as the lectotype--distinguishable by the black stamp "Herb. J. Cardot"

on its label. This specimen fits the protologue and is from the author's herbarium. Duplicate specimens at BM, FI, H-BR, NY, PC, S, and US are considered isolectotypes.

COMMENTS: The dioicous condition, leaf morphology, areolation, and growth form of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato.*

* * *

Brachythecium crinitifolium (C. Müll.) *in Broth., Nat. Pfl. 1(3): 1143. 1909. nom. nud. fide* Wijk, et al. vol. 1. p. 207.

COMMENTS: Brotherus erroneously proposed this binomial. From the descriptive position in the text and location given, it is clear that he had intended to cite *Brachythecium crinitirameum* C. Müll. (Brazil) instead. The implied basionym of *Brachythecium crinitifolium* is *Leucomium crinitifolium* (C. Müll.) Mitt. Thus, *B. crinitifolium* C. Müll. *in* Broth. is considered *nom. illeg. et superfl. comb. superfl.*

Even though this combination is superfluous, it is not illegitimate since its implied basionym is legitimate (ICBN 63.3). Article 63.1 does not apply here; thus the combination *B. crinitifolium* is not a *nom. nud.*

* * *

Brachythecium crinitirameum C. Müll., Hedwigia 40: 75. 1901.

Type specimen (lectotype *des. mihi*) HBG: "Brazil, Minas Geraes, Auf landsteinfelsen der Serra do Ouro Preto, Feb. 1892, *E. Ule 1475*." [!]

Plants robust, yellow-green, forming a dense mat ± with radiating creeping stems. Stems to 8.2 cm long, creeping and radiculose at attachment to substrate, densely foliate and terete with many subpinnate branches; branches to 0.7 cm long, decumbent to erect, equal in length,

becoming shorter toward stem apices, densely foliate and terete; central strand narrow, inner cortex cells large and thin-walled becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 1.8-2.5 (x=2.1) X 0.5-1.1 (x=0.8) mm, erect-imbricate when dry, becoming more open when moist, concave, slightly decurrent, weakly plicate, broadly ovate to ovate-lanceolate, long-acuminate with single or double twisted apices; margins plane, reflexed at base, entire below, serrulate in upper 2/3 and ± serrate in apices; costae broad at base, rapidly tapering and slender above, ending near middle (53%), ± in an inconspicuous spine; branch leaves somewhat reduced and narrower, with sharper marginal teeth. Median leaf cells rhomboidal to linear, 57.0-103.7 (x=83.3) X 5.7-9.1 (x=7.5) μm; apical cells similar 62.7-96.9 (x=76.8) X 4.6-6.8 (x=6.4) μm; basal cells lax, rectangular to irregularly rectangular, slightly porose, 42.2-70.7 (x=53.5) X 8.0-17.1 (x=12.3) μm; alar cells forming a distinct group of slightly lax, quadrate to rectangular cells, 25.1-51.3 (x=33.1) X 13.7-23.9 (x=17.2) μm. The rest unknown.

TYPIFICATION: The type of this species is represented by four isotypic specimens, "Brazilia, Minas Geraës, Serra Ouro Preto, in rupibus, Febr. 1892, *E. Ule 1475*," one each in the herbaria at H-BR, HBG, R, and US. With the loss of C. Müller's original herbarium at B, I designate the specimen at HBG as the lectotype since it fits the protologue. Duplicate specimens at H-BR, R, and US are considered isolectotypes.

COMMENTS: The growth form, leaf morphology and areolation of this specimen fit within the accepted range of variation for *B. poadelphus*.

* * *

Brachythecium crocatum Hamp. *in* C. Müll., Bull. Herb. Boissier 5: 218. 1897.

Type specimen (neotype *des. mihi*): BM: "Guatemala, *sine collectum, 180.*" [!]

Plants medium-sized, pale yellowish green (color faded), forming mats. Stems to 2.5 cm long, prostrate, terete, densely foliate, with tufted rhizoids where attached to substrate, irregularly branched; branches to 1.0 cm long, erect, terete, densely foliate; central strand narrow, outer and inner cortex similar, walls slightly thickened; pseudoparaphyllia triangular. Leaves 1.6-2.4 (x=1.9) X 0.4-1.0 (x=0.7) mm, erect-patent when dry, more open when moist, concave, ± decurrent, not plicate, ovate, abruptly acuminate, apices ± flexuose and half-twisted; margins reflexed at base, plane above, serrate in acumina, serrulate to base; costae broad at base, quickly narrowed above and ending below the middle (48%) with one or more short lateral spurs. Median cells fusiform to long fusiform 57.0-96.9 (x=73.4) X 8.0-13.7 (x=10.3) µm; apical cells slightly shorter 45.6-91.2 (x=67.8) X 5.7-10.3 (x=8.3) µm; basal cells rectangular 57.0-99.2(x=70.0) X 14.8-25.1 (x=19.8) µm; alar cells rectangular, not forming distinct groups 19.4-36.5 (x=29.6) X 11.4-19.4 (x=14.7) µm. Dioicous. Perichaetial leaves ecostate, sheathing at base, outer leaves ovate, acute, inner leaves longer, slenderly acuminate; margins plane, entire and bordered by a single row of long, thin-walled rectangular cells. Perigonia not observed. Setae 17.0-19.0 (x=18.3) mm long, smooth, red-brown. Capsules 1.9-2.2 (x=2.0) X 0.6-0.9 (x=0.8) mm, inclined, cylindrical and slightly curved; exothecial cells rectangular, in vertical rows, walls

uniformly thickened; annulus undifferentiated; operculum 0.8-1.1 (x=1.0) X 0.7-1.0 (x=0.8) mm conic-apiculate; cilia 1-3 nodose. Spores 8.8-16.5 (x=13.8) μm finely papillose.

TYPIFICATION: Neotypification of this species is based upon examination of two specimens from the Hampe Herbarium BM, "*Sciuro-Hypnum crocatum n. sp., sine collectum*, Guatemala *180*" and "*Hypnum crocatum n. sp. sine collectum*, Guatemala, *171*." Müller (1897) credited the name *Brachythecium crocatum* to Hampe (*in sched.* 1868) and identified the type specimen as "*sine loco speciali et no ex Hb. Hampeano, ab A. Bernoulli collatum accepi*." A handwritten description (presumably Hampe's) attached to the specimen sheet and referring to both specimens does not mention a collector or implicit holotype. No definitive connection can be made between the specimen cited by Müller and the two specimens in the Hampe Herbarium. I have selected specimen *Sciuro-Hypnum crocatum n. sp.*, Guatemala, *180*, to serve as the neotype since it best fits Müller's description.

COMMENTS: Hampe's handwritten description of the neotype material indicated the species as monoicous. Müller did not indicate sexuality in his description, but in my examination of both Hampe specimens no perigonia were found suggesting that *Brachythecium crocatum* is dioicous.

Bartram (1949a, p. 353) considered *B. crocatum* synonymous with *B. stereopoma*. The lax leaf areolation, serrate leaf margins, distinct costae, shape of the capsule and operculum of *B. crocatum* are more characteristic of *B. conostomum*.

* * *

Brachythecium cuspidarioides Dus., Bot. Not. 1905: 308. 1095.

Basionym: [*Brachythecium cuspidarioides* Dus., Rep. Princeton Univer. Exp. Patag. 8: 125. 1903. *nom. nud.*]

Type specimen (lectotype *des. mihi*) S: "Patagonia occ., in valle fluminis Aysen in terra, Jan. 5 a. 1897, *P. Dusén*" [389]. [!]

Plants robust, yellow at growing tips, brown below, forming an open mat. Stems to 9.5 cm long, erect, densely foliate, julaceous to slightly turgid, infrequently and irregularly branched; branches to 4.0 cm long, erect, julaceous to slightly turgid; central strand narrow, inner cortex large and thin-walled, becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia elongate-ovate acute ± apiculate. Leaves 2.4-3.1 (x=2.7) X 0.8-1.2 (x=1.0) mm, erect-imbricate when dry, becoming more erect and tumid when moist, deeply concave (cymbiform), short-decurrent, ± auriculate, not to weakly plicate, broadly obovate, gradually tapering to broadly tapering and rounded, abruptly aristate 0.2-0.5 (x=0.4) mm long; margins reflexed at base, plane above, entire; costae broad at base, tapering, slender above, ± with short lateral spurs, ending above middle (61%). Branch leaves narrower, ovate, gradually acuminate, ± aristate. Median leaf cells linear to linear-rhomboidal 74.1-125.4 (x=94.3) X 5.7-9.1 (x=7.1) µm; apical cells shorter 39.9-74.1 (x=60.1) X 5.7-6.8 (x=6.5) µm; basal cells lax rectangular, walls pitted 45.6-111.7 (x=75.6) X 11.4-22.8 (x=16.2) µm; alar cells rectangular, inflated in auricles and into decurrencies 34.2-70.7 (x=48.9) X 17.1-39.9 (x=27.6) µm. Autoicous. Perichaetia cylindrical, leaves clasping at base, ecostate, outer leaves ovate-acute, inner leaves longer, ovate-acuminate; margins plane, entire

and ± bordered by a single row or rectangular cells. Perigonia pyriform, leaves ecostate, outer leaves orbicular, inner leaves ovate-acute to short-acuminate; margins plane, entire, and bordered by a single row of rectangular cells. The rest unknown.

TYPIFICATION: The designation of original specimens is hampered by the brevity of information and lack of collection numbers given in the protologue "Patagonia occ. in ripa fluminali: Fuegia australis in paludosis, *Dusén*." Four different Dusén collections have been distributed with this name. Dusén specimens 5866 at GB, FH, NY(2), S, and 5975 at S are not considered "original specimens" since they were identified by V. F. Brotherus and were collected after the binomial was validly published. The other two collections *Dusén 126* [GB, H-BR, S, UPS] and *Dusén 389* [FH(2), FI, GB, M(2), NY(3), S(4), US, UPS] are considered syntypic since they were identified by Dusén, collected from the cited location, and collected before the publication date. The Dusén specimens 389 listed above illustrate a problem inherent to many of Dusén's specimens. Some lack a collection number on their labels. However, compatibility of other label information and the size and growth form of the plants indicate the specimens are from the same gathering.

I designate one of the unnumbered specimens at S [=389] as the lectotype (second specimen down on right side of sheet) since it fits the protologue description, has a handwritten label in Dusén's cursive style, is in the author's herbarium, and has many distributed duplicates. Duplicates of this specimen at FH(2), FI, GB, M(2), NY(3),

S(3), UPS, and US are considered to be isolectotypes. The Dusén specimen 126 at GB, H-BR, S, and UPS are considered to be paratypes.

COMMENTS: Dusén (1903, p. 125) originally published this name in a list of *Hatcher* specimens he (Dusén) had identified; however, the name only became valid (ICBN 45.1) when Dusén gave a description and cited specimens in 1905.

The growth form, leaf morphology, and areolation of this specimen fit within the accepted range of variation for *B. subplicatum*. I concur with Cardot (1908, p. 16a) and consider *B. cuspidarioides* to be a synonym of *B. subplicatum*.

* * *

Brachythecium delicatum Robins., Bryologist 67(4): 450. 1964.

Type specimens (holotype, explicit) US: "Mexico, Veracruz, Mature pine-deciduous forest in cloud mist belt 2320 m elev., 33 km NE of Perote on route 140, March 11, 1960, *Hale & Soderstrom 19357*" [!]; (paratype, explicit), US [!], TENN [!]: Costa Rica, Dead wood in shade of cloud forest, 4.4 mi. from rim, Volcan Irazu, June 17, 1962, *Berkeley 62-67*.

Plants small- to medium-sized in shiny, loose, open, light green mats. Stems to 3.0 cm long, prostrate, densely foliate, irregularly branched; branches to 2.0 cm long, of unequal length, prostrate; central strand narrow, inner cortex cells large and thin-walled, outer cortex 2-3 layers of small thick-walled cells; pseudoparaphyllia ovate-lanceolate. Leaves 1.2-1.5 (x=1.3) X 0.4-0.6 (x=0.5) mm, open to spreading and generally complanate, not concave, ± slightly decurrent, ± slightly plicate at leaf base, ovate-lanceolate to lanceolate,

acuminate; margins reflexed at base, plane above, serrate in apices, serrate or serrulate to near base; costae broad at base, tapering above, ending near middle (56%) with a dorsal spine. Median leaf cells rhomboidal to linear 57.0-79.8 (x=67.7) X 4.6-8.0 (x=6.0) μm; apical cells shorter 26.2-52.4 (x=40.6) X 3.4-6.8 (x=5.4) μm; basal cells shorter, rectangular to hexagonal 22.8-51.3 (x=36.1) X 6.8-17.1 (x=10.6) μm; alar cells forming weakly defined groups, irregularly quadrate to rectangular 17.1-34.2 (x=21.9) X 9.1-25.1 (x=14.0) μm. Autoicous. Perichaetia cylindrical, leaves sheathing at base, ecostate, outer leaves short ovate-acuminate, inner leaves longer, ovate, long and slenderly acuminate; margins plane, entire and ± bordered by a single row of rectangular cells. Perigonia pyriform, leaves ecostate, ovate-acuminate; margins plane, entire and ± bordered by a single row of rectangular cells. Setae 9.0-15.0 (x=12.4) mm long, red-brown, smooth. Capsules 1.0-1.3 (x=1.2) X 0.37-0.68 (x=0.59) mm, suberect to horizontal, cylindrical and curved, constricted below mouth, red-brown; exothecial cells rectangular, uniformly incrassate; annulus of 2 rows of inflated cells; operculum 0.50-0.56 (x=0.50) X 0.50-0.67 (x=0.57) μm, conic-apiculate; cilia 2-3, nodose, ± appendiculate, papillose. Spores 8.8-13.0 (x=14.3) μm, finely papillose.

COMMENTS: Robinson (1967, p. 37) synonymized this taxon with *Brachythecium corbierei* Card. and noted a close relationship to *Brachythecium occidentale* (Hamp.) Jaeg. I agree with Robinson (*op. cit.*) and place both *B. delicatum* and *B. corbierei* into the synonymy of *B. occidentale*.

* * *

Brachythecium duriusculum (Schimp. *ex* C. Müll.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 337. 1879. (Ad. 2:403).

Basionym: *Hypnum duriusculum* Schimp. *ex* Müll., Syn. Mus. Frond. 2: 426. 1851.

Type specimen (lectotype *des. mihi*) NY: "Mexico, Cerro de los Nabajos, Herb. C. Müll., *C. Ehrenberg" s.n.* [!]

Plants medium-sized, yellow-brown, loosely tufted. Stems 2.0-5.0 cm long, decumbent, rigid, terete, densely foliate in younger portions, ± denuded in older portions, irregularly branched; branches to 0.8 cm long, erect and terete; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller and thick-walled toward stem surface; pseudoparaphyllia ovoid. Leaves 1.3-1.5 (x=1.4) X 0.5-0.8 (x=0.6) mm, erect imbricate, ± homomallous, concave, slightly decurrent, ± plicate, ovate to lanceolate, abruptly short-acuminate, older leaves broader and rounded at insertion; margins plane, entire or serrulate at apices; costae broad at base, gradually tapering above, occasionally forked and/or ± with lateral spurs, ending above midleaf (59%). Median leaf cells fusiform to linear 37.6-66.1 (x=52.2) X 4.6-6.8 (x=5.9) µm; apical cells shorter 28.5-45.6 (x=34.9) X 5.7-8.0 (x=7.2) µm; basal cells lax, hexagonal to rectangular, ± pitted and forming a distinct row of ± red-brown cells where attached to stem 18.2-47.9 (x=38.0) X 6.8-17.1 (x=13.2) µm; alar cells forming an inconspicuous group of quadrate to rectangular cells 18.2-31.9 (x=24.3) X 5.7-17.1 (x=11.3) µm. Autoicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate and narrowly acute, inner leaves longer and acuminate, lower margins bordered by a row of long rectangular cells.

Perigonia ovoid, leaves ecostate, outer leaves ovate and narrowly acute, inner leaves longer and acuminate, lower margins bordered by a single row of long rectangular cells. Setae 9.0-12.0 (x=10.4) mm long, red-brown with numerous low papillae along upper portion, gradually becoming smooth toward base. Capsules 1.1-1.6 (x=1.4) X 0.4-0.7 (x=0.6) mm, inclined, slightly curved and asymmetric, oblong-ovoid, red-brown; exothecial cells in vertical rows, quadrate to rectangular to ± irregular-shaped, walls uniformly thickened; annulus weakly developed; operculum 0.6-0.7 (x=0.7) X 0.4-0.7 (x=0.4) mm, conic-apiculate; cilia 1-2, nodose to subappendiculate. Spores 9.9-19.8 (x=15.4) μm, smooth.

TYPIFICATION: Even though Müller (1851, p. 426) indicated that Schimper applied this species name to specimens in Schlechtendahl's Herbarium, it is not certain if the cited specimen, "Mexico, in cavernis trachytaceis crateris m. Cerro de los Nabajos, Mart. 1839, *C. Ehrenberg*," was selected by Schimper *ex. Herb. Schlechtendahl* or by Müller from available specimens. To attempt to clarify the uncertainty of the type, specimens were requested from Schlechtendahl's Herbarium at HAL. Unfortunately, no response was received. Isotypic specimens from B (Brandis Herb.), BM, H-BR, H-SOL, JE, NY, and S bear no reference to Schlechtendahl's Herbarium. Nevertheless, one isotypic specimen at H-BR is indicated as "Specimen original, *Herb. Schimperium*," whereas, isotypic specimens at NY and H-SOL are indicated as originating from the "Müller Herb." Since the protologue description was written by Müller and his specimens at B were destroyed, I designate the specimen from NY as the lectotype since it fits the protologue description, was originally from Müller's herbarium, and has more complete sporophytes

than the specimen in H-SOL. Duplicate specimens at B(Brandis Herb.), BM, H-BR, H-SOL, JE, and S are considered isolectotypes.

COMMENTS: The growth form, leaf morphology, areolation, and sporophyte characteristics of this specimen fit within the accepted range of variation for *B. plumosum sensu lato*. I agree with Mitten (1869, p. 565) in synonymizing *B. duriusculum* (Schimp. *ex* C. Müll.) Jaeg. with *B. plumosum*.

* * *

Brachythecium espinosae Herz., Beih. Bot. Centralbl. 61B: 690. 1945.

Type specimen (lectotype *des. mihi*) JE: "Ecuador, Ohne nähere Fundortsangabe *R. Espinosa 38*." [!]

Plants slender, medium-sized, yellow-green, forming a loose mat. Stems to 10.0 cm long, prostrate, terete, moderately foliate, irregularly branched; branches to 1.5 cm long, terete; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 1.4-2.3 (x=2.0) X 0.5-1.1 (x=0.8) mm, appressed to the stem to erect when dry, erect to patent when moist, slightly concave, stem leaves strongly decurrent, branch leaves less so, ± plicate, ovate to ovate-lanceolate, acuminate; margins reflexed at base, plane above, serrulate in upper 2/3, older leaves nearly entire; costae broad at base, tapering above and ending near middle (57%). Median leaf cells linear 62.7-114.0 (x=93.8) X 5.7-11.4 (x=9.0) µm; apical cells similar 51.3-102.6 (x=81.2) X 6.8-9.1 (x=7.8) µm; basal cells irregularly rectangular 34.2-74.1 (x=56.7) X 11.4-25.1 (x=17.7) µm; alar cells lax, quadrate to rectangular,

extending into decurrencies 22.8-51.3 (x=38.1) X 13.7-26.2 (x=17.7) µm. Perichaetia not observed. Perigonia pyriform, leaves ecostate, ovate, long-acuminate; margins plane, entire, and bordered by a single row of rectangular cells below. The rest unknown.

TYPIFICATION: In the protologue Herzog cited two syntypic specimens, "Ecuador; Ohne nähere Fundortsangabe, *R. Espinosa no. 33* and *38*." Both are located in the Herzog herbarium at JE. I designate specimen no. 38 as the lectotype since it fits the protologue description and is in Herzog's herbarium. Specimen no. 33 is considered a paratype.

COMMENTS: The growth form, leaf morphology, and areolation of this specimen fit within the accepted range of variation for *B. rutabulum*.

* * *

Brachythecium eupopuleum (C. Müll.) Kindb., Enum. Bry. Exot. Suppl. 2. p. 97. 1891.

Basionym: *Hypnum (Brachythecium) eupopuleum* C. Müll., Linnaea 42: 500. 1879.

Type specimen (lectotype *des. mihi*) S: "Musci Venezuelenses, Prope Coloniam Tovar, 1854-5, *A. Fendler 144*" [!]

Plants medium-sized, yellow-green, forming loose spreading mats. Stems to 4.0 cm long, prostrate, terete, densely foliate, irregularly to subpinnately branched; branches to 1.0 cm long, terete, ± tapering at tips, older branches becoming stem-like with irregular branching; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 1.2-2.1

(x=1.4) X 0.4-0.9 (x=0.5) mm, erect ± imbricate when dry, erect to patent when moist, concave, slightly decurrent, plicate; older stem leaves broadly ovate to deltoid with long attenuate tips; upper stem and branch leaves elongate-triangular to ovate-lanceolate, with long-acuminate tips; margins plane above and recurved at base, serrulate in upper 2/3, smooth below; costae broad at base, tapering above and ending near middle (54%). Median leaf cells fusiform to linear 50.2-79.8 (x=63.8) X 5.7-8.0 (x=6.3) μm; apical cells similar 46.7-85.5 (x=65.2) X 4.6-6.8 (x=5.5) μm; basal cells irregularly rectangular 25.1-52.4 (x=41.0) X 8.0-22.8 (x=12.9) μm; alar cells lax, quadrate to rectangular extending into decurrencies 18.2-51.3 (x=30.8) X 11.4-25.1 (x=16.2) μm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate and long-acuminate, inner leaves longer and slender-acuminate with squarrose apices; margins plane, entire, and bordered by a single row of rectangular cells below. The rest unknown.

TYPIFICATION: The type of this species is derived of eight isotypic specimens, "Musci Venezuelenses, *A. Fendler 144*," one each in the herbaria at FH, G, H-BR, H-SOL, NY, OXF, PC, and S. With the loss of Müller's original herbarium at B, a lectotype was chosen from among extant specimens. However, all extant specimens are heterogeneous. Each specimen consists of one or two different growth forms of *Brachythecium* (a delicate slender form and a dense robust form), a *Mittenothamnium*, and a *Thuidium*. Both growth forms of Brachythecium differ from the protologue description by their dioicous condition and lack of sporophytes. Both *Mittenothamnium* (with a monoicous condition) and *Thuidium* do contain sporophytes. Because the *Mittenothamnium* is

mixed with and morphologically is very similar to the delicate, slender *Brachythecium*, I suspect Müller derived his protologue description using both taxa. I, therefore, emend Müller's protologue description by adding the following: *dioicum e sine fructus*. Now, the delicate slender *Brachythecium* in the specimen packet at S can serve as lectotype *in parte* for this species, because it conforms to the emended type description. The dense, robust form of *Brachythecium* mixed with the lectotype is a robust from of *Brachythecium stereopoma* and is not considered to be type material. Duplicate specimens of *Fendler 144* at H-BR, H-SOL, and OXF, having the delicate slender growth form, are considered isolectotypes *in parte*. Duplicate specimens at FH, G, NY, and PC, having a robust growth form, are not considered type material since these specimens do not agree with the emended protologue description. These latter specimens represent nothing more than a robust form of *Brachythecium stereopoma* (Spruce *ex* Mitt.) Jaeg. A "Musci Venezuelenses, *Fendler 63a*" specimen at BM has no type status.

COMMENTS: The dioicous condition, growth form, leaf morphology and areolation, of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium euryodictyon (C. Müll.) Kindb., Enum. Bry. Exot. Suppl 2. p. 97. 1891.

Basionym: *Hypnum euryodictyon* C. Müll., Bot. Jahrb. Syst. 5: 82. 1884.

Type specimen (lectotype *des. mihi*) BM: "Kerguelen Island, Dec. 1874, Herb. C. Müll., *Dr. Naumann*" *s.n.* [!]

Plants medium-sized, yellow to light green, forming loose tufts. Stems to 7.0 cm long, decumbent, terete, densely foliate, becoming denuded in older portions, infrequently and irregularly branched; branches to 5.0 cm long, terete; central strand narrow, inner cortex cells large and thin-walled, outer cells smaller with slightly thickened walls; pseudoparaphyllia ovate ± erose. Leaves 1.8-2.8 (x=2.55) X 0.6-0.9 (x=0.8) mm, erect to patent, more open when moist, concave, slightly decurrent, occasionally with small round auricles, not plicate, ovate, short- to long-acuminate; margins ± reflexed at base, plane above, entire; costae broad at base, tapering above, disappearing near midleaf (48%). Median leaf cells fusiform to long rhomboidal 62.7-114.0 (x=101.5) X 6.8-14.8 (x=9.5) μm; apical cells shorter, fusiform 45.6-79.8 (x=67.8) X 6.8-11.4 (x=8.8) μm; basal cells rectangular, ± pitted 57.0-119.7 (x=84.4) X 11.4-22.8 (x=18.2) μm; alar cells numerous, quadrate to rectangular 22.8-39.9 (x=30.9) X 11.4-22.8 (x=16.5) μm. The rest unknown.

TYPIFICATION: In the protologue Müller (1884, p. 76) gave a brief ecological and morphological diagnosis and limited information on the type specimen from, "Kerguelen Islands, *Naumann*." Later in 1889 (p. 32) Müller republished this species giving more complete description and type specimen information, "Ins. Kergulen, Betsy Cove, Decbr. 1874." Newton (1979, p. 127) indicated she examined five syntype specimens from BM and S-PA; however, only two specimens of this species from BM were made available to me. I designate the specimen labeled "*Hypnum euryodictyon* Kerguelen Island, *Dr. Naumann*, Dec. 1874, Herb. C. Müll." as the lectotype, since this specimen fits the protologue description

and was originally from the author's herbarium. A duplicate of this specimen at BM is considered an isolectotype.

COMMENTS: Müller's (1884, p. 82) recognition of this species was based on its aquatic habit and denuded lower portions of the stems. Newton (1979, p. 127) felt this species did not differ from aquatic forms of *Brachythecium austro-salebrosum* (C. Müll.) Kindb. found elsewhere and considered them to be synonymous. Because *H. euryodictyon* and *H. austro-salebrosum* (≡*Brachythecium austro-salebrosum*) were published simultaneously, Newton (*op. cit.*) reduced *Hypnum euryodictyon* in synonymy under *B. austro-salebrosum* as nothing more than a habitat variation. I concur with Newton's (*op. cit.*) assessment of this species and consider *B. euryodictyon* (C. Müll.) Kindb. to be a synonym of *B. austrosalebrosum*.

* * *

Brachythecium fasciculato-caudatum C. Müll., Hedwigia 36: 129. 1897.

Type specimen (lectotype *des. mihi*) JE: "Argentinia, Cuesta de Sn. Rosa, mit *Entodon*, *P. G. Lorentz s.n.*" [!]

Plants medium-sized, sordid yellow-green, matted caespitose. Stems to 4.5 cm long, decumbent to erect, terete, densely foliate, irregularly branched; branches to 0.7 cm long, erect, terete, densely foliate, tapering, older branches becoming stemlike and irregularly rebranched; central strand narrow, inner cortex cells large and thin-walled, outer 2-3 layers of cells smaller and thick-walled; pseudoparaphyllia ovate-acuminate. Leaves 0.8-1.5 (x=1.1) X 0.4-0.8 (x=0.6) mm, erect-imbricate when dry becoming open-erect when moist, concave, slightly decurrent, plicate, ovate to broadly ovate or deltoid, apices acuminate, ± bent to

one side; margins entire and recurved at base, plane above and serrulate to serrate in upper portion; costae broad at base quickly tapering above, ending near middle (55%) in an inconspicuous spine. Median leaf cells rhomboidal to fusiform 36.5-68.4 (x=46.4) X 5.7-6.8 (x=6.5) µm; apical cells shorter, fusiform 29.6-50.2 (x=40.6) X 4.6-5.7 (x=5.4) µm; basal cells irregularly rectangular 11.4-45.6 (x=34.5) X 8.0-17.1 (x=11.7) µm; alar cells quadrate to rectangular, ± in rows, forming a discrete group 11.4-36.5 (x=22.2) X 9.1-18.2 (x=13.5) µm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate-acuminate, inner leaves longer and more acuminate; margins plane, entire and ± bordered by a single row of rectangular cells below. The rest unknown.

TYPIFICATION: The type of this species is represented by two isotypic specimens, "Argentinia subtropica, Cuesta de Sn. Rosa, Junio 1873 *P. G. Lorentz*," one each in the herbaria at H-BR, and JE. With the loss of Müller's original herbarium at B, I designate the specimen at JE as the lectotype since it fits the protologue description. The duplicate specimen at H-BR is considered an isolectotype.

COMMENTS: The growth form, leaf morphology, areolation, and the sporophytic characters of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato.*

* * *

Brachythecium filirameum C. Müll., Hedwigia 36: 127. 1897.

Type specimen (lectotype *des. mihi*) S: "Argentina, Tucuman, April 1872, *Com.* C. Müller, Musci Ex. Herb. Hjalmar Moller., *P. G. Lorentz" s.n.* [!]

Plants small and slender, yellow-green, forming spreading loose mat. Stems to 7.0 cm long, prostrate, terete, distantly foliate, with tufted rhizoids where attached to substrate, pinnately to subpinnately branched; branches equal in length to 0.7 cm long, spreading to erect, terete ± tapering; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate-acuminate. Leaves 1.1-1.3 (x=1.2) X 0.5-0.8 (x=0.6) mm, erect-imbricate when dry, erect to patent when moist, concave, narrowly decurrent, slightly plicate, broadly ovate to ovate-lanceolate, acuminate to long-acuminate with ± twisted apices; stem leaves distinctly larger with broader decurrencies; deeply concave and slightly plicate; margins plane or reflexed at base, serrulate to serrate in upper 2/3; costae broad at base, tapering above and ending beyond middle (60%) in an inconspicuous spine. Median leaf cells rhomboidal to linear 42.2-79.8 (x=56.3) X 5.7-8.0 (x=6.2) μm; apical cells similar 34.2-65.0 (x=49.4) X 3.4-6.8 (x=5.6) μm; basal cells irregularly rectangular 22.8-57.0 (x=40.4) X 10.3-12.5 (x=11.2) μm; alar cells lax, quadrate to rectangular extending into decurrencies 17.1-25.1 (x=20.5) X 8.0-16.0(x=11.7) μm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate, long-acuminate, inner leaves longer, slenderly acuminate; margins plane, entire, and bordered by a single row of rectangular cells below. Perigonia not observed. Setae 11.0-16.0 (x=12.2) mm long, red-brown, smooth. Capsules 1.4-1.6 (x=1.5) X 0.6-0.9 (x=0.7) mm, inclined to erect, cylindrical and curved, ± constricted below mouth when dry, yellow-brown, exothecial cells rectangular, in vertical rows, with lateral

walls thicker than end walls; annulus not differentiated; cilia 2-3, nodose and papillose, operculum 0.8-0.9 (x=0.8) X 0.6-0.8 (x=0.7) mm, long-conic to conic-subrostate, ± apiculate. Spores 11.0-14.3 (x=12.1) µm, finely papillose.

TYPIFICATION: The type of this species is represented by four isotypic specimens, "Argentina subtropic prope Tucuman, April 1872, P. G. Lorentz," one each in the herbarium at HBG and NY and two in the herbaria at S. With the loss of Müller's original herbarium at B, I designate one of the specimens at S as the lectotype since it fits the protologue description, and was originally from Müller's herbarium at B. Duplicate specimens at HBG, NY, and S are considered isolectotypes.

COMMENTS: Six years before Müller published this name, Kindberg (1891, p. 97) had included it in his "Enumaratio Bryinearum exoticarum" indicating Müller as the authority. Even though the name was effectively published (ICBN 30.1), it remained invalid (ICBN 32.1) until Müller published a description.

The dioicous condition, leaf morphology, areolation, growth form, and sporophyte characters of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium filirepens Dus., Bot. Not. 1905: 309. 1905.

Type specimen (lectotype *des. mihi*) S: "Chile, Patagonia occ., in valle fluminis Aysen, in terra, Feb. 17, 1897, *P. Dusén*" *s.n.* [!]

Plants small-sized, yellow-green, forming a open intricate mat. Stems to 8.0 cm long, terete, loosely foliate, prostrate ± with tufted rhizoids where attached to substrate, subpinnately to irregularly

branched; branches to 1.1 cm long, distinctly smaller and more densely foliate than stems, prostrate to ascending, short, tapering and ± arching; central strand narrow, inner cortex cells large and thin-walled, outer 2-3 layers of cells small with slightly thickened walls; pseudoparaphyllia ovate to triangular. Leaves 0.9-1.2 (x=1.1) X 0.6-1.0 (x=0.8) mm, appressed when dry becoming more erect when moist; stem leaves concave, wide and long decurrencies, not plicate, broadly ovate quickly long-acuminate to deltoid, ± twisted and secund at tips (not reflexed); branch leaves smaller and narrower, concave with narrower decurrencies, not plicate, cordate-ovate, acuminate and secund at tips; margins plane, reflexed at base, serrulate to serrate in upper half, entire to subserrulate below; costae stout, subpercurrent, gradually tapering above and ending in an inconspicuous spine (76%). Median leaf cells rhomboidal to linear, pitted 36.5-70.7 (x=51.8) X 4.6-6.8 (x=5.9) μm; apical cells slightly shorter, pitted 29.6-57.0 (x=41.8) X 5.7-6.8 (x=6.4) μm; basal cells rectangular to irregular rectangular, pitted 30.8-51.3 (x=41.8) X 8.0-13.7 (x=10.0) μm; alar cells lax, forming a large group of quadrate to rectangular cells that become inflated in decurrencies 19.4-39.9 (x=30.9) X 11.4-19.4 (x=15.8) μm. Branch stems smaller, not as broad, with shorter decurrencies, margins sharply serrate and alar cells not as lax. Autoicous. Perichaetia cylindrical, leaves ecostate to faintly costate, sheathing at base, with reflexed tips, outer leaves ovate-acute to short-acuminate, inner leaves longer, ovate and more acuminate; margins plane, entire and ± bordered by a single row of rectangular cells. Perigonia pyriform, leaves ecostate, ovate-acute to short-acuminate; margins plane, entire, and bordered by a

single row of rectangular cells. Setae 15.0-29.0 (x=19.8) mm long, red-brown, with scattered low papillae above and smooth below. Capsules 1.1-2.0 (x=1.4) X 0.7-1.0 (x=0.8) mm, horizontal, cylindrical, curved, dark red-brown, ± blackened with age; exothecial cells reticulate, of unequal size, irregularly quadrate cells and uniformly thickened walls; cilia 1-2, nodose and appendiculate, with scattered papillae. Spores 13.2-18.7 (x=15.4) µm finely papillose. The rest unknown.

TYPIFICATION: Dusén's name was validly published, although no specimen was cited after the protologue description (ICBN 32.1). As is typical of many Dusén specimens, inconsistent collection numbers appear on "duplicate" specimens in various herbaria. In the following discussion, I refer to collections by their collection dates and cite collection numbers between (). I designate the specimen S labeled "Chile, Patagonia occ., in valle fluminis Aysen, in terra, Feb. 17, 1897, P. Dusén" as the lectotype, since it fits the protologue description, is from Dusén's herbarium, and bears a handwritten label written in Dusén's cursive style. Duplicate specimens at PC(567) and S(567) collected "Feb. 17. 1897" are considered isolectotypes. Specimens from M(A4), NY(A4), PC(567), S(2-567), and WU(567) collected "Feb. 16. 1897" are considered representative specimens.

COMMENTS: I consider this specimen to be a member of the section *Reflexa* because of the distinctive broad and long decurrencies, leaf morphology, subpercurrent costa, and papillose upper seta.

* * *

Brachythecium fissidentoides Herz., Biblioth. Bot. 87: 160. 1916.

Type specimen (lectotype *des. mihi*) JE: "Bolivia, In der Quebrada de Pocona, auf nassen Steinen, ca. 2800 m, *Herzog 5113*." [!]

Plants medium-sized, dark green, forming mats. Stems to 4.5 cm long, prostrate, terete, densely foliate, with tufted rhizoids in older portions, freely branched; branches to 1.5 cm long, terete, ± tapering at the ends; central strand narrow, inner cortex cells large and thin-walled, becoming smaller with slightly thickened walls towards stem surface; pseudoparaphyllia triangular. Leaves 2.0-2.5 (x=2.2) X 0.7-1.1 (x=0.8) mm, erect to patent, concave, with narrow decurrencies, not to slightly plicate, ovate, abruptly or gradually tapering to long, slender, ± flexuose and half-twisted apices; margins recurved at base, plane above, serrulate to serrate above, entire below; costae broad at base, tapering above and ending near midleaf (46%), with one or more short lateral spurs. Median leaf cells fusiform 47.9-100.3 (x=73.2) X 9.1-11.4 (x=10.3) μm; apical cells more linear 45.6-114.0 (x=71.8) X 5.7-11.4 (x=7.9) μm; basal cells rectangular and lax, ± pitted 45.6-96.9 (x=57.6) X 14.8-27.4 (x=20.5) μm; alar cells weakly defined, quadrate to rectangular 17.1-62.7 (x=29.9) X 11.4-26.2 (x=18.1) μm. Dioicous. Perichaetia pyriform to cylindrical, leaves ecostate, sheathing at base, outer leaves ovate, acute, inner leaves longer, slenderly acuminate; margins plane, entire, ± bordered by a single row of elongate rectangular cells. Perigonia not observed. Setae 8.0-15.0 (x=12.0) mm long, red-brown, smooth. Capsules 1.3-2.1 (x=1.6) X 0.3-0.6 (x=0.5) mm, erect to slightly inclined, cylindrical and slightly curved, greenish brown to light red-brown; exothecial cells rectangular, in vertical

rows, walls uniformly thickened; annulus undifferentiated; operculum 0.8-0.9 X 0.6-0.7 mm, conic-apiculate; cilia 1-3, nodose. Spores 13.6-15.9 (x=14.9) µm, finely papillose.

TYPIFICATION: The type of this species is represented by four isotypic specimens "Bolivia, In des Quebrada de pocona auf nassen Steinen, ca 2800 m, *Herzog 5113*" one each, in the herbaria at H, JE, L, and PC. I designate the specimen at JE as the lectotype since it fits the protologue description and is from the author's herbarium. Duplicates of this specimens at H, L, and PC are considered to be isolectotypes.

COMMENTS: Herzog described this species as being autoicous; however, this could not be confirmed from examining the lectotype or isolectotype specimens. I consider the species to be dioicous.

The growth form, leaf shape, areolation, and sporophytic characters of this specimen fall within the accepted range of variation for *B. conostomum*.

* * *

Brachythecium flaccum C. Müll., Nuovo Giorn. Bot. n. ser. 4(2): 156. 1897.

Type specimen (lectotype *des. mihi*) FI: "Bolivia, provincia Cochabamba prope Choquecamata, Jun. 1889. ex. herb. E. Levier, *Germain 1160*." [!]

Plants small- to medium-sized, yellow-green. Stems to 5.0 cm long, prostrate, densely foliate, irregularly to subpinnately branched; branches to 1.5 cm long, short, unequal, attenuate, ± hooked at apices; central strand narrow, inner cortex cells large, gradually becoming

smaller and thick-walled toward stem surface; pseudoparaphyllia ovate-acuminate. Leaves 1.1-1.7 (x=1.4) X 0.4-0.8 (x=0.6) mm, erect-imbricate, straight or circinate, slightly decurrent, concave and plicate at leaf base, ovate-lanceolate to lanceolate, acuminate, twisted at apices; margins reflexed at base, plane above, serrate in apices, serrulate to base; costae broad at base, tapering above, ending above middle (67%) in a dorsal spine. Median leaf cells long rhomboidal, in older leaves becoming linear 45.6-96.9 (x=65.8) X 4.6-6.8 (x=5.8) μm; apical cells slightly shorter 38.5-68.4 (x=43.8) X 3.4-10.3 (x=6.3) μm; basal cells shorter, rectangular to hexagonal, ± pitted 28.5-47.9 (x=37.4) X 6.8-22.8 (x=11.4) μm; alar cells forming small groups, quadrate to irregularly rectangular 13.7-36.5 (x=29.0) X 6.8-12.5 (x=10.0) μm. Autoicous. Perichaetia cylindrical, leaves sheathing at base, ± ecostate, outer leaves short ovate-acuminate, inner leaves longer, ovate, long and slenderly acuminate; margins plane, entire and ± bordered by a single row of rectangular cells in lower portion. Perigonia pyriform, leaves ecostate, ovate-acuminate; margins plane, entire and ± bordered by a single row of rectangular cells. Setae 11.0-16.0 (x=13.3) mm long, red-brown, smooth. Capsules 1.0-1.6 (x=1.3) X 0.5-1.0 (x=0.75) mm, horizontal to erect, short cylindrical and curved, constricted below mouth, red-brown to dark red-brown; exothecial cells rectangular, uniformly incrassate; annulus of two rows of inflated cells; operculum 0.6 X 0.75 mm, conic; cilia 2, nodose and appendiculate, papillose. Spores 9.0-15.0 (x=12.5) μm, finely papillose.

TYPIFICATION: Müller's introduction (1897, fasc. I, p. 5) stated the specimens used to prepare descriptions were Germain collections from "Bolivia provincia Cochabamba prop. Choquecamata 1889" in the Levier Herbarium at FI. With the loss of Müller's herbarium at B, it is unknown if Müller retained the original specimens in his herbarium or if he returned them to FI. The type of this species is represented by nine isotypic specimens, one each, in the herbaria at G, H, JE, M, NY, PC, and S, and two at FI. I designate one of the specimens at FI as the lectotype since it fits the protologue description and is from Levier's herbarium. Duplicate specimens at FI, G, JE, L, M, NY, PC, and S all *ex* herb. E. Levier, are considered isolectotypes.

COMMENTS: The growth form, leaf morphology, areolation and sporophyte characters of this specimens fit within the accepted range of variation for *B. occidentale*.

In the Levier Herbarium (FI) there is one Germain specimen Bolivia, provincia Cochabamba prop. Choquecamata, Germain 1158, Jun. 1889 labeled, "*Brachythecium flaccum* C. Müll. n. sp. var. *nanum* C. M." This varietal name is not valid since it has not been published and is, therefore, considered a *nom. herb.* I refer this specimen to *Brachythecium occidentale* (Hamp.) Jaeg.

* * *

Brachythecium flexinerve Card., Rev. Bryol. Lichénol 37: 67. 1910.

Type specimen (lectotype *des. mihi*) PC: "Mexico, Hildalgo, Cuzamaloza, Sept., 22, 1908. 8500 ft., *C. G. Pringle 10620*." [!]

Plants medium-sized, sordid yellow-green, matted caespitose. Stems to 1.5 cm long, decumbent to erect, terete, densely foliate, irregularly

and pinnately branched; branches to 0.6 cm long, erect, terete, densely foliate, tapering; central strand narrow, inner cortex cells large and thin-walled, outer 2-3 layers of cells smaller and thick-walled; pseudoparaphyllia ovate-acuminate. Leaves 1.1-1.4 (x=1.2) X 0.4-0.6 (x=0.5) mm, erect when dry becoming open-erect when moist, concave, slightly decurrent, not plicate, ovate to ovate-lanceolate, acuminate, with apices ± bent to one side; margin recurved at base, plane or slightly recurved above, serrulate to serrate in upper half; costae broad at base, quickly tapering above, ending near middle (53%) in an inconspicuous spine. Median leaf cells rhomboidal to fusiform 37.6-75.2 (x=56.3) X 5.7-8.0 (x=6.4) μm; apical cells similar, fusiform 39.9-85.5 (x=55.5) X 5.7-6.8 (x=6.0) μm; basal cells irregularly rectangular 20.5-52.4 (x=36.4) X 8.0-14.8 (x=11.2) μm; alar cells forming a discrete group of quadrate to rectangular cells, ± in rows, 17.1-28.5 (x=21.9) X 8.0-17.1 (x=14.3) μm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate-acuminate, inner leaves longer, slender long-acuminate; margins plane, entire and ± bordered by a single row of rectangular cells below. Perigonia not observed. Setae 12.0-16.0 (x=14.6) mm long, red-brown, smooth. Capsules 1.1-2.5 (x=1.8) X 0.5-1.1 (x=0.7) mm, suberect, cylindrical and curved, reddish yellow-green; exothecial cells rectangular, in vertical rows, lateral walls thicker than end walls; annuli not differentiated; cilia 2-3, nodose and papillose; opercula 0.6-0.9 (x=0.8) X 0.5-0.8 (x=0.6) mm, long conic, ± apiculate. Spores 11.0-15.4 (x=13.2) μm, finely papillose.

TYPIFICATION: Cardot cited two syntypic Pringle specimens from Mexico in the protologue, "Etat de Hidalgo, Cuzamaloza, 1908, 10620,"

and, "Etat de Puebla Honey-station, 1908, 15317 *in parte*." I have examined 24 duplicates of *Pringle 10620* and one specimen of *Pringle 15317*. I designate one of the two *Pringle 10620* specimens from PC as the lectotype since it fits the protologue and is from Cardot's herbarium (identifiable by its handwritten label with "Herb. J. Cardot" stamped on it). Duplicate specimens at BM, C, CANM, FH(2), FI, G, GL, H-BR, JE, L(2), M, MO, NY, PC, S(4), UPS, US, and VT are considered isolectotype. Pringle specimen 15317 at PC is considered a paratype.

COMMENTS: The growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium flexiventrosum (C. Müll.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 321. 1878 (Ad. 2: 387)

Basionym: *Hypnum (Brachythecium) flexiventrosum* C. Müll., Linnaea 38: 653-654. 1874.

Type specimen (lectotype *des. mihi*) PC: "Mexico, forsan, Mirador, Typus com. Mus. Berlin, *Hb. C. Mohr*" *s.n.* [!]

Plants medium-sized. Stems 1.3 cm long, prostrate, densely foliate, irregularly to subpinnately branched; branches to 0.4 cm long, ascending, slender, tapering at tips, unequal in length; central strand narrow, inner cortex cells large, gradually becoming smaller and thick-walled toward stem surface; pseudoparaphyllia ovate-acuminate. Leaves 1.0-1.4 (x=1.2) X 0.3-0.5 (x=0.4) mm, erect-imbricate, straight or occasionally curved, slightly concave and plicate at leaf bases, with a slight decurrencies, lanceolate to ovate-lanceolate, acuminate, ±

twisted at apices; margins reflexed at base, plane above, serrate in apices, serrulate to base; costae broad at base, tapering above, ending near middle (49%) with an inconspicuous dorsal spine. Median leaf cells long-rhomboidal to linear 36.5-61.6 (x=53.6) X 5.7-8.0 (x=6.4) μm; apical cells slightly shorted 41.0-59.3 (x=48.1) X 4.6-6.8 (x=5.9) μm; basal cells shorter, rectangular to hexagonal ± pitted 23.9-43.3 (x=33.5) X 5.7-11.4 (x=8.2) μm; alar cells forming small indiscrete groups, quadrate to irregularly quadrate or rectangular 11.4-26.2 (x=18.9) X 8.0-16.0 (x=11.6) μm. The rest unknown.

TYPIFICATION: This species is represented by one isotypic specimen, "Mexico, forsan Mirador, *Hb. C. Mohr*," in the herbarium at PC. With the loss of Müller's herbarium at B, I designate the specimen at PC as a lectotype since it fits the protologue description and was originally from the Berlin Herbarium. No other specimens of this species were made available to me.

COMMENTS: Reports of *B. flexiventrosum* for Central America and northern South America are based on distorted or imperfect concepts of the species. An expanded discussion of this species *sensu* other authors is presented in the species comments of *Brachythecium occidentale* (Hamp.) Jaeg. (p. 180).

The growth form, leaf morphology, and areolation of this specimen fit within the accepted range of variation for *B. occidentale*.

* * *

Brachythecium fossarum C. Müll., Hedwigia 40: 77. 1901.

Type specimen (lectotype *des. mihi*) HBG: "Brazilia, St. Catharina, An einem feuchten Abhange der Garcia bei Blumenau, Julio 1888, *E. Ule 370*." [!]

Plants slender, medium-sized, yellow-green, forming open spreading cushions. Stems to 8.0 cm long, prostrate to ascending, terete, densely foliate, ± pinnately branched; branches to 3.2 cm long, terete, tapering, becoming shorter toward stem apices, older branches stemlike and irregularly rebranched; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 1.3-1.8 (x=1.6) X 0.7-0.8 (x=0.8) mm, erect ± imbricate when dry, erect-imbricate to patent when moist, concave, slightly decurrent, plicate, ovate to ovate-lanceolate, acuminate to ovate gradually long-acuminate; margins entire and recurved at base, plane above, serrulate in upper 2/3, smooth below; costae broad at base, tapering above and ending near middle (59%). Median leaf cells fusiform to linear 63.8-102.6 (x=76.7) X 5.7-8.0 (x=6.6) μm; apical cells similar 47.9-82.1 (x=64.8) X 4.6-6.8 (x=5.7) μm; basal cells irregularly rectangular 39.9-68.4 (x=51.3) X 6.8-17.1 (x=11.3) μm; alar cells lax, quadrate to rectangular, extending into decurrencies 17.1-51.3 (x=30.2) X 8.0-14.8 (x=12.0) μm. The rest unknown.

TYPIFICATION: This species is represented by two implied syntypic E. Ule specimens "Brazilia, Blumenan, im Graben an der Garcia, Julio 1888, *E. Ule 369*," one in each of the herbaria HBG, and H-BR; and "Brazilia, St. Catharina, An einem Abhange der Garcia bei Blumenau, Julio 1888, *E. Ule 370*," one in each of the herbaria at FI, HBG, H-BR, and M. Since the specimen cited in the protologue, "Brazilia, Sa. Catharina, in fossis fluminis Garcia, Julio 1888, *E. Ule*. lacks a collection number, it is unknown if Müller was referring to both or just

one Ule specimen. Thus, I assume Müller cited these two specimens collectively and consider them to be syntypic. With the loss of the original material in Müller's herbarium at B, I designate the *E. Ule 370* specimen at HBG as the lectotype since it fits the protologue description. Duplicates of this specimen at FI, H-BR, and M are considered to be isolectotypes. The *E. Ule 369* specimens at HBG, and H-BR are considered paratypes.

COMMENTS: The growth form, leaf morphology and areolation of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium frigidum (C. Müll.) Besch., Mém. Soc. Sci. Nat. Cherbourg 16: 248. 1872.

Basionym: *Hypnum frigidum* C. Müll., Bot. Zeitung (Berlin). 14: 456. 1856.

Type specimen (neotype *des.* Robinson 1963, p. 137) US: "Mexico, Ixtaccihuatl, near the Glaciers, Jan. 1909. *C. A. Purpus 3722*" [!]: isotypes; CANM (permanent-mounted slide only) [!], F [!], FH [!], NY [!], MO [!], PC [!], and US [!].

Plants robust, yellow-green, in erect dense and deep cushions. Stems to 5.0 cm long, erect terete, infrequently and irregularly branched; branches to 2.0 cm long, erect, terete, of various lengths; central strand narrow, inner cortex cells large and thin-walled, becoming smaller with slightly thicker walls towards stem surface and the outermost layer of cells small; pseudoparaphyllia deltoid to broadly ovate, short-acuminate. Leaves 1.8-2.7 (x=2.4) X 0.9-1.5 (x=1.1) mm,

erect-imbricate when dry, becoming more open when moist, concave, long decurrent, strongly plicate, broadly-ovate to ovate, gradually acuminate, or elongate-triangular, apices ± twisted; margins reflexed at base, plane above, serrulate to near base or serrulate above and entire below; costae broad at base gradually tapering above, ending above middle (73%). Median leaf cells long fusiform to linear 59.3-102.6 (x=75.7) X 6.8-11.4 (x=9.8) μm; apical cells shorter 34.2-75.2 (x=54.3) X 2.3-11.4 (x=7.5) μm; basal cells lax, irregularly rectangular, with a distinct row of larger cells at stem insertion 43.3-88.9 (x=63.7) X 11.4-35.3 (x=19.6) μm; alar cells quadrate, becoming inflated, rectangular in decurrencies 22.8-61.6 (x=43.5) X 18.2-28.5 (x=23.0) μm. The rest unknown.

COMMENTS: The original specimen cited by Müller, "Mexico ad Rio Frio inter Puebla et Mexico, in montibus editioribus planitiei editae, in sylvis Thujae et aliarum Coniferarum, in tractu montis vulcanici Itztaccihuatl: 1849, *v. Chrismar*," is apparently lost or destroyed. There are no isotypic specimens to be found in other herbaria. Because of this lack of original (type) specimens, Robinson (1963, p. 137) designated the *Purpus 3722* topotypic specimen at the US herbarium as the neotype. The neotype differs from the protologue description by its erect growth form and lack of a sporophyte. However, the distinctive strongly plicate, concave leaves, and inflated alar cells extending into the long decurrencies, bring this neotype into alignment with the protologue description.

I consider this specimen to be closely related with other taxa in the section *Brachythecia*.

* * *

Brachythecium fuegianum (Besch.) Broth. Nat. Pfl. 1(3):1143. 1909. *nom dub. et illeg.*

COMMENTS: In 1909 Brotherus (p. 1143) made a new combination *Brachythecium fuegianum* based on "(Besch. als *Stereophyllum*) in Fuegia." Index Muscorum (Wijk et al., Vol. 4, p. 569) listed this new combination as *S. fuegianum hom. illeg.* of 1889. Since Bescherelle twice published *S. fuegianum* (1885 and 1889) and types for both were cited from Tierra Del Fuego, either name could apply to Brotherus's reference "in Fuegia." Thus, according to ICBN 33.1, Brotherus's combination is not validly published. For this reason, I consider *B. fuegianum* (Besch.) Broth. to be a *nom. dub.*

Description, typification and comments on *Stereophyllum fuegianum* Besch., Miss. Sc. Cap. Horn 5(Bot): 302. 1889. follows.

* * *

Stereophyllum fuegianum Besch., Miss. Sci. Cap. Horn. 5(Bot): 302. 1889. *hom. illeg. incl. spec. prior.*

[*non Stereophyllum fuegianum* Bull. Soc. Bot. France 32: LXVII. 1885.]

[See *Brachythecium fuegianum* (Besch) Broth., above.]

Type specimen (lectotype *des. mihi*) PC: "Ile Hermite, baie St. Martin, T. d. Fueg., 1883, det. Besch, Herb. J. Cardot *Hariot*" *s.n.* [!]

Plants moderately robust, julaceous, shiny, deep yellow-green. Stems to 4.0 cm long, erect, terete, sparsely and irregularly branched; branches to 0.4 cm long, short and tapering, terete, distinctly smaller than stems; central strand narrow, inner cortex cells large and thin-walled, outer 2-3 layers of cells small with slightly thickened walls;

pseudoparaphyllia oblong-ovate, obtuse to apiculate. Leaves 1.2-1.9 (x=1.6) X 0.6-1.3 (x=1.2) mm, erect-imbricate when dry, little changed when moist, deeply concave with long, broad wings forming decurrencies, not plicate, cordate-ovate, abruptly constricted above forming short, narrow acumina 0.2-0.4 (x=0.3) with distinct, smooth or toothed shoulders at constrictions; margins reflexed at decurrencies, plane above, entire to slightly serrulate throughout; costae slender, broad at base, quickly tapering and/or branched above, ending near midleaf (54%). Median leaf cells not uniform in size, linear to linear-flexuous 66.1-102.6 (x=80.5) X 6.8-12.5 (x=8.1) µm; apical cells becoming shorter 30.8-70.7 (x=52.9) X 6.8-12.5 (x=9.7) µm; basal cells rectangular to irregularly rectangular, lax, ± pitted 34.2-91.2 (x=56.1) X 12.5-28.5 (x=17.9) µm; alar cells numerous, lax, filling the decurrencies 20.5-45.6 (x=36.1) X 14.8-34.2 (x=24.5) µm. The rest unknown.

TYPIFICATION: The type of this species is represented by six syntypic specimens based on the protologue as, "Terre de Feu: ile L' Hermite, baie Saint-Martin, *Hariot*," one at the herbaria at S, two at NY (one filed with *B. rivulare*, the other filed with *B. longidens*) and three at the herbarium at PC. Two of the syntypes in PC "*Stereophyllum fuegianum* Besch. *sp. nov*. Ile Hermite, baie St. Martin, 1 Janvier 1883, Mission Sc. Cap. Horn, *P. Hariot*" *s.n.*; and (Outside label) "*Stereophyllum fuegianum* Besch., Ile Hermite, Fuegian, 1883, Herb. Mus. Paris, *Hariot*" *s.n.*, (Inside label) "*Hypnum fuegianum ?* Mitt, Ile Hermite (T. de. Feu.) baie St. Martin, 1 Janiver 83, *H. 123*" do not fit the protologue description and are referred (by me) to *Brachythecium paradoxum* (Hook. *f. et* Wils.) Jaeg. Of the four outstanding specimens,

all of which fit the protologue description I have selected the one remaining specimen at PC as the lectotype. This specimen best represents the taxon since it fits the protologue description and was determined by Bescherelle. The remaining three specimens at NY(2) and S are considered paratypes.

COMMENTS: The taxonomic status of this species has been obscured because of a reckless nomenclatural treatment by its author. Bescherelle first published the name *Stereophyllum fuegianum* in 1885 (Bull. Soc. Bot. France 32: LXVII.) citing the type specimen "Terre de Fue: ile Hermite, *Hariot, 130, et Hahn*," but without description. This name is illegitimate (ICBN 63.1) since Bescherelle cited as its synonym, the previously validly published name *Brachythecium longidens* C. Müll. "in *Flora* 1885," [Cited type specimen: Fuegia, Beagle Channel, Mayo 1882, *Spegazzini*]. Since *B. longidens* C. Müll. was validly published, *S. fuegianum* Besch. (1885) becomes a *nom. superf. in synon.* under it. Unfortunately, I am unable to determine the taxonomic status of *S. fuegianum* Besch. (1885) since I have not discovered any authentic (type) material. Finally, although of questionable resolve, I consider *B. longidens* to be a *nom. obsc.* since no original (type) material for this taxon appears extant (see comments on *B. longidens* in this chapter, p. 339).

Later, in 1889, Bescherelle again published *S. fuegianum* in "Miss. Sc. Cap. Horn 5(Bot): 302" and indicated that his 1885 *S. fuegianum* was not a synonym "*synon. excl.*" of this (his 1889) taxon, thus creating a *hom. illeg. incl. spec. prior.* (ICBN 64.1). Additionally, he included an unpublished name *Brachythecium stereophyllum* C. Müll., "*in lit.* juin

1886" (*nom. inval. in synon.* ICBN 34.1) as a synonym of the 1889 *S. fuegianum*.

The growth form, leaf morphology, and areolation of this specimen fit within the accepted range of variation for *B. majusculum* Newton.

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Brachythecium georgico-glareosum (Müll. *in* Nenmaner) Kindb., Enum. Bry. Exot., Suppl. 2. p. 97. 1891.

Basionym: *Hypnum (Brachythecium) georgico-glareosum* C. Müll. *in* Nenmaner, Deutsch. Exp. Int. Polarforsch. 2: 218. 1890.

Type specimen (lectotype *des. mihi*) PC: "Austro-Georgia, Ex Museo botanico Berlinensi, 14/I/1883 *Will*," *s.n.* [!]

Plants medium-sized, pale yellow-green, tufted. Stems to 6.4 cm long, erect, terete, densely foliate, tapering at tips, irregularly branched; branches to 2.5 cm long, erect terete, tapering at tips; central strand narrow, inner cortex cells large and thin-walled, becoming smaller with slightly thickened walls at stem surface; pseudoparaphyllia ovate. Leaves 2.3-3.2 (x=2.8) X 1.1-1.6 (x=1.2) mm, erect to erect-patent when dry, becoming more open when moist, concave, slightly decurrent ± with small round auricles, strongly plicate, broadly ovate to ovate, gradually tapering and abruptly forming short apices; margins reflexed at base, plane above, ± serrulate in apices, entire below; costae broad at base, narrower and gradually tapering above, ending near middle (62%). Median leaf cells fusiform to linear 62.7-119.7 (x=90.1) X 8.0-10.3 (x=8.7) µm; apical cells similar and shorter 39.9-91.2 (x=68.1) X 6.8-12.5 (x=8.8) µm; basal cells rectangular, with slightly thickened and pitted walls 45.6-91.2 (x=68.4)

X 13.7-27.4 (x=20.3) µm; alar cells quadrate to rectangular, in weakly defined groups, 13.7-36.5 (x=24.9) X 12.5-22.8 (x=18.1) µm. Autoicous. Perichaetia cylindrical, leaves sheathing at base, ecostate, outer leaves orbicular, inner leaves ovate and long-acuminate; margins entire, not bordered. Perigonia pyriform, leaves sheathing at base, ecostate, inner leaves orbicular, inner leaves ovate-acuminate; margins entire, bordered by a single row of rectangular cells. The rest unknown.

TYPIFICATION: The type of this species is represented by four syntypic specimens, "Austro-Georgia, Duelle auf dem Hochplateau cum *Hypnum austro-fluviatili*, sterile, 14 Julio, 1883 *Dr. Will*; Landjunge rarius, sterile, 14 Januario 1883, *Dr. Will*," one of each at PC, and as reported by Newton (1979, p. 127) one each at H-Br [*non vidi*]. With the loss of C. Müller's original herbaria at B, I designate the Will specimen [PC] collected on "14 Januario 1883" as the lectotype since it fits the protologue description and was originally from the B herbarium. The other Will specimen [PC] collected on "14 Julio 1883" at PC is considered a paratype. The two syntypic Will specimens at H-BR were not made available to me, thus their disposition remains uncertain although they may represent additional original material.

COMMENTS: Müller described this species as sterile; however, I did find perichaetia and perigonia on the syntype specimen.

Müller considered this species to be similar to *Hypnum austro-glareosum* C. Müll. (=*Brachythecium austro-glareosum*) from Kerguelen Island; differing in the plant being more compact and leaves with shorter apices. However, the growth form, leaf morphology, and areolation of this specimen fit within the accepted range for *B. austro-*

salebrosum. Hence, I concur with Newton (1979, p. 127) in considering *B. georgico-glareosum* to be a taxonomic synonym of *B. austro-salebrosum*.

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Brachythecium grandirete C. Müll., Nuovo Giorn. Bot. Ital. n. ser. 4(2): 155. 1897.

Type specimen (lectotype *des. mihi*) PC: "Bolivia, prope Choquecamata provincia Cochabamba, VI 1889, *Germain 5113*." [!]

Plants medium-sized, yellow-brown, forming mats. Stems to 2.0 cm long, prostrate, terete, densely foliate, with tufted rhizoids in older portions, freely branched; branches to 0.5 cm long, terete, ± tapering at the ends; central strand narrow, inner cortex cells large and thin-walled, becoming smaller with slightly thickened walls towards stem surface; pseudoparaphyllia triangular. Leaves 1.5-2.2 (x=1.8) X 0.7-0.9 (x=0.8) mm, erect to patent, concave, forming narrow decurrencies, not to slightly plicate, ovate, abruptly or gradually tapering into long, slender, ± flexuose and half-twisted acumina; margins recurved at base, reflexed at base serrulate to serrate above, entire below; costae broad at base tapering above and disappearing near midleaf (45%) with one or more short lateral spurs. Median leaf cells fusiform 45.6-91.2 (x=72.0) X 9.1-16.0 (x=12.0) µm; apical cells becoming more linear 62.7-106.0 (x=79.6) X 6.8-11.4 (x=8.8) µm; basal cells rectangular, lax, ± pitted, 45.6-79.8 (x=60.2) X 17.1-23.9 (x=19.8) µm; alar cells not well defined, quadrate to rectangular 22.8-47.9 (x=31.7) X 11.4-25.1 (x=19.8) µm. Dioicous. Perichaetia pyriform to cylindrical, leaves ecostate, sheathing at base, outer leaves ovate, acute, inner leaves longer, slenderly acuminate; margins plane, entire, ± bordered by a single row

of long rectangular cells. Perigonia not observed. Setae 12.0-16.0 mm long, smooth, yellowish red-brown. Capsule 2.2 X 0.7 mm, erect to slightly inclined, cylindrical and slightly curved, yellow-brown; exothecial cells rectangular, in vertical rows, with uniformly thickened walls; annulus undifferentiated; operculum 1.0 X 0.9 mm, conic-apiculate. Cilia and spores not observed.

TYPIFICATION: Müller's introduction (1897b, fasc. 1, p. 5) stated that specimens used to prepare descriptions were Germain collections from, "Bolivia provincia Cochabamba prop. Choquecamata 1889," in the Levier Herbarium at FI. With the loss of the Müller's herbarium at B, it is unknown if Müller retained the original specimen in his herbarium or if he returned it to FI. Type specimens of this species are represented by five isotypic duplicates, one each, in the herbaria at FI, G, H, NY, and PC. I designate the specimen at PC as the lectotype. This specimen fits the protologue description and was originally from Müller's herbarium at B. Duplicate specimens at FI, G, NY, and H (*ex* Herb. E. Levier) are considered isolectotypes.

COMMENTS: Müller described this species as being autoicous; however, I could not confirm this after examining the lectotype and isolectotypes specimens, and conclude the species is dioicous.

The growth form, leaf morphology, areolation, and sporophytic characters of this specimen fit within the accepted range of variation for *B. conostomum*.

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Brachythecium grandirete var. ***robustum*** C. Müll., in Par., Ind. Bryol. Suppl. 44. 1900. *nom. nud.*

COMMENTS: This variety is listed in Paris (1900, p. 44) and is represented by several duplicate specimens, "Bolivia, provincia Cochabamba prope Choquecamata, *Germain 1157* (*ex.* herb. Levier)," in the herbaria at FI(2), G, H, NY, and S. Paris (1900, p. 44) indicated that the variety was published and collected from the same location as the species; however, the variety is not mentioned in the species description nor published elsewhere and is therefore a *nom. nud.*

All specimens examined, bearing this illegitimate varietal name, are not distinct from the species' variation I know for *Brachythecium grandirete* and, therefore, fall within my concept of acceptable variation for *B. conostomum.*

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Brachythecium guatemalense McFarland sp. nov.

Type specimen (holotype) F: "Guatemala, Quezaltenango, Slopes of Volcan de Santa Maria above Palojunos, alt. 2400-3769 m, March 6, 1939, *Standley 67674.*" [!] Isotype FH.

Plants medium-sized, yellow-green, forming a thin mat. Stems to 4.0 cm long, loosely foliate, terete to complanate, prostrate with tufts of rhizoids, irregularly pinnately branched; branches to 1.5 cm long, progressively becoming shorter towards stem apices, distantly foliate, terete, prostrate to erect, tapering, with rhizoids at tips; central strand narrow, inner cortex cells large and thin-walled becoming smaller toward stem surface; pseudoparaphyllia orbicular, abruptly acuminate. Leaves loosely imbricate to spreading when dry becoming erect to spreading when moist, slightly concave, with long tapering decurrent wings, not to slightly plicate; stem leaves 1.2-1.6 (x=1.5) X 0.7-0.9

(x=0.8) mm, cordate-triangular to broadly ovate-lanceolate, acuminate, apices ± twisted and/or bent to one side; margins reflexed at bases and in acumina, plane elsewhere, serrate to serrulate in apices, serrulate to entire below; costae broad at base, quickly tapering above, ending above middle (60%) in an inconspicuous spine; branch leaves smaller, not as broad, margins more sharply serrate, costae stronger, ending in a spine. Median leaf cells fusiform 36.5-62.7 (x=51.4) X 5.7-10.3 (x=7.0) μm; apical cells similar 26.2-46.7 (x=39.4) X 5.7-8.0 (x=7.0) μm; basal cells irregularly rectangular 28.5-57.0 (x=37.3) X 6.8-12.5 (x=10.7) μm; alar cells numerous, small, quadrate to rectangular extending into decurrencies 11.4-28.5 (x=20.9) X 10.3-17.1 (x=12.1) μm, lower cells of decurrencies long and narrow. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves linear, abruptly acuminate, inner leaves with longer flexuose apices; margins plane, entire and ± bordered by a single row of rectangular cells below. Perigonia not observed. Setae 13.0-19.0 (x=15.2) mm long, red-brown, smooth. Capsules 0.9-1.8 (x=1.4) X 0.4-0.6 (x=0.5) mm, inclined to horizontal, short-cylindric, curved, constricted below mouth when dry, dark red-brown; exothecial cells rectangular to quadrate, ± in vertical rows, uniformly incrassate; annuli of two rows of small cells; cilia single, nodose; opercula 0.6-0.8 (x=0.7) X 0.4-0.6 (x=0.5) mm, conic-apiculate. Spores 11.0-15.4 (x=13.0) μm, finely papillose.

COMMENTS: The name of this species is derived from its restricted distribution in the higher elevation in Guatemala. Although perigonia were neither observed in the holotype nor isotype, they have been

observed in other specimens of this species. These perigonia are typical for the genus and confirm dioicy in this species.

I place this specimen in the section *Stereopoma*.

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Brachythecium hastifolium Card., Rev. Bryol. Lichénol 37: 69. 1910.

≡ [*Heterophyllum hastifolium* (Card.) Fleisch., Musci Fl. Buitenzorg 4: 1177. 1923. *comb. nov. superfl.*]

Type specimen (lectotype *des. mihi*) PC: "Mexico, Etat de Nuevo Leon, Sierra Madre, Monterey, 16 Mai 1889, *C. G. Pringle 723*." [!]

Plants medium-sized, yellow-green. Stems to 4.0 cm long, prostrate, terete, densely foliate, irregularly to subpinnately branched; branches to 1.0 cm long, terete, ± tapering at tips, central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 1.5-1.9 (x=1.8) X 0.4-0.9 (x=0.7) mm, erect ± imbricate when dry, erect to patent when moist, concave, slightly decurrent, plicate; elongate-triangular to ovate-lanceolate, long-acuminate with apices ± bent to one side; margins plane and recurved at base, serrulate in upper 2/3, smooth below; costae broad at base, tapering and ending near middle (55%). Median leaf cells fusiform to linear 62.7-114.0 (x=85.7) X 5.7-10.3 (x=7.9) µm; apical cells similar 57.0-91.2 (x=74.1) X 4.6-8.0 (x=7.0) µm; basal cells irregularly rectangular 39.9-68.4 (x=52.9) X 9.1-26.2 (x=13.8) µm; alar cells lax, quadrate to rectangular and extending into decurrencies 13.7-36.5 (x=21.5) X 9.1-17.1 (x=13.7) µm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base and squarrose at apices,

outer leaves ovate and long-acuminate, inner leaves longer and slenderly acuminate; margins plane, entire, and bordered by a single row of rectangular cells below. The rest unknown.

TYPIFICATION: Cardot cited two of Pringle's "Plantae Mexicanae" exsiccate specimens, "Etat de Nuevo Leon, Sierra Madre, 1889, *723*," and, "Etat de Puebla, Honey-station, 1908, *10474 in parte*," in the protologue. I have examined five syntypic specimens which fit the protologue description, one each of 723 from FI, H-BR, PC, and S, and one specimen of 10474 from PC. I designate *Pringle 723* at PC as the lectotype since it fits the protologue description; the label is written in Cardot's cursive style, and the specimen is deposited in his herbarium. Duplicates of this specimen at FI, H-BR, and S are considered isolectotypes. *Pringle 10474* at PC is considered a paratype. Specimens of *Pringle 10474* at CANM, FH, G, M, S(2),and US contain plant material of *Heterophyllium affine* (Mitt.) Fleisch., and are thus not considered original material.

COMMENTS: As noted by Thériot (1931, p. 38) a chaotic nomenclature for this taxon resulted after Fleischer made the new combination *Heterophyllium hastifolium* (Card.) Fleisch., based on a syntypic specimen (nontypic) which violated Cardot's protologue description. This error stemmed from the misuse of the name *B. hastifolium* for exsiccate divisions made of *Pringle's 10474* specimen, which Cardot had originally annotated as "*in parte*" for that portion of this specimen in his herbarium. As noted above in the typification of this species, all, except for the specimen at PC "*Brachythecium hastifolium Pringle 10747*," specimens are *Heterophyllium affine* (Mitt.) Fleisch. Fleischer surely

based his new (incorrect) combination on one of these specimens. Thus, the name *Heterophyllium hastifolium* (Card.) Fleisch. is a superfluous *comb. nov.* and is rejected.

The dioicous condition, leaf morphology, areolation, and growth form of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato.*

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Brachythecium helvolum (Mont.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 336. 1878. (Ad. 2: 402).

Basionym: *Leskea helvola* Mont., Syll. Gen. Spec. 19. 1856.

Type specimen (lectotype *des. mihi*) G: "Ecuador, Quito, *M. Jameson*" *s.n.* [!]

Plants medium-sized, pale yellow and glossy. Stems to 5.5 cm long, terete, densely foliate, irregularly to subpinnately branched; branches to 1.5 cm long, terete, densely foliate, tapering; central strand narrow, inner cortex cells large, gradually becoming smaller and thick-walled toward stem surface; pseudoparaphyllia ovate-acute. Leaves 1.6-2.3 (x=2.0) X 0.7-1.1 (x=0.9) mm, erect when dry, becoming more open when moist, concave, long-decurrent, slightly plicate, broadly ovate, gradually and long-acuminate with ± half-twisted apices; margins reflexed below, plane above, serrate above and serrulate below or serrate to base, teeth distant; costae broad at base, slender tapering, above, ending near middle (52%), ± in an inconspicuous dorsal spine; branch leaves smaller, narrower, less decurrent, more serrate along upper margins. Median leaf cells fusiform to linear 70.7-114.0 (x=92.8) X 6.8-9.1 (x=7.5) μm; apical cells similar 62.7-131.1 (x=88.2) X 5.7-8.0

(x=6.8) μm; basal cells rectangular to hexagonal, ± pitted 45.6-74.1 (x=58.4) X 8.0-14.8 (x=10.9) μm; alar cells forming distinct clusters of lax quadrate to rectangular cells 22.8-42.2 (x=31.5) X 13.7-26.2 (x=18.7) μm, with narrower rectangular cells filling the decurrencies. Autoicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate-acute, inner leaves longer, slenderly acuminate, apices ± reflexed; leaf margins plane and entire, sometimes weakly bordered by a single row of rectangular cells. Perigonia ovoid, leaves similar but shorter than perichaetial leaves. Setae 23.0-42.0 (x=35.6) mm, red-brown, densely papillose the entire length. Capsule 2.1 X 0.7 mm, (immature) horizontal, cylindrical and curved, light brown; exothecial cells rectangular, arranged in vertical rows, with uniformly thickened walls; annulus differentiated, 1-2 rows of inflated cells; operculum 0.5 X 0.5 mm, conic-apiculate with a darkened apex. Peristome and spores not examined.

TYPIFICATION: Only a single specimen of this species has been made available to me. This specimen, from the herbarium at G, is not considered holotypic since it is neither from the author's (PC, FI) (Sayre, 1977, p. 514), nor the collector's (BM, K, E) (Stafleu & Cowan, 1979, p. 421) herbarium. I therefore designate the single specimen in the herbarium at G as the lectotype since it fits the protologue description.

COMMENTS: The lectotype specimen consists of three plants glued to a card with several setae and one sporophyte. To preserve the specimen, examination of the peristome was not attempted.

The growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. rutabulum*.

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Brachythecium herzogii Broth., Nat. Pfl. ed. 2, 11: 365. 1925.

Basionym: [*Brachythecium scaberrimum* Herz., Biblioth. Bot. 87: 161. 1916. *hom. illeg.*]

Type specimen (lectotype *des. mihi*) JE: "An der Waldgrenze des Rio Saujana, ca. 3400 m. Oktober 1911, *Th. Herzog 3268*." [!]

Plants slender, medium-sized, forming a loose mat, olive-green to brown. Stems to 6.0 cm long, prostrate, julaceous, densely foliate, irregularly branched; branches to 2 cm long, erect; central strand narrow, inner cortex cells large and thin-walled, outer 2-3 layers of cells distinctly smaller with very thick walls; pseudoparaphyllia short-lanceolate to ovate-acute. Leaves 0.8-1.2 (x=1.0) X 0.3-0.5 (x=0.4) mm, loosely imbricate when dry, erect when moist, concave, plicate, not to slightly decurrent, narrowly to broadly lanceolate, acuminate with ± twisted apices; margins plane, serrate at tips smooth to serrulate below; costae broad at base, gradually tapering and ending above middle (71%) in a dorsal spine. Median leaf cells linear 45.6-74.1 (x=55.5) X 3.4-8.0 (x=5.4) µm; apical cells shorter 17.1-36.5 (x=29.3) X 3.4-8.0 (x=5.6) µm; basal cells shorter, with thickened, ± pitted walls 16.0-39.9 (x=26.4) X 3.4-9.1 (x=6.5) µm; alar cells quadrate, forming small distinct groups 11.4-34.2 (x=17.3) X 4.6-11.4 (x=7.9) µm. Synoicous. Perichaetia cylindrical, leaves sheathing at base, ecostate, outer leaves short ovate-acuminate; inner leaves longer ovate, slenderly

acuminate; margins plane, entire and ± bordered by a single row of rectangular cells. Setae 15.0-19.0 mm long, roughly papillose throughout, red-brown. Capsules, 1.1-1.3 X 0.7-0.9 mm erect, cylindrical and curved, ± slightly constricted below the mouth, dark red-brown; exothecial cells quadrate to rectangular and incrassate; cilia 1-2, nodose. The rest unknown.

TYPIFICATION: Herzog cited two specimens, "An der Waldgrenze des Rio Saujana, ca. 3400 m, No. 3268"; and "im Hochtal von Viloco, ca. 4500 m, No. 3141." in the protologue, but indicated that the latter specimen differed as a high Andean form, distinguished by the short, rumpled leaves. Additionally, on the label of the latter specimen, Herzog has inscribed "forma depauperate." I assume Herzog considered the former specimen to represent the taxon and designated this specimen in Herzog's herbarium at JE as the lectotype. Duplicates of this specimen in the herbaria at M, L, and S are considered to be isolectotypes. Herzog specimens 3141 at JE and S are considered paratypes.

COMMENTS: The binomial *Brachythecium scaberrimum* Cardot (Bull. Soc. Bot. Geneve ser 2,3: 291. 1911) predates Herzog's (1916) use of this name and makes it a later homonym (64.1, ICBN). Brotherus (Nat. Pfl. ed. 2. 11: 365. 1925.) gave a new name *Brachythecium herzogii nom. nov.* as a substitute for Herzog's *B. scaberrimum*.

The growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. praelongum*.

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Brachythecium hirtipes (Schimp. *ex* C. Müll.) Par., Ind. Bryol. ed. 2, 1:145. 1904.

Basionym: *Rhynchostegium hirtipes* Schimp. *ex* C. Müll., Nuovo Giorn. Bot. Ital. n. ser. 4(2): 157. 1897.

≡ [*Brachythecium hirtipes* Schimp., (Exsiccatae) Plantae Andium Boliviensium, 1863. *Mandon 1703; nom. herb.*]

Type specimen (lectotype *des. mihi*) BM: "Bolivia, Sorata, 1858, *Mandon 1703*." [!]

Plants medium-sized, greenish yellow, forming a loose mat. Stems to 4.0 cm long, terete, prostrate, subpinnately branched; branches to 0.8 cm long, ascending, terete, tapering; central strand narrow, inner cortex cells large and thin-walled, outer 2 cell layers small and thick-walled; pseudoparaphyllia ovate. Leaves 1.1-2.0 (x=1.6) X 0.5-1.3 (x=0.9) mm, open erect when dry, becoming erect to spreading when moist, stem leaves concave, strongly decurrent, not to slightly plicate, deltoid to ovate-acuminate, apices short and twisted; margins reflexed at base, plane above, serrulate in upper 1/2, entire below; costae slender, tapering from base, reaching to near middle (53%), occasionally ending in a dorsal spine; branch leaves concave, not or slightly decurrent, not or slightly plicate, ovate-lanceolate, acuminate, acumina longer and occasionally twisted. Median leaf cells linear 68.4-108.3 (x=93.0) X 5.7-8.0 (x=7.0) μm; apical cells slightly shorter 57.0-85.5 (x=69.0) X 5.7-9.1 (x=7.4) μm; basal cells larger and rectangular 34.2-79.8 (x=52.7) X 11.4-20.5 (x=15.8) μm; alar cells square to rectangular, becoming inflated-rectangular with adjacent smaller marginal cells in decurrencies 22.8-68.4 (x=46.2) X 13.7-25.1 (x=19.3) μm. Autoicous.

Perichaetia cylindrical, leaves ecostate; outer leaves sheathing at base, short, spreading, inner leaves longer, long-acuminate, squarrose; margins plane, entire or serrulate at apices and ± bordered by a single row of rectangular cells in lower portions. Perigonia ovoid, leaves ecostate, ovate-acuminate; margins plane, entire or serrulate at apices, bordered by a single row of rectangular cells in lower portions. Setae 11.5-29.0 (x=23.5) mm long, red-brown, strongly and densely papillose. Capsules 1.6-2.5 (x=2.1) X 0.8-1.1 (x=0.9) mm, horizontal, cylindrical and curved, dark red-brown; exothecial cells rectangular, in vertical rows, uniformly incrassate; cilia paired, nodose and papillose. Spores 11.4-14.8 (x=13.9) µm, finely papillose. The rest unknown.

TYPIFICATION: The type of this species, "Bolivia, prov. Larecaja, prope Sorta, 1858 *Mandon 1703*," is represented by five isotypic duplicates, one each in the herbarium at BM, PC, and three each at G. With the loss of Müller's original herbarium at B, I designate the specimen at BM as the lectotype since it fits the protologue description and is in Schimper's herbarium at BM. Duplicate specimens at G and PC are considered isolectotypes.

COMMENTS: Mandon's moss exsiccatae *Plantae Andium Boliviensium* was identified by Schimper, but never published. These Schimper-named specimens were later sent to Müller who described and published them (Sayre, 1975, p. 365). Schimper had originally labeled Mandon's specimen 1703 as *Brachythecium hirtipes*, yet Müller published this specimen as *Rhynchostegium hirtipes*. Later Paris (1904, p. 145) listed this specimen in his *Index Bryologicus* as *Brachythecium hirtipes*. Distribution of Mandon's exsiccatae did not constitute effective

publication (ICBN 29.1) or valid publication (ICBN 32.1); therefore, the basionym for this species falls to Müller's *R. hirtipes*.

The growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. rutabulum sensu lato*.

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Brachythecium hylocomioides Card., Rev. Bryol. Lichénol 37: 69. 1910.

Type specimen (holotype, implicit) PC: "Mexico, State of Puebla, Honey Station, on stones, 7000 ft, 16 June 1908, *C. G. Pringle 10484*" [!]

Plants slender, medium-sized, yellow-green, forming a dense spreading mat. Stems 4.0-7.0 cm long, prostrate, terete, densely foliate, with tufted rhizoids where attached to substrate, pinnately to subpinnately branched; branches to 0.8 cm long, equal in length, distinctly smaller than stems, spreading to erect, terete, tapering and ± curved; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate-acuminate. Stem leaves 1.2-1.4 (x=1.4) X 0.6-0.9 (x=0.8) mm, erect-imbricate when dry, erect to patent when moist, concave, plicate, slightly decurrent, broadly ovate-acuminate to deltoid, long-acuminate at tips, apices bent to one side, ± twisted, and ± reflexed; margins plane or reflexed at base, entire or serrulate in upper 2/3; costae broad at base, rapidly tapering above and ending near middle (54%); branch leaves smaller than stem leaves 0.9-1.4 (x=1.1) X 0.3-0.6 (x=0.5) mm, less plicate and decurrent. Median leaf cells rhomboidal to linear 36.5-65.0 (x=50.4) X 5.7-8.0 (x=7.0) μm;

apical cells similar 45.6-85.5 (x=62.5) X 5.7-8.0 (x=6.4) μm; basal cells becoming lax, irregularly rectangular 41.0-68.4 (x=51.6) X 9.1-20.5 (x=14.3) μm; alar cells numerous, lax, quadrate to rectangular, alar cells extending into decurrencies 13.7-30.8 (x=23.8) X 11.4-22.8(x=15.6) μm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate, long-acuminate, inner leaves longer and slenderly acuminate; margins plane, entire, and bordered by a single row of rectangular cells below. Perigonia not observed. Setae 20.0-21.0 mm long, red-brown, smooth. Capsules 1.5 X 0.6 mm, inclined to erect, cylindrical and curved, ± constricted below mouth when dry, dark red-brown to black; exothecial cells rectangular, in vertical rows, with thickened lateral and somewhat thinner end walls; cilia 1-2, nodose and papillose. Spores 13.7-17.1 (x=15.4) μm, finely papillose. The rest unknown.

TYPIFICATION: A case is made for an implicit holotype of this species because a single collection is cited by Cardot in the original description despite the existence (today) of numerous duplicates. In the Cardot herbarium at PC one Pringle specimen bearing a printed label of the exsiccate logo, is hand-inscribed (blue ink) with state location, collection number, date, and location information; and (black ink) with the species name. The cursive style of the blue-inked writing is the same as that found on other Pringle specimens in his herbarium at VT (presumably Pringle's cursive style). The black-inked writing is clearly in Cardot's cursive style. It seems plausible that Pringle sent this specimen to Cardot for identification with the collection number of Pringle's exsiccate. It is obvious that the information on the label of

this specimen was used for the specimen cited in the protologue since all of the duplicates of this specimen (all of which have identical printed exsiccate labels) differ in terms of type locality "Hidalgo" and the lack of substrate information. For these reasons and since this specimen fits the protologue description precisely, I find this specimen "the one specimen" (ICBN 7.3) used by Cardot in describing this species and consider it an implicit holotype. Duplicates of this specimen that I have examined from the following herbaria are considered isotypes: BM, CANM, FH(2), FI, G, H-BR, L(2), M, MO, NY(3), PC(2), S(4), TENN, UPS, US, and VT. The state location as printed on the labels of these isotypes, "Hidalgo," is in error since the town, Honey-station, is in Puebla as cited in the protologue.

COMMENTS: The dioicous condition, growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium immersum Thér., Rev. Bryol. Lichénol 9: 34. 18. 1936.

Type specimen (lectotype *des. mihi*) PC: "Equateur, cours d' eau du Pichincha, dans l' eau, 4,000-4,400 m, 6 novembre 1930, *R. Benoist 3178*." [!]

Plants robust, yellow-green above, dark brown to black below, in a dense mat. Stems to 6.0 cm long, terete, prostrate, irregularly to subpinnately branched; branches to 1.1 cm long, unequal in length, tapering, in one plane, distinctly smaller than stems; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller and slightly incrassate towards stem surface, outer layer of

cells very small and thick-walled; pseudoparaphyllia deltoid-acute. Stem and branch leaves distinctly differentiated. Stem leaves 1.1-1.7 (x=1.4) X 0.7-1.3 (x=1.1) mm, erect ± imbricate when dry, spreading to squarrose when moist, concave, strongly decurrent, plicate at base, broadly cordate-ovate, abruptly narrowed into short apices, ± bent to one side; margins reflexed at base, plane above, serrate to base; costae strong, broad at base, abruptly ending in acumen (86%), toothed above, ± ending in a dorsal spine. Branch leaves smaller 0.8-1.4 (x=1.1) X 0.3-1.0 (x=0.7) mm, erect to spreading, narrower, ovate-acute, concave, not to slightly decurrent. Median leaf cells fusiform to rhomboidal 34.2-59.3 (x=49.7) X 5.7-8.0 (x=6.5) μm; apical cells shorter, fusiform 28.5-51.3 (x=38.0) X 5.7-9.1 (x=7.4) μm; basal cells rectangular, ± pitted 30.8-62.7 (x=45.9) X 6.8-14.8 (x=9.6) μm; alar cells quadrate to rectangular, longer in decurrencies 22.8-51.3 (x=34.2) X 10.3-19.4 (x=15.2) μm. The rest unknown.

TYPIFICATION: The type of this species is represented by seven isotypic specimens, "Equateur, cours d'eau du Pichincha, 4,000 m, *M. R. Benoist 3178*," two in the herbarium at S and five in the herbarium at PC. I designate one of the five specimens from PC as the lectotype, since it fits the protologue description and is from Thériot's herbarium. Duplicate specimens at PC(4) and S(2) are considered isolectotypes.

COMMENTS: Steere's (1948, p. 148) typification of this species "*Benoist 3178 type fide Thériot 1936*" is not considered adequate for typification since it did not specify which of the *Benoist 3178* syntypes was being typified.

The growth form, leaf morphology and areolation of this specimen are characteristic of the genus *Kindbergia* (Brachytheciaceae). Basionym: *Stokesiella hom. illeg.*). I, therefore, make the new combination *Kindbergia immersum* (Thér.) McFarland *comb. nov.* This species is not treated taxonomically in this study since it is in a genus other than *Brachythecium*.

* * *

Brachythecium integrifolium Thér., Smithsonian Misc. Collect. 85(4): 37. 19. 1931

Type specimen (lectotype *des. mihi*) PC: "Mexico, Distrito Federal, Tlalpam, 2300 m., 3 VII 1913, *G. Arsene 9499*." [!]

Plants medium-sized, in a dense mat. Stems to 3.5 cm long, prostrate, terete, radiculose, hooked at tips, irregularly pinnately branched; branches to 0.8 cm long, short, unequal, spreading, attenuate, hooked at tips; central strand narrow, inner cortex large and thin-walled becoming smaller with thinner walls at stem surface; pseudoparaphyllia ovate, apiculate to acute. Leaves 1.1-1.8 (x=1.3) X 0.5-0.8 (x=0.6) mm, falcate-secund, appressed to erect when dry, becoming more open when moist, concave, slightly decurrent, not plicate, ovate-lanceolate, acuminate; margins plane above, reflexed below, entire; costae narrowed above from a broad base, often branched, and ending above middle (60%). Branch leaves distinctly smaller and narrower. Median leaf cells irregular-sized, short to long fusiform 12.5-50.2 (x=31.9) X 4.6-11.4 (x=7.4) µm; apical cells similar 34.2-51.3 (x=42.9) X 5.7-8.0 (x=6.5) µm; basal cells lax, oblong-rectangular 22.8-34.2 (x=29.6) X 9.1-17.1 (x=12.7) µm; alar cells ovoid to quadrate,

becoming inflated and hyaline in decurrencies 22.8-57.0 (x=39.3) X 12.5-28.5 (x=20.7) μm. Dioicous. Perichaetia not observed. Perigonia cylindrical, leaves ecostate, outer and inner leaves ovate abruptly acuminate; margins plane, entire, and bordered by a single row of rectangular cells. The rest unknown.

TYPIFICATION: The type of this species is represented by six isotypic specimens, "Mexico, Distr. Federal, Tlalpam, *Arsene 9499*," one each in the herbaria at BM, FH, MICH (slide mount), PC, S, and US. I designate the specimen at PC as the lectotype since this specimen fits the protologue description and is from Thériot's herbarium. Duplicates of this specimen at BM, FH, MICH, S, and US are considered isolectotypes.

COMMENTS: Thériot compared this species to *Brachythecium hylocomioides* Card., and *B. reflexum* Starke. From the protologue description and examination of isotypic specimens, I find the growth form and leaf areolation of this specimen are more typical of the genus *Drepanocladus* (Amblystegiaceae). Dr. Howard Crum (1985, pers. comm., University of Michigan, Ann Arbor, Mich. USA) is in agreement and considers this taxon to be equal to *Drepanocladus aduncus* var. *polycarpus* f. *gracilescens* (B.S.G.) Monk. Hence, this species is not treated taxonomically in this study.

* * *

Brachythecium jamaicense C. Müll., Bull. Herb. Boissier 5: 218. 1897.

Type specimen (lectotype *des. mihi*) BM: "Jamaica, Contenti Road 3000 ft ele., Growing on strong bark, Dec. 16, 1896, *W. Harris 10089*." [!]

Plants slender, medium-sized, yellow-green, forming a dense mat. Stems to 2.0-3.0 cm long, prostrate, terete, densely foliate, irregularly to subpinnately branched; branches to 0.8 cm long, spreading to erect, of unequal length, terete and ± tapering, becoming shorter towards stem apices; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate-acuminate. Leaves 1.0-1.5 (x=1.3) X 0.4-0.7 (x=0.6) mm, erect-imbricate when dry, erect to patent when moist, concave, moderately decurrent, somewhat plicate, ovate to ovate-lanceolate, acuminate with ± twisted tips; margins plane or recurved below, serrulate to serrate in upper 2/3; costae broad at base, tapering above and ending near middle (57%). Branch leaves smaller and with shorter decurrencies. Median leaf cells rhomboidal to linear 47.9-79.8 (x=62.5) X 5.7-8.0 (x=6.7) μm; apical cells similar 39.9-91.2 (x=65.7) X 5.7-8.0 (x=6.5 μm; basal cells irregularly rectangular 28.5-59.3 (x=43.5) X 8.0-27.4 (x=12.9) μm; alar cells lax, quadrate to rectangular extending into decurrencies 13.7-39.9 (x=24.5) X 8.0-18.2 (x=13.7) μm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate and long-acuminate, inner leaves longer and slenderly acuminate; margins plane, entire, and bordered by a single row of rectangular cells below. Perigonia ovoid, leaves ecostate, ovate-acuminate; margins plane, entire, and ± bordered by a single row of rectangular cells. Seta 5.0 mm long, red-brown, smooth. The rest unknown.

TYPIFICATION: The type of this species is represented by four isotypic duplicates, "Jamaica, Contenti Road, 3000 ped. altum, in

saxosis, Dec. 1896, *W. Harris* in Hb. Jamaicensi No. 10,089," one each, in the herbaria at BM, H, H-BR, and US. With the loss of the Müller's herbarium at B, I designate the specimen at BM as the lectotype because it fits the protologue description. Duplicate specimens at H, H-BR, and US are considered isolectotypes.

COMMENTS: The dioicous condition, leaf morphology, areolation, growth form, and sporophyte characters of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium jamaicense var. ***albidum*** Müll., Bull. Herb. Boissier 5: 218. 1897.

Cited specimen "Jamaica. *sine loco speciali*: 1878, *Boswell* in Hb. Geheeb. 1878." [*non vidi*]

COMMENTS: Whereas most *Brachythecium* species described by C. Müller from the southern neotropics are represented by duplicates of original materials distributed to other herbaria, no type specimen(s) or duplicates of this variety could be located. I, therefore, presume that all type materials have been lost or destroyed and refer this variety to a *nom. obsc.*

* * *

Brachythecium julaceum Schimp. *ex* C. Müll., Nuovo Giorn. Bot. Ital. n. ser. 4(2): 167. 1897. *nom. nud.*

≡ [*Brachythecium julaceum* Schimp., (Exsiccatae) Plantae Andium Boliviensium, 1858, G. Mandon 1707. *in herb.*]

Cited specimen: "Plantae Andium Boliviensium, Prov. Larecaja, Vicinus Sorata, Apachata de Chuchu Reg. alpina 4500 m, Mart. 1858, *G. Mandon 1707*." [!]

COMMENTS: This binomial was published by Müller in a list of Mandon specimens identified by Schimper. Although effectively published (ICBN 30.1), it was never validly published since it lacks a description (ICBN 32.1). Hence, *Brachythecium julaceum* Schimp. *ex* C. Müll. is considered to be a *nom. nud.*

Specimens of *Mandon 1707* that I have seen from BM(2) and PC(2) are all referred to *Brachythecium praelongum* Schimp. *ex* C. Müll.

* * *

Brachythecium laevifolium (Mitt.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 343. 1878. (Ad. 2: 409.)

Basionym: *Hypnum laevifolium* Mitt. J. Linn. Soc. Bot. 12: 565. 1869.

Type specimen (lectotype *des. mihi*) NY: "Columbia, Andes Bogotenses, Boqueron, prope Bogota (8600 ped.), ad lapides *Weir 295*." [!]

Plants medium-sized, yellow-brown, forming loose mats. Stems to 2.0 cm long, prostrate, terete, irregularly branched; branches to 1 cm long, erect, terete; central strand narrow, inner cortex cells large, gradually becoming smaller and thick-walled toward stem surface; pseudoparaphyllia orbicular to ovate-acute. Leaves 1.1-1.7 (x=1.5) X 0.4-0.8(x=0.6) mm, imbricate to erect when dry, patent when moist, concave, short-decurrent, not plicate, ovate to lanceolate, acuminate with short, abruptly ending apices, in older leaves the base rounded to

the insertion; margins reflexed at base, plane above, entire; costae broad at base, gradually tapering above, ending above midleaf (60%), occasionally with short lateral spurs. Median leaf cells fusiform to linear 39.9-68.4 (x=53.9) X 5.7-8.0 (x=7.0) μm; apical cells shorter, fusiform 36.5-68.4 (x=47.7) X 5.7-10.3 (x=7.4) μm; basal cells lax, fusiform to rectangular 22.8-62.7 (x=43.1) X 6.8-17.1 (x=11.4) μm; alar cells forming inconspicuous groups, quadrate to rectangular 11.4-29.6 (x=21.8) X 8.0-11.4 (x=9.9) μm. Autoicous. Perichaetia cylindrical, leaves sheathing at base, ecostate, outer leaves appressed, ovate-acute to short-acuminate, inner leaves long-acuminate; margins plane, entire, ± bordered by a single row of rectangular cells below. Perigonia pyriform, leaves ecostate, outer leaves ovate, inner leaves ovate-apiculate to short-acuminate; margins plane, entire, bordered with a single row of rectangular cells. Setae 16.0-20.0 long, dark red-brown, with numerous low papillae above, gradually becoming smooth at base. Capsules 1.6-1.7 X 0.7-0.8 mm, suberect to horizontal, cylindrical and curved, oblong-ovoid red-brown; exothecial cells in vertical rows, quadrate to rectangular, walls uniformly thickened; annulus of one row of narrow cells; operculum 1.0 X 0.6 mm, conic-apiculate. Cilia not observed. Spores immature.

TYPIFICATION: The type of this species is represented by two isotypic specimens "Andes Bogotenses, Boqueron, prope Bogota (8600 ped.), ad lapides, *Weir* 295," one each at NY and S. I designate the specimen at NY as the lectotype since it fits the protologue description and comes from the author's herbarium. The specimen at S is considered an isolectotype.

COMMENTS: The growth form, leaf shape, areolation, and sporophytic characters of this specimen fit within the accepted range of variation for *B. plumosum sensu lato.*

* * *

Brachythecium lanceolifolium Card., Rev. Bryol. Lichénol 37: 66. 1910.

Type specimen (holotype implicit) PC: "Mexico, Etat de Nuevo Leon, Sierra Madre, Monterey, 2800 ft., 27 May 1908, *C. G. Pringle 15098.*" [!]

Plants slender, small-sized, yellow-green, forming a dense mat. Stems to 2.0 cm long, terete, densely foliate, with tufted rhizoids where attached to substrate, irregularly to subpinnately branched; branches to 0.7 cm long, unequal in length, spreading to erect, terete, not tapering; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller toward stem surface; pseudoparaphyllia ovate-acuminate. Stem leaves 1.1-1.5 (x=1.2) X 0.4-0.7 (x=0.6) mm, erect-imbricate when dry, erect-patent when moist, concave, slightly decurrent, plicate, ovate to lanceolate, short- or gradually long-acuminate with apices bent to one side, ± twisted; margins plane or reflexed at base, entire or serrulate in apices; costae broad at base, quickly tapering above with one or more short lateral spurs and ending near middle (60%) ± in an inconspicuous spine. Branch leaves smaller than stem leaves. Median leaf cells fusiform 34.2-66.1 (x=51.0) X 5.7-8.0 (x=7.0) µm; apical cells similar 34.2-70.7 (x=49.6) X 5.7-9.1 (x=6.8) µm; basal cells becoming lax, irregularly rectangular 28.5-45.6 (x=36.6) X 11.4-22.8 (x=16.4) µm; alar cells numerous, lax, quadrate to rectangular, arranged more or less in columns of cells 13.7-

39.9 (x=23.7) X 12.5-20.5 (x=16.4) μm, but not sharply delimited from lower median and basal cells. The rest unknown.

TYPIFICATION: A case is made for an implicit holotype of this species because a single collection is cited by Cardot in the original description despite the existence (today) of numerous duplicates. In the Cardot herbarium at PC, of the three Pringle 15098 specimens, only one bearing a printed label of Pringle's older exsiccate logo is hand-inscribed (blue ink) with state location, collection number, date, and location information; and (black ink) with the species name. The cursive style of the blue-inked writing is the same as that found on other Pringle specimens in his herbarium at VT (presumably Pringle's cursive style). It seems plausible that Pringle sent this specimen to Cardot for identification with the collection number of Pringle's exsiccate. I find this specimen "the one specimen" (ICBN 7.3) used by Cardot in describing this species and consider it an implicit holotype. Duplicate specimens at FI, H-BR, NY, PC(2), S, US, and VT are considered to be isotypes.

COMMENTS: Brotherus (1925, p. 360) indicated that Cardot considered *Brachythecium tenuinerve* Card., *Brachythecium albulum* Besch. *ex* Card., and *Brachythecium lanceolifolium* Card., as synonyms of *Brachythecium acuminatum* (Hedw.) Aust. I recognize these three taxa as being synonymous with *Brachythecium stereopoma* (Spruce *ex* Mitt.) Jaeg. Little relationship between *B. acuminatum* and *B. stereopoma* is apparent since *B. stereopoma* differs from *B. acuminatum* by the presence of cilia on the inner peristome, larger leaf cells and much more slender costae.

In Sharp and Crum (unpublished) *Mexican Moss Manual*, I treat *B. lanceolifolium* as a species. After examining the many isotypic specimens, I find this taxon nothing more than a depauperate form of *B. stereopoma sensu lato*.

* * *

Brachythecium lanceolifolium var. ***gracile*** Card., Rev. Bryol. Lichénol 37: 66. 1910.

Type specimen (lectotype *des. mihi*) PC: "Mexico, Etat de Nuevo Leon, Sierra Madre, Monterey, 2800 ft., 27 May 1908, *C. G. Pringle 10454*." [!]

Plants slender, small-sized, yellow-green, forming a thin mat. Stems to 3.0 cm long, terete, densely foliate, decumbent, with tufted rhizoids where attached to substrate, irregularly to subpinnately branched; branches unequal in length, to 0.6 cm long, spreading to erect, terete, not tapering; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller toward stem surface; pseudoparaphyllia ovate-acuminate. Leaves 0.9-1.3 (x=1.1) X 0.3-0.5 (x=0.4) mm, erect-imbricate when dry, erect-patent when moist, concave, slightly decurrent, not plicate, ovate to lanceolate, short- or gradually long-acuminate with apices ± bent to one side and ± twisted; margins plane or reflexed at base, entire or serrulate in apices; costae broad at base, quickly tapering above with one or more short lateral spurs and ending near middle (54%) in an spine. Median leaf cells fusiform 41.0-57.0 (x=49.6) X 5.7-10.3 (x=7.0) µm; apical cells similar 35.3-85.5 (x=54.9) X 5.7-9.1 (x=7.3) µm; basal cells lax, irregularly rectangular, 22.8-50.2 (x=35.9) X 9.1-20.5 (x=12.7) µm; alar cells

numerous, lax, quadrate to rectangular, arranged more or less in columns 16.0-34.2 (x=26.1) X 9.1-19.4 (x=13.6) μm, but without sharp demarcation from lower median and basal cells. The rest unknown.

TYPIFICATION: Cardot cited three Pringle "Plantae Mexicanae" exsiccate specimens, "Meme localité que le type *no. 10453, 10454, 15097*" in the protologue as types. I designate the *Pringle 10454* at PC as the lectotype since it fits the protologue description and is in Cardot's herbarium. Duplicates of this specimen were distributed by Pringle with dual collection numbers *10453 and 10454*. These duplicate specimens (with dual numbers) at B, BM, CANM, FH(3), G, GB, H-BR, JE, L(2), M, MO, NY(2), PC(2), S(4), TENN, US, VT, and WU along with *Pringle 10454* specimens at BM and PC are considered to be isolectotypes. *Pringle 15097* specimens at C, PC, TENN, and US, and the *Pringle 10453* specimen at PC are considered to be paratypes. *Pringle 10453* at VT and *Pringle 10453* and *10454* at UPS are referred to *Palamocladium leskeoides* (Hook.) Britt.

COMMENTS: In Sharp and Crum (unpublished) *Mexican Moss Manual*, I treated this variety as a synonym of *B. lanceolifolium*. After examining the many isotypes of this variety, I find this variety as well as the species to represent nothing more than a depauperate form of *B. stereopoma sensu lato*.

* * *

Brachythecium laxireticulatum Card., Rev. Bryol. Lichénol 37: 67. 1910.

Type specimen (lectotype *des. mihi*) FH: "Mexico, *Bourgeau 1345 e.p.*" [!]

Plants medium-sized, forming a thick intertwined mat. Stems to 2.7 cm long, prostrate, terete, densely foliate, freely branched; branches to 1.3 cm long, terete, ± tapering at the ends; central strand narrow, inner and outer stem cells similar in size with moderately thick walls; pseudoparaphyllia triangular. Leaves 1.7-2.3 (x=2.0) X 0.7-0.9 (x=0.8) mm, erect to patent, concave, narrowly decurrent, not to slightly plicate, ovate, abruptly or gradually tapering into long slender acumina 0.4-0.8 (x=0.65) mm, ± flexuose, half-twisted; margins recurved at base, plane and entire to serrulate above; costae broad at base, tapering above and disappearing near midleaf (40%), with one or more short lateral spurs. Median leaf cells fusiform, 39.9-98.0 (x=77.6) X 9.1-12.5 (x=11.1) μm; apical cells more linear 53.6-93.5 (x=71.7) X 8.0-10.3 (x=9.0) μm; basal cells rectangular 57.0-79.8 (x=63.8) X 17.1-47.9(x=22.1) μm; alar cells weakly differentiated, quadrate to rectangular 20.5-51.3 (x=32.7) X 17.1-22.8 (x=18.9) μm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate-acute, inner leaves longer, slenderly acuminate; margins plane, entire, ± bordered by a single row of long, thin-walled rectangular cells. Perigonia not observed. Setae 8.0-11.0 (x=9.1) mm long, smooth, red-brown. Capsules 2.1-2.5 X 0.9-0.9 mm, erect to slightly curved, cylindrical and slightly curved, yellowish red-brown; exothecial cells rectangular, in vertical rows, cell walls uniformly thickened; annuli undifferentiated; opercula 0.7-0.9 X 0.5-0.6 mm, conic-apiculate. Spores finely papillose 11.0-17.0 (x=14.0) μm.

TYPIFICATION: Cardot cited three Mexican specimens, "Vallée de Mexico *Bourgeau 1345*; près de Santa-Fé. *Bourgeau 1396*; and Pic d'Orizaba

Galeotti 6966." Only two isotypic specimens, FH and PC, of *Bourgeau 1345* were made available to me. Both of these specimens indicate they are *ex. parte* of the original *Bourgeau 1345* collection. I designate the *Bourgeau 1345 e.p.* specimen at FH as the lectotype since it fits the protologue description and is the more complete specimen of the two. The duplicate specimen at PC (Herb. Thériot) is considered an isolectotype.

COMMENTS: The growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. conostomum*.

* * *

Brachythecium lepidopiloides (C. Müll.) Kindb., Enum. Bry. Exot. p. 7. 1888.

Basionym: *Hypnum (Brachythecium) lepidopiloides* C. Müll., Linnaea 42: 450. 1879.

Type specimen (original specimen) S: "Argentinia, Cordobensis, Estancia Germanilla Chacra de la Merced prope Cordoba, Majo 24, 1874, *P. G. Lorentz" s.n.* [!]

COMMENTS: Although Müller acknowledged that the growth form of this taxon was "Plagiothecioid" (flattened with spreading leaves), he placed it under *Hypnum* Section *Brachythecium* because of the single costa and leaf form. Later, Kindberg raised its sectional rank to the genus *Brachythecium*. From the protologue description and examination of the original specimen, I concur with Wijk and Margadant (1959, p. 75) that *Brachythecium lepidopiloides* (C. Müll.) Kindb. is more accurately treated as their *comb. nov. Stereophyllum lepidopiloides* (C. Müll.) Wijk

et Marg., (Plagiotheciaceae). The growth form and very distinctive asymmetric leaf base (one side being wider and composed of many quadrate hyaline alar and basal cells which lay between the leaf margin to the costae and extend from the attachment of the stem up the lamina 8-15 cells, contrasted to the narrower side which has linear basal cells and only a few quadrate alar cells) contravene the gametophyte morphology for the genus *Brachythecium*.

* * *

Brachythecium lescuraeoides Broth. in Perkins, Bot. Jahrb. Syst. 49: 178. 1913.

Type specimen (lectotype *des. mihi*) H-BR: "Bolivia, Aguila, an der Cordillera Real, 5200 m, April 19, 1909, *Edith Knoche 61*." [!]

Plants medium-sized, forming a dense yellow-green mat. Stems 2.0-3.0 cm long, prostrate, densely foliate and terete, irregularly branched; branches to 1.0 cm long, numerous, short and erect, tapering; central strand narrow, inner cortex cells large and thin-walled, outer 2-3 layers of cortex cells smaller and thin-walled; pseudoparaphyllia small, triangular. Leaves 1.1-2.0 (x=1.6) X 0.4-0.7 (x=0.5) mm, loosely imbricate when dry, erect to ± open-complanate when moist, concave, plicate, decurrent, ovate-lanceolate to lanceolate, long-acuminate, ± falcate; margins plane, serrulate to serrate throughout; costae stout, tapering above and ending near middle (56%) ± in an inconspicuous spine. Median leaf cells linear 57.0-102.6 (x=70.2) X 4.6-6.8 (x=4.9) μm; gradually becoming shorter in the acumen; apical cells 36.5-76.4 (x=49.1) X 3.4-5.7 (x=4.1) μm; basal cells shorter and broader with thickened-porose walls, rectangular to irregular rectangular 22.8-45.6

(x=34.2) X 5.7-11.4 (x=8.3) μm; alar cells quadrate to rectangular, forming a small distinct group 11.4-28.5 (x=18.2) X 6.8-11.4 (x=8.9) μm. The rest unknown.

TYPIFICATION: In the protologue, Brotherus cited four syntypic specimens, "Aguila an der Cordillera Real, 5200 mü. M, *Edith Knoche 15, 25, 59a, and 61.*" Three duplicates of specimen 61, one each at FH, H, and JE, were the only type specimens made available to me. The existence and whereabouts of the other syntypes are unknown. I designate the Knoche specimen 61 in Brotherus's herbarium at H-BR as the lectotype and duplicate specimens at FH and JE as isolectotypes.

COMMENTS: Although the isolectotype at FH bears an anonymous annotation *Brachythecium salebrosum* (Web. et Mohr) B.S.G., this misidentification on the label does not change its suitability as one of the types for *B. lescuraeoides*. The basal areolation and leaf texture at the margin of this taxon differ from that of *B. salebrosum*, yet fit within the accepted range of variation for *B. praelongum*.

* * *

Brachythecium longidecurrens Bartr., Farlowia 2(3): 318. 1946.

Type specimen (holotype, implicit) FH: "Prov. de Magellanes, Fuegia media, Rio Bueno, in silva, (*Notof. metso.*), *H. Roivainen 2018*." [!]

Plants medium-sized, yellow-green and glossy. Stems to 6.0 cm long, terete, prostrate, ± with tufted rhizoids where attached to substrate, irregularly branched; branches to 1.1 cm long, distinctly smaller than stems, prostrate to ascending, short tapering and arching; central strand narrow, inner cortex cells large and thin-walled, outer 2-3 layers of cells small and thick-walled; pseudoparaphyllia ovate to

triangular. Leaves 1.1-1.8 (x=1.6) X 0.7-1.3 (x=1.1) mm, erect imbricate when dry, becoming more erect when moist; stem leaves concave, lightly plicate, broad and strong decurrent, deltoid long-acuminate with apices ± twisted and secund (not reflexed); branch leaves smaller and narrower, cordate-ovate, acuminate with secund tips; margins plane, reflexed at base, serrulate to serrate in upper half, entire to subserrulate below; costae stout and subpercurrent, gradually tapering above and ending in an inconspicuous spine (73%). Median leaf cells linear, pitted 59.3-98.0 (x=83.9) X 5.7-9.1 (x=6.7) μm; apical cells narrower, pitted 35.3-91.2 (x=62.1) X 4.6-8.0 (x=6.2) μm; basal cells lax rectangular to irregularly rectangular, pitted 22.8-91.2 (x=51.6) X 8.0-22.8 (x=12.4) μm; alar cells forming a large group of lax quadrate to rectangular cells, becoming inflated in decurrencies 28.5-47.9 (x=38.9) X 12.5-22.8 (x=16.9) μm. Autoicous. Perichaetia short cylindric, leaves ecostate, sheathing at base, reflexed tips, outer leaves ovate, acute to short-acuminate, inner leaves longer, ovate and long-acuminate; margins plane, entire and ± bordered by a single row of rectangular cells. Perigonia pyriform, leaves ecostate, ovate, acute to short-acuminate; margins plane, entire, and bordered by a single row of rectangular cells. Setae 22.0-25.0 mm long, red-brown, with scattered low papillae above and smooth below. Capsule 1.8 X 1.1 mm, horizontal, oblong-ovoid and curved, dark red-brown, blackened with age; exothecial cells unpatterned, unequally sized and irregularly quadrate with uniformly thickened walls; cilia 1-2, nodose and appendiculate, with scattered papillae. The rest unknown.

TYPIFICATION: Bartram (1946, p. 318) cited the "type" as *Roivainen 2018* along with two (paratype) additional specimens *Roivainen 2025* and *2063*, all from the same location. Unfortunately, these specimens at H (Herb. Roivainen) are contrary to the protologue, location, and habitat description, and cannot be considered holo- or paratype. Instead, duplicate *Roivainen 2018* and *2025* specimens at FH do match the protologue, location, and habitat descriptions and are selected (by me) as an implied holotype and paratype.

This case for typification resulted from the following facts and conclusions.

H-specimen 2018 disagrees with the protologue's substrate information. Furthermore, the collection number and "Typus" are recorded in blue ink, whereas the printed/handwritten label and data are in black ink. H-specimens 2025 and 2063 differ markedly from the protologue's type locality, "Fuegia occ., Fj. Finlandia, Bahia Kairam" and Fuegia occidentalis, Fjords de Agostini, Bahia Goth-Hansen, inter Marsippospermun." Finally, collection number 2025 is also penned in blue ink.

FH-specimens (Herb. Bartram) 2018, 2025, and 480 (paratype *fide* Bartram's notes) are accompanied by Bartram's notes, which for specimen 2018 (the type) give complete English and Latin descriptions and specimens cited. This evidence strongly suggests that the Roivainen specimens in Bartram's possession were those used to construct the original description.

FH-specimen 480, and other *Roivainen s.n.* specimens at CANM(1) and S(2) are considered representative specimens (although they may be

authentic). For the CANM and one S specimens, they do match the protologue and are packaged with Roivainen's printed label, but simply lack a collection number. The other S-specimen bears locality data as "Fuegia occidentalis Fjords de Agostini; Brazo Tzguierdo, Feb. 22, 1929 Roivainen s.n."

Some additional information more fully circumscribes the previous discussion. In 1937 Roivainen and Bartram published on a portion of Roivainen's collections (not including this taxon) from Tierra del Fuegia, noting, "The main portion of my Fuegian leaf mosses will be preserved in the Botanical Museum of the University of Helsinki" (Roivainen, 1937, p. VI). Even before 1937, Bartram had returned Roivainen's specimens to Helsinki; after which "a complete series of specimens including types of many new species which resulted from the study, all of which are now in my herbarium" (Bartram, 1946, p. 318) were sent back to Bartram.

Sometime during correspondence, Bartram must have informed Roivainen that several of his specimens represented a new species, *Brachythecium longidecurrens nom herb.* When Roivainen prepared his specimens for the Museum at Helsinki and for distribution, he included the species name plus "Bartr. sp. nov." on his un-numbered labels.

Later in 1946, Bartram validated this name and cited from the duplicates in his possession, *Roivainen 2018* "Typus," and *Roivainen 2025, 2063.*

Collection numbers and "Typus" (blue ink) were added to the H-specimens at some later date, probably after 1955. Evidence for this conclusion is an additional *Roivainen s.n.* specimen at FH, that was

purchased from H in 1955. This specimen agrees with the protologue and may actually be part of the type. In any case, all authentic material is to be found at FH, not H.

The three reputed types, H-2018, 2025, 2063, must be regarded only as representative specimens. In spite of Isoviita's 1970 annotations to the H-specimens, 2018 "isotype," and 2025 & 2063 "paratypes," I feel certain that these specimens are Roivainen collections of *B. longidecurrens*, other than the types.

COMMENTS: T. Seki has annotated the three H specimens with a note indicating the close relationship of this species to *Brachythecium macrogynum* Card. In addition, his notes under *B. macrogynum* (Seki, 1975, p. 72) suggest a close relationship among *B. longidecurrens, B. macrogynum* and *B. subpilosum* (Hook. *f. et* Wils.). I consider *B. macrogynum* to be a synonym of *B. subpilosum*. *B. longidecurrens* is distinctive, differing from *B. subpilosum* by its strong decurrencies, inflated alar cells, subpercurrent costa, and nearly smooth seta.

The growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. filirepens* Dus.

* * *

Brachythecium longidens (C. Müll.) Kindb., Enum. Bry. Exot. p. 7. 1888.

Basionym: *Hypnum (Brachythecium) longidens* C. Müll., Flora 68: 427. 1885.

Type specimen: "Fuegia, Beagle Channel, in sylvis umbrosis, Majo 1882, *Spegazzini*" s.n. [*non vidi*]

COMMENTS: Whereas most *Brachythecium* species described by Müller from the southern neotropics are now represented by duplicates of his original specimens distributed to other herbaria prior to the destruction of his herbarium at B, no type specimen(s) or duplicates of this species have been located. The eight so-named specimens examined (listed below) in this study can all be assigned to either *Brachythecium praelongum* Schimp. *ex* Müll., or *Brachythecium subpilosum* (Hook. f. *et* Wils) Jaeg. I therefore presume that all type materials have been lost or destroyed and refer to this species as a *nom. obsc.*

Brachythecium praelongum in no way fits Müller's protologue description of *B. longidens*. Although the gametophytic characters of *B. subpilosum* and *B. longidens* do agree, the sporophytes differ in *B. subpilosum* by their papillose setae (of low papillae) and well developed cilia of the endostome. Typification of *B. longidens* is inappropriate at this time, for lack of original or other suitable specimen material.

Bescherelle (1885, p. 67) placed *B. longidens* in synonymy with his new species *Stereophyllum fuegianum* Besch. The nomenclatural impropriety of this combination is discussed under *Stereophyllum fuegianum*, p. 301. No taxonomic comparison can be made of this merger at this time since the latter taxon lacks any original material.

SPECIMENS EXAMINED: ***Chile:*** FI(in part), WU; Aysen, in valle fluminis Aysen in tera, M. Febr. a. 1897 *P. Dusén A10* (=*B. praelongum*: BM, FI(in part), S(3); Aysen, in valle fluminis Aysen in tera, M. Febr. a. 1897 *P. Dusén A10* (=*B. subpilosum*); GOET; Malleco, Valkan Longuimay, *Nothofagus pumilo* Wald au der Baumgrenze. Au Baumstammen, 1/1/66 det. H. Roivainen *B. Ruthsatz s.n.* (=*B. subpilosum*); NY; as *Hypnum longidens*

Duby, ms. a Bescherelle (the rest illegible) comm. Duby 1874, (=not *Brachythecium*).

* * *

Brachythecium longisetum Herz., Biblioth. Bot. 87: 159. 1916.

Type specimen (lectotype *des. mihi*) JE: "Ecuador, auf Steinenim Gebüsch bei Incacorral, 2200 m, Juni 1911, *Th. Herzoga 4959*." [!]

Plants medium-sized, yellow-green, forming a loose mat. Stems to 5.0 cm long, prostrate, terete, densely foliate, irregularly branched; branches to 1.0 cm long, terete ± tapering at tips; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 1.1-1.8 (x=1.6) X 0.5-0.9 (x=0.7) mm, appressed to erect when dry, erect to patent when moist, concave, stem leaves strongly decurrent, branch leaves less so, ± plicate, ovate to ovate-lanceolate, acuminate with ± twisted apices; margins reflexed at base, plane above, serrulate in upper 2/3, older leaves nearly entire; costae broad at base, tapering above and ending near middle (61%). Median leaf cells linear 39.9-96.9 (x=66.0) X 5.7-6.8 (x=6.5) µm; apical cells similar 34.2-79.8 (x=52.6) X 5.7-11.4 (x=7.2) µm; basal cells irregularly rectangular 25.1-62.7 (x=42.4) X 11.4-17.1 (x=13.5) µm; alar cells lax, quadrate to rectangular extending into decurrencies 13.7-45.6 (x=26.3) X 10.3-20.5 (x=14.0) µm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate, long-acuminate, inner leaves longer, slenderly acuminate; margins plane, entire, and bordered by a single row of rectangular cells below. Perigonia not observed. Setae 25.0-30.0 (x=27.6) mm long, red-

brown, smooth. Capsules 1.5-2.5 (x=2.2) X 0.6-0.9 (x=0.8) mm, inclined to erect, cylindrical and curved, yellow-brown to red-brown; exothecial cells in vertical rows, rectangular, walls uniformly thickened; annuli not differentiated; opercula 0.9-1.2 (x=1.0) X 0.7-0.9 (x=0.8) mm, long-conic, apiculate; cilia 2-3 nodose. Spores 14.8-19.3 (x=17.3) µm, finely papillose.

TYPIFICATION: The type of this species is represented by seven isotypic duplicates, "Bolivia, An Steinen im Gebusch bei Incacorral, ca. 2200 m, *Herzog 4959*," one each, in the herbaria at H, JE, L, M, PC, S, WU. I designate the specimen at JE as the lectotype since it fits the protologue description and is in the author's herbarium. Duplicate specimens at H, L, M, PC, S, and WU are considered isolectotypes.

COMMENTS: The dioicous condition, growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato.*

* * *

Brachythecium macroconum (C. Müll.) Kindb., Enum. Bry. Exot. p.7. 1888.

Basionym: *Hypnum (Brachythecium) macroconum* C. Müll., Linnaea 42: 454. 1879.

Type specimen (lectotype *des. mihi*) S: "Argentina, Salta 11000 ft., com. C. Müller 1890, *Lorentz*" *s.n.* [!]

Plants medium-sized, yellow-brown in younger portions becoming reddish brown in older portions. Stems to 3.0 cm long, prostrate to ascending, terete, with tufted rhizoids, irregularly to subpinnately branched; branches to 1.0 cm long, erect, terete, tapering; central strand narrow, inner cortex cells large and thin-walled, becoming

smaller with thickened walls toward stem surface, outer layer of cells small with thickened walls; pseudoparaphyllia oblong-orbicular. Leaves 1.3-1.7 (x=1.5) X 0.5-0.8 (x=0.7) mm, imbricately appressed to erect when dry, patent when moist, concave, short decurrent, not plicate, ovate-lanceolate to lanceolate, narrowly acute to short-acuminate, ending abruptly, older leaves broader at base and rounded to the insertion; margins plane above, reflexed at base, smooth to serrulate in apices; costae broad at base gradually tapering above, occasionally with short lateral spurs, ending above midleaf (61%), ± in an inconspicuous spine. Median leaf cells fusiform to short-linear 36.5-68.4 (x=51.4) X 5.7-8.0 (x=6.8) μm; apical cells shorter, fusiform 25.1-45.6 (x=36.5) X 5.7-9.1 (x=6.7) μm; basal cells lax, irregularly rectangular 26.2-62.7 (x=37.6) X 6.8-22.8 (x=14.7) μm; alar cells forming small groups of ± lax, quadrate to rectangular cells 13.7-34.2 (x=23.8) X 6.8-20.5 (x=13.3) μm. Autoicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves appressed, acute to short-acuminate, inner leaves long-acuminate; margins bordered by a single row of narrow rectangular cells. Perigonia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate, inner leaves ovate-apiculate to short-acuminate; bordered by a single row of narrow rectangular cells. Setae 13.0-20.0 mm long, dark red-brown with low, dense papillae above, becoming nearly smooth at base. Capsules 1.3-1.5 X 0.5-0.8 mm, suberect to horizontal, oblong-ovoid, curved; greenish-brown to dark red-brown; exothecial cells in ± vertical rows, irregularly quadrate and/or rectangular, walls uniformly thickened; annuli differentiated with two rows of small cells. Opercula 0.4-0.7 X 0.5-0.7 mm, conic-apiculate;

"*ciliis 2-3 brevioribus hyalinis capillaribus appendiculatis*" (Müller, 1879, p. 454). Peristome and spores not observed by me.

TYPIFICATION: The type of this species is represented by five isotypic specimens, "Argentinia, Saltensis, Nevado de Castillo prope Salta, ad ripam rivuli, ca. 11,000 ped. elev., cum *Entodonte suberythropode et Anoctangio excelso, Lorentz*," one each in the herbaria at H-BR, JE, and NY, and two in the herbarium at S. With the loss of Müller's original herbarium at B and no specimens of this species in the Lorentz herbarium at FI, I designate one of the two specimens at S as the lectotype. This specimen best represents this species since it fits the protologue description and is complete with sporophytes. Duplicate specimens at H-BR, JE, NY, and S are considered isolectotypes.

COMMENTS: The growth form, leaf morphology, areolation and sporophyte characters of this specimen fit within the accepted range of variation for *B. plumosum sensu lato*. I, therefore, concur with Persson (1946, p. 132) in considering *B. macroconum* to be a taxonomic synonym of *B. plumosum*.

* * *

Brachythecium macroconum var. ***robustius*** (C. Müll.) Par., Ind. Bryol. 137. 1894.

Basionym: *Hypnum (Brachythecium) macroconum* var. *robustius* C. Müll., Linnaea 42: 454. 1879.

Cited specimen: "Argentina subtropica, Saltensis, Nevado de castillo prope Salta, 11000 ped. elev., *Lorentz*" s.n. [*non vidi*]

COMMENTS: This variety was validly published (ICBN 32.1); however, no specimens were made available to me. I, therefore, consider this variety to be a *nom. obsc.*

* * *

Brachythecium macrogynum Card., Bull. Herb. Boissier ser. 2, 5: 1010. 1905.

Type specimen (lectotype *des. mihi*) S: "Argentina, Tierra del Fuego, montagne pres du Ushuaia *C. Skottsberg 171*." [!]

Plants medium-sized, yellow-green, shiny. Stems to 6.5 cm long, prostrate and ascending with tufted rhizoids where attached to substrate, densely foliate, terete, irregularly branched; branches to 1.2 cm long, unequal in length, densely foliate, erect and ± tapering; central strand narrow, inner cortex large and thin-walled, becoming smaller with slightly thickened walls at stem surface; pseudoparaphyllia orbicular broadly ovate-acute with eroded apices. Leaves 1.4-1.7 (x=1.6) X 0.4-1.1 (x=0.9) mm, erect-imbricate when dry, little changed when moist, concave, slightly decurrent, plicate, ovate-lanceolate to ovate-triangular, abruptly acuminate forming small shoulders at constrictions, ending with short narrow tips, 0.3-0.5 (x=0.4) mm long; margins reflexed at base, plane above, entire or serrulate to near base and ± serrate in apices, ± toothed at constriction; costae stout, broad at base, rapidly tapering above and ending beyond the middle (60%) ± in a inconspicuous spine. Median leaf cells linear-flexuous 74.1-104.9 (x=87.7) X 6.8-8.0 (x=7.5) µm; apical cells shorter 47.9-79.8 (x=65.9) X 5.7-9.1 (x=7.0) µm; basal cells wider, rectangular 36.5-75.2 (x=51.5) X 8.0-13.7 (x=10.7) µm; alar cells forming a large distinct group of

quadrate to rectangular cells 18.2-36.5 (x=28.6) X 9.1-22.8 (x=15.4) μm. Autoicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves orbicular to ovate and abruptly acuminate, inner leaves longer and abruptly long-acuminate; median cells distinctly linear-flexuous; margins plane, entire or serrulate in apices and not to weakly bordered by a single row of rectangular cells. Perigonia pyriform, leaves ecostate, ovate, abruptly acuminate; margins plane, entire, and bordered by a single row of rectangular cells. Setae smooth, yellowish red. The rest unknown.

TYPIFICATION: In the protologue Cardot designated an implicit holotype by his statement "Typus in herb. Cardot" (ICBN 7.3). However, since I did not receive a specimen of this species from Cardot's herbarium at PC, the existence of this specimen is unknown to me. Of the three isotypic specimens "Terre-de-Feu: Ushuaia" I have seen (one from UPS and two from S), I designate one specimen at S labeled "Herb. J. Cardot *Brachythecium macrogynum* Card. (*e. specim. origin.*) Tierra del Fuego, montagne pres du Ushuaia, 6/3/1902, *C. Skottsberg 171*" as the lectotype. This specimen fits the protologue description, is originally from Cardot's herbarium, and is designated as a portion of the original specimen. Duplicate specimens at S and UPS are considered isolectotypes.

COMMENTS: Although the protologue description was written in French, the species name was validly published according to ICBN articles 36.1, 36.2 (descriptions before 1 Jan. 1935).

The growth form, leaf morphology, and areolation of this specimen fit within the acceptable range of variation for *B. subpilosum*.

* * *

Brachythecium macromitriadelphus C. Müll. in Par., Ind. Bryol. suppl. 46. 1900. *nom. nud.*

Cited specimen: "Costa Rica, Alajuala, 1878, Hb. C. Müll., *Polakowsky" s.n.* [!]

COMMENTS: This binomial was effectively published by Paris (ICBN 30.1), but was never validly published since it lacks a description (ICBN 32.1). Hence, *Brachythecium macromitriadelphus* is considered to be a *nom. nud.*

A single Polakowsky specimen I have seen from PC is referred to *Brachythecium stereopoma sensu lato*. Validating this binomial with a Latin description would be superfluous since it would automatically go into synonymy.

* * *

Brachythecium majusculum Dus., Rep. Princeton Univ. Exp. Patag. 8: 125. 1903. *nom. nud.*

Original specimens: "Patagonia, Punta Arenas, 22/xi/1895, *P. Dusén 2*; Tierra del Fuego, Rio Azopardo, 28/ii/1896, *P. Dusén s.n.*" [!]; "*indidem*, 1/iii/1896, *P. Dusén 201*" [!]; "*indidem*, 6/iii/1896, *P. Dusén 269*" [!]; Tierra del Fuego, Ushuain, 5/v/1896, *Dusén 360*." [!]

COMMENTS: This binomial was effectively published (ICBN 31.1) by Dusén and his specimens of it were distributed to various herbaria. However, *B. majusculum* is not validly published since it lacks a description (ICBN 32.1). Hence, *Brachythecium majusculum* Dus. is considered to be a *nom. nud.*

Dusén's original specimens have been referred to other taxa as follows: *Dusén 2*, B, GB, S, UPS, US and *Dusén 360*, FI, GB, S, UPS =

Brachythecium subpilosum (Hook. *f. et* Wils.) Jaeg.; *Dusén 201*, S (mixed collection) = *Brachythecium rutabulum* (Hedw.) B.S.G. and *Brachythecium subplicatum* (Hamp. in C. Müll.) Jaeg.; and *Dusén 269* S, UPS, WU, and *Dusén s.n.* GB, NY = *Brachythecium majusculum* Newton (1974)--having validated Dusén's *nom. nud.*

* * *

Brachythecium majusculum Newton, Brit. Antarct. Surv. Bull. 39: 45. 1974.

Type specimen (holotype, explicit) AAS: "South Georgia, Bird Islands, behind Jordan Cove, alt. c. 200 ft., 15.xii. 1960, *Greene 266*." Isotypes BA, CHR, H [!], INACH, NY [!], S-PA, TNS.

Plants robust, drab yellow-green, deeply caespitose. Stems to 6.0 cm long, prostrate to erect, terete, densely foliate, julaceous, infrequently branched, branches to one side or subpinnately branched; branches to 1.5 cm long, erect, julaceous, with tapered ends; central strand narrow, inner cortex cells large and thin-walled, outer 2-3 epidermal cell layers smaller with thickened walls; pseudoparaphyllia orbicular to ovate-acute. Leaves 2.1-2.9 (x=2.4) X 1.2-2.1 (x=1.6) mm, imbricate when dry, slightly spreading when moist, deeply concave, broad and long decurrent, not plicate, broadly ovate to cordate-ovate, gradually tapering above to long apices, older leaves with long channeled 0.3-0.6 (x=0.4) mm and bluntly tipped acumina; margins recurved below and above, plane along mid-leaf, entire except with sharp teeth at base of acumina; costae very broad at base, tapering above or forking or with short spurs to above middle (62%). Median leaf cells fusiform to linear, faintly pitted 70.7-125.4 (x=91.4) X 8.0-13.7

(x=10.4) μm; apical cells similar 51.3-112.9 (x=79.5) X 6.8-11.4 (x=9.1) μm; basal cells lax, rectangular, pitted 47.9-108.3 (x=73.9) X 16.0-28.5 (x=20.3) μm; alar cells numerous, quadrate or short rectangular 25.1-62.7 (x=33.6) X 13.7-28.5 (x=22.3) μm extending into the decurrencies. "Autoecious. Seta scabrous in upper part. Capsule broadly oblong, inclined. Calyptra and operculum unknown. Peristome perfect. Spores spherical, almost smooth, green" (Newton, 1974, p. 45).

COMMENTS: The above description is derived from isotypes at H and NY.

Dusén (1903, p. 125) first introduced this name and distributed so-named specimens, although he never validated it with a description (see discussion of *B. majusculum* Dus. in type studies). Newton attempted to reform Dusén's concept for this species by examining the five so-named Dusén specimens in his herbarium. Newton found the specimens to be heterogeneous, consisting of *Brachythecium subpilosum* (Hook. *et.* Wils.) Jaeg., a *Brachythecium* unknown to her, and an element determined as *B. majusculum* by both C. Müll. and Dusén. Using the latter specimen in her concept, Newton validated the name by electing a holotype and providing a description of a specimen from South Georgia. Newton's holotype was considered to be more representative of the species than any of the original Dusén specimens, and consisted of sufficient plant material to provide for isotypes.

The robust size, broad leaf decurrencies, papillose setae, and conic-apiculate opercula (observed from non-type specimens) ally this specimen with other taxa of the section *Reflexa*.

* * *

Brachythecium meridense (C. Müll.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 327. 1878. (Ad. 2: 393.)

Basionym: *Hypnum meridense* C. Müll., Linnaea 19:220. 1847.

≡ *Cirriphyllum meridense* (C. Müll.) Fleisch., Musci Fl. Buitenzorg 4: 1542, 1686. 1923.

Type specimen (lectotype *des. mihi*) BM: "Venezuela, Meridae, *Moritz*" *s.n.* [!]

Plants small-sized, dirty green, in a loose mat. Stems to 2.5 cm long, prostrate terete, subpinnately branched; branches 1.0 cm long, erect, terete; central strand narrow, inner cortex cells large and thin-walled, outer 2-3 layers of cells small and thick-walled; pseudoparaphyllia orbicular. Leaves, 1.0-1.3 (x=1.1) X 0.3-0.7 (x=0.5) mm, imbricate to erect when dry, patent when moist, concave, short-decurrent, not plicate, ovate to lanceolate, gradually acuminate to short-acuminate, apices ± blunt; margins reflexed at base, plane above, entire; costae broad at base, gradually tapering above, occasionally with short lateral spurs, ending above midleaf (64%). Median leaf cells fusiform 36.5-59.3 (x=47.7) X 4.6-6.8 (x=5.9) µm; apical cells shorter 28.5-45.6 (x=35.2) X 5.7-9.1 (x=7.0) µm; basal cells fusiform to lax-rectangular 22.8-45.6 (x=36.7) X 8.0-19.4 (x=14.6) µm; alar cells quadrate to rectangular, in an inconspicuous group 19.4-36.5 (x=27.0) X 6.8-17.1 (x=11.5) µm. Autoicous. Perichaetia cylindrical, leaves sheathing at base, ecostate, outer leaves appressed, acute to short-acuminate, inner leaves long-acuminate; margins plane, not bordered. Perigonia cylindrical, leaves ecostate, outer leaves ovate, inner leaves ovate-apiculate to short-acuminate; margins plane, bordered with a

single row of rectangular cells in lower portions. Setae 23.0-23.5 mm long, dark red-brown with low dense papillae above, gradually becoming nearly smooth at base. Capsule 1.9 X 1.0 mm, suberect to horizontal, oblong-ovoid, dark red-brown; exothecial cells in vertical rows, quadrate to rectangular, walls uniformly thickened; annulus a single row of narrow cells. Operculum 0.9 X 0.9 mm, conic-apiculate. Endostome and spores not observed.

TYPIFICATION: The type of this species is represented by two syntypic specimens "Venezuela, in montibus nivosis prov. Meridae, *Moritz*," both at BM (one specimen labeled 65 & 65a, and the other *sine numero*). With the loss of Müller's herbarium at B, I designate the *Moritz s.n.* as the lectotype since it fits the protologue description and is the most sporophyte complete. The other specimen *Moritz 65 & 65a* is considered to be a paratype.

COMMENTS: Fleischer (1923, p. 1542) proposed the new combination *Cirriphyllum meridense* (C. Müll.) Fleisch. This combination resulted from Loeske's and Fleischer's (1907, p. 22) emended concept of the genus *Cirriphyllum*, altered from Grout (1898, p. 222). Fleischer also included *Brachythecium plumosum* (Hedw.) B.S.G. and *Brachythecium brunneo-alar* (C. Müll.) Jaeg. in the emended concept. Although Brotherus (1925, p. 367) acknowledged the emended *Cirriphyllum*, he did not recognize any of Fleischer's (ibid.) new combinations; and in more recent works neither the emended concept for *Cirriphyllum* nor the new combinations has been adopted (Takaki, 1956; Robinson, 1962; Nyholm, 1965; Crum and Anderson, 1981).

The autoicous condition, conic operculum, and short leaf apices of *Brachythecium meridense B. brunneo-alar*, and *B. plumosum* ally these species to *Brachythecium* and exclude them from *Cirriphyllum sensu* Grout.

Müller considered this species to be dioicous since he did not observe any perigonia. I, however, did observe perigonia on the plants examined and thus consider the species to be autoicous.

The growth form, leaf morphology, areolation, and sporophytic characters of this specimen are within the acceptable range of variation for *B. plumosum sensu lato*.

* * *

Brachythecium microcollinum Bartr., Farlowia 2(3): 318. 1946.

Type specimen (holotype implicit) FH: "Chile, Prov. de Nuble, Recinto, in silva umbrosa, alt. 750 m., Apr. 20, 1929, *H. Roivainen* 955." [!]

Plants small, soft, yellow-green, densely caespitose. Stems to 3.0 cm long, slender, prostrate to ascending, subjulaceous, irregularly to subpinnately branched; branches 2.0-5.0 mm long, prostrate to ascending, unequal, julaceous; central strand narrow, inner cortex cells large, gradually becoming smaller and thick-walled toward stem surface; pseudoparaphyllia depressed, ovate with eroded margins. Leaves 0.5-0.7 (x=0.6) X 0.2-0.3 (x=0.3) mm, erect-imbricate when dry, erect-patent when moist, slightly concave with ± short decurrencies, not plicate, ovate-lanceolate and acuminate; margins plane to recurved at base, sharply serrate above, serrate to serrulate to base; costae stout, subpercurrent, broad at base, gradually tapering above and ending in the acumina with one or more spines (70%). Median leaf cells fusiform to

linear 34.2-63.8 (x=47.3) X 4.6-5.7 (x=5.5) μm; apical cells smaller 22.8-39.9 (x=29.0) X 5.7-6.8 (x=5.9)1 μm; basal cells irregular rectangular 14.8-45.6 (x=25.0) X 5.7-11.4 (x=7.3) μm, alar cells in a small inconspicuous group, quadrate to rectangular 11.4-28.5 (x=16.2) X 5.7-11.4 (x=8.4) μm. Autoicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves short, ovate and acuminate, inner leaves longer and abruptly long-acuminate; margins plane, serrate in apices and ± bordered by a single row of rectangular cells below. Perigonia pyriform, leaves ecostate, ovate and acuminate; margins plane, serrate and bordered by a single row of rectangular cells. Setae 5.5-7.4 (x=6.4) mm long, red-brown, smooth. Capsules 0.8-1.1 (x=0.9) X 0.3-0.6 (x=0.5) mm, erect to suberect or horizontal, cylindrical to short-ovoid and curved, constricted below mouth when dry, dark red-brown; exothecial cells rectangular, uniformly incrassate, in vertical rows; cilia 1, nodose, appendiculate and papillose. Spores 7.7-13.2 (x=11.1) μm. The rest unknown.

TYPIFICATION: I refer the reader to the type study of *Brachythecium longidecurrens* Bartr. (p. 335) for discussion of the herbaria location for Roivainen specimens cited by Bartram (1946, p. 318). I recognize the *Roivainen 955* specimen (cited above) in Bartram's herbarium at FH as the implicit holotype and duplicates of it at H(2) and S as isotypes. A paratype, *Roivainen 954*, (cited by Bartram, 1946, p. 318) with the same label information as the holotype, is also to be found in Bartram's herbarium at FH.

COMMENTS: This specimen belongs in the section *Julacea* because of its small size, subjulaceous stems, and julaceous branches.

* * *

Brachythecium minusculifolium C. Müll., Hedwigia 36: 128. 1897.

Type specimen (lectotype *des. mihi*) H-BR: "Argentinia, Salta, *Lorentz" s.n.* [!]

Plants small-sized, yellow-green. Stems to 4.0 cm long, prostrate, terete, densely foliate, irregularly branched; branches to 0.8 cm long, unequal in length, terete, ± ascending, tapering; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate-acute to acuminate. Leaves 0.9-1.3 (x=1.1) X 0.4-0.6 (x=0.5) mm, erect-imbricate when dry, erect to patent when moist, concave, decurrent, slightly plicate, ovate to ovate-lanceolate, acuminate; margins reflexed at base, plane above, entire to serrulate in upper 2/3; costae broad at base, tapering above, ending above middle (61%) in a inconspicuous spine. Median leaf cells fusiform or elongate rhomboidal to linear 37.6-73.0 (x=57.6) X 5.7-8.0 (x=7.2) µm; apical cells similar 42.2-70.7 (x=54.8) X 4.6-6.8 (x=5.9) µm; basal cells lax, irregularly rectangular 22.8-57.0 (x=41.2) X 9.1-18.2 (x=13.1) µm; alar cells lax, quadrate to rectangular in distinct groups 13.7-42.2 (x=25.0) X 9.1-18.2 (x=14.1) µm. Dioicous. Perigonia, pyriform, leaves ecostate, sheathing at base, outer leaves ovate-acuminate, inner leaves longer, ovate and abruptly acuminate; margins plane, entire and bordered by a single row of rectangular cells. *"Perichaetialia ut caulina in axi crassiusculo multo majora, e basi vaginaceo-convoluta latiuscula enervi in subulam elongatam acutatum attenuata, e cellulis laxiuscule prosenchymaticis pellucidissimis reticulata; theca in pedunculo longiusculo crassiusculo glabro rubro flexuoso inclinata cylindraceo-*

oblonga curvula, operculo conico acuto" (Müller 1897a, p. 128). The rest unknown.

TYPIFICATION: Only one specimen of this species has been made available to me. This specimen from Brotherus' herbarium at H-BR is incomplete; it lacks the perichaetia and sporophyte described in the protologue by Müller. It does, however, match the description of the gametophyte. The H-BR specimen is probably a fragment of the original specimen, "Argentinia subtropica Saltensis, Gavone prope Salta, fine Martii cum fructibus immaturis 1873, *P. G. Lorentz*," destroyed in the Müller herbarium at B and is considered to be an isotypic duplicate. I designate this specimen from H-BR as the lectotype.

COMMENTS: The growth form, leaf morphology, and areolation of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium mollirameum C. Müll., Hedwigia 36: 129. 1897.

Type specimen (lectotype *des. mihi*) WU: "Argentinia, subtropica, Chaco, Maroma inter Sn. Andres, ad rupa et arbor, 1873, *P. S. Lorentz*." *s.n.* [!]

Plants slender, medium-sized, yellow-green, forming a dense mat. Stems to 4.0 cm long, prostrate, terete, densely foliate, irregularly to subpinnately branched; branches to 1.0 cm long, terete ± tapering; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 1.1-1.7 (x=1.5) X 0.5-0.8 (x=0.6) mm, erect-imbricate when dry, erect to patent

when moist, concave, stem leaves strongly decurrent, branch leaves less so, plicate, ovate to ovate-lanceolate, acuminate, apices ± twisted; margins reflexed at base, plane above, serrulate in upper 2/3, entire below; costae broad at base, tapering above and ending near middle (63%). Median leaf cells rhomboidal to linear 45.6-79.8 (x=58.5) X 5.7-8.0 (x=6.6) μm; apical cells similar 36.5-70.7 (x=55.6) X 3.4-6.8 (x=5.9) μm; basal cells irregularly rectangular 30.8-52.4 (x=39.8) X 8.0-17.1 (x=11.4) μm; alar cells lax, quadrate to rectangular extending into decurrencies 13.7-36.5 (x=23.9) X 12.5-19.4 (x=15.6) μm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate, long-acuminate, inner leaves longer, slenderly acuminate; margins plane, entire, and bordered by a single row of rectangular cells below. Perigonia not observed. Setae 15.0-23.0 (x=19.3) mm long, red-brown, smooth. Capsules 1.2-2.6 (x=1.9) X 0.5-0.8 (x=0.6) mm, inclined to erect, cylindrical and curved, ± constricted below mouth when dry, dark red-brown; exothecial cells rectangular, in vertical rows, with thickened lateral and somewhat thinner end walls; cilia 2-3, nodose. Spores 14.8-20.5 (x=17.4) μm, finely papillose. Annulus and operculum not observed.

TYPIFICATION: The type of this species is represented by five isotypic duplicates, "Argentinia subtropica, Choca, inter Orán et Sn. Andés, Septembri 1873 cum fructibus vetustis nigrescentibus, *P. G. Lorentz*," one each, in the herbaria at H-BR, HBG, JE, WU and two each at S. Since C. Müller's herbarium at B was destroyed, I designate the specimen in the Forster herbarium at WU as the lectotype. This specimen is a duplicate from Müller's herbarium and fits the protologue

description. Duplicate specimens at H-BR, HBG, JE, S(2), and WU are considered isolectotypes.

COMMENTS: The dioicous condition, leaf morphology, growth form, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium mollirameum var. ***delicatulum*** Herz., Biblioth. Bot. 88: 25. 1920.

Type specimen (lectotype *des. mihi*) JE: "Argenetina, auf gefallenen Baumstämmen im Wald zwischen Aguarai and Yacuiba, ca. 400 m, *Th. Herzog 5154*." [!]

Plants slender, small-sized, yellow-green, forming a loose mat. Stems to 5.0 cm long, prostrate, terete, moderately foliate, subpinnately branched; branches to 1.0 cm long, unequal in length, terete, tapering at tips; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 0.6-1.2 (x=1.0) X 0.4-0.7 (x=0.5) mm, erect-imbricate when dry, erect to patent when moist, concave, strongly decurrent, plicate, ovate to ovate-lanceolate, acuminate; margins reflexed at base, plane above, serrulate in upper 2/3, older leaves nearly entire; costae broad at base, tapering above and ending above the middle (67%); branch leaves distinctly smaller with leaf bases rounded insertion, not or slightly decurrency. Median leaf cells rhomboidal to linear 39.9-62.7 (x=52.6) X 5.7-9.1 (x=6.6) µm; apical cells similar 34.2-79.8 (x=49.1) X 3.4-6.8 (x=5.5) µm; basal cells irregularly rectangular 26.2-39.9

(x=32.4) X 8.0-18.2 (x=12.3) μm; alar cells lax, quadrate to rectangular, extending into the decurrencies 6.8-34.2 (x=18.7) X 9.1-17.1(x=14.0) μm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate, long-acuminate, inner leaves longer, slenderly acuminate; margins plane, entire, and bordered by a single row of rectangular cells below. The rest unknown.

TYPIFICATION: The type of this species is represented by two isotypic specimens "Argentinia, auf gefallenen Baumstammen im Wald zwischen Aguarai und Yacuiba, ca. 400 m, *Herzog No. 5154*," one each in the herbaria at JE and S. I designate the specimen at JE as the lectotype since it fits the protologue description and is in Herzog's herbarium. The duplicate specimen at S is considered to be an isolectotype.

COMMENTS: The dioicous condition, leaf morphology, areolation, and growth form of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium morenoi C. Müll., Hedwigia 36: 128. 1897.

Type specimen (lectotype *des. mihi*) H-BR: "Argentinia Patagonica, Rio Santa Cruz, 1879, *Moreno*" *s.n.* [!]

Plants medium-sized, yellow-green. Stems prostrate, terete, irregularly branched; branches to 2.0 cm long; central strand narrow, inner cortex cells large and thin-walled, becoming smaller and thick-walled toward stem surface; pseudoparaphyllia ovate-acute to ovate-acuminate. Leaves 1.8-2.1 (x=1.9) X 0.4-0.6 (x=0.5) mm crowded, erect-imbricate when dry, little changed when moist, concave, slightly

decurrent, strongly biplicate and keeled, ovate to lanceolate, acuminate to long-acuminate; margins reflexed at base, reflexed or plane above, entire throughout or serrulate to serrate in acumina; costae broad at base, tapering above and ending near middle (56%). Median leaf cells fusiform to linear, pitted, 74.1-114.0 (x=87.0) X 5.7-9.1 (x=7.1) μm; apical cells similar 57.0-102.6 (x=71.3) X 5.7-8.0 (x=6.7) μm; basal cells more lax, elongate-ovate to rectangular, pitted 16.0-59.3 (x=41.0) X 8.0-13.7 (x=11.3) μm; alar cells forming distinct groups in rows of 4-12 cells between margins and plicae and extending into decurrencies, not pitted 8.0-20.5 (x=15.7) X 11.4-17.1 (x=13.2) μm. The rest unknown.

TYPIFICATION: This species is represented by two isotypic specimens, "Argentina, Rio S. Cruz, 1897, *Moreno*," one each in the herbaria at H-BR and S. With the loss of Müller's original herbarium at B, I designate the specimen at H-BR as the lectotype since it fits the protologue description. The duplicate specimen at S is considered an isolectotype.

COMMENTS: Seki (1974, p. 72) synonymized this species with *Brachythecium sericeo-virens* (C. Müll.) Par., based on a non-type specimen which he considered to be "authenticated" because it was determined by Cardot. I have treated *B. sericeo-virens* as a *nom. obsc.* (see type study for this name, p. 404) and after studying the same specimen cited by Seki, refer it to *B. austro-glareosum* (C. Müll.) Kindb.

The growth form, leaf morphology, and areolation of the *Brachythecium morenoi* fit within the accepted range of variation for *B. austro-glareosum*.

* * *

Brachythecium nematogonium (C. Müll.) Kindb., Enum. Bry. Exot. p. 8. 1888.

Basionym: *Hypnum (Brachythecium) nematogonium* C. Müll., Linnaea 42: 453. 1879.

Type specimen (lectotype *des. mihi*) NY: "Argintinia, Cordoba, Sierra de Cordoba, Ascochinga, Sept. 1871. *P. G. Lorentz*" *s.n.* [!]

Plants small- to medium-sized, yellow-green, in a thin dense mat. Stems to 4.5 cm long, prostrate, densely foliate, irregularly to subpinnately branched; branches to 1.5 cm long, short, unequal, attenuate, ± hooked at apices; central strand narrow, inner cortex cells large, gradually becoming smaller and thick-walled toward stem surface; pseudoparaphyllia ovate-acuminate. Leaves 1.0-1.7 (x=1.4) X 0.4-0.7 (x=0.6) mm, erect-imbricate, when dry, more open when moist, slightly decurrent, concave and plicate at leaf base, ovate to ovate-lanceolate, acuminate with twisted apices; margins reflexed at base, plane above, serrulate in upper one third, entire below; serrulate to base; costae broad at base, tapering above and ending above middle (61%) in a dorsal spine. Median leaf cells fusiform 53.6-82.1 (x=68.9) X 5.7-9.1 (x=7.0) µm; apical cells slightly shorter 34.2-68.4 (x=55.7) X 5.7-8.0 (x=6.0) µm; basal cells shorter, rectangular to hexagonal, ± pitted 28.5-51.3 (x=39.8) X 9.1-14.8 (x=11.6) µm; alar cells forming small discrete groups, quadrate to irregularly rectangular, ± lax 11.4-28.5 (x=20.1) X 11.4-20.5 (x=14.8) µm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves short, ovate-acuminate, inner leaves longer, ovate, long and slenderly acuminate; margins plane,

entire and ± bordered by a single row of rectangular cells in lower portion. The rest unknown.

TYPIFICATION: The type of this species is represented by three isotypic duplicates, "Argentinia, Cordobensis, Sierra de Cordoba, Ascochinga, Sptbr. 1871, *Dr. P.G. Lorentz*," one in the herbarium at NY and two in the herbarium at S. With the loss of Müller's original herbarium at B, I designate the specimen at NY as the lectotype. This specimen best represents the species as a lectotype since it fits the protologue description, has a handwritten label in Müller's cursive style, and was originally from the herbarium at B. Duplicate specimens at S(2) are considered isolectotypes.

COMMENTS: The growth form, leaf morphology, and areolation of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium occidentale (Hamp.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 326. 1878. (Ad. 2: 392).

Basionym: *Hypnum occidentale* Hamp., Ann. Sci. Nat. Bot. ser. 5, 5: 314. 1866.

Type specimen (lectotype *des. mihi*) BM: "Colombia, Bogota, Tequendama, 2500 m., in sylvis, *A. Lindig*" *s.n.* [!]

Plants small- to medium-sized, green, in loose mats. Stems prostrate, laxly foliate, irregularly to subpinnately branched; branches short, ascending, unequal; central strand narrow, inner cortex cells large, gradually becoming smaller and thick-walled toward stem surface; pseudoparaphyllia ovate-acuminate. Leaves 0.9-1.6 (x=1.2) X 0.2-0.8

(x=0.5) mm, erect-imbricate, straight or occasionally falcate, slightly concave and decurrent, plicate at leaf bases, ovate-lanceolate to lanceolate-acuminate, apices ± twisted; margins reflexed at base, plane above, serrate in apices, serrulate to base; costae broad at base, tapering above, ending near middle (55%) with an inconspicuous dorsal spine. Median leaf cells long-rhomboidal to linear 47.9-93.5 (x=65.9) X 4.6-9.1 (x=5.9) μm; apical cells slightly shorter 28.5-85.5 (x=55.4) X 3.4-9.1 (x=5.6) μm; basal cells shorter, rectangular to hexagonal, ± pitted 20.5-45.6 (x=32.9) X 6.8-13.7 (x=9.6) μm; alar cells forming small indiscrete groups, quadrate to irregularly quadrate or rectangular, 17.1-28.5 (x=22.2) X 8.0-11.4 (x=9.2) μm. Autoicous. Perichaetia cylindrical, leaves sheathing at base, ecostate, outer leaves short, ovate-acuminate, inner leaves longer and ovate, slenderly acuminate; margins plane, remotely serrate above, entire below. Perigonia pyriform, leaves ecostate, ovate, long-acuminate; margins plane, serrate at apices and entire below, ± bordered by a single row of rectangular cells. Setae 14.0-20.0 (x=17.8) mm long, red-brown, smooth to weakly papillose below. Capsules 1.0-1.4 (x=1.4) X 0.7-1.3 (x=1.0) mm horizontal, short oblong-ovid, curved, constricted below mouth, orange-brown; exothecial cells rectangular, in vertical rows, uniformly incrassate; annuli of two rows of inflated cells; opercula conic, 0.6-0.7 (x=0.65) X 0.6-0.9 (x=0.8) mm; cilia 2, nodose and appendiculate, papillose. Spores (immature) finely papillose.

TYPIFICATION: The type of this species consists of three isotypic specimens, "Bogota, Tequendama, 2500 m, in sylvis, cum aliis intermixtum angusto parce, *A. Lindig*," all attached to one herbarium sheet in

Hampe's herbarium (BM). I designate the specimen on the bottom right corner of this herbarium sheet as the lectotype since it fits the protologue description and is in the author's herbarium. The other two specimens are considered isolectotypes.

COMMENTS: Hampe (1866, p. 314) placed this species in the section *Ptychohypnum-Brachythecium* subsection *Velutina*. I concur with Hampe's (*op. cit.*) assessment by considering this specimen to be a member of the section *Velutina* of present hierarchical ranking.

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Brachythecium paradoxum (Hook. *f. et* Wils.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 339. 1878 (Ad. 2: 405).

Basionym: *Hypnum paradoxum* Hook. *f. et* Wils., London J. Bot. 3. 554. 1844.

Type specimen (lectotype *des. mihi*) BM: "Hermite Island, Cape Horn, Antart. Exp. 1839-1843, Herb. Hooker, *J. D. Hooker 169*." [!]

Plants medium-sized, in loose mats. Stems to 5.0 cm long, prostrate, densely foliate, irregularly to subpinnately branched; branches to 0.8 cm long, short, ascending, unequal, hooked on ends; central strand narrow, inner cortex cells large, gradually becoming smaller and thick-walled toward stem surface; pseudoparaphyllia ovate-acuminate. Leaves 1.4-2.0(x=1.7) X 0.4-0.9 (x=0.6) mm, erect-imbricate when dry, more open when moist, strongly falcate-secund, slightly concave and decurrent, strongly plicate, ovate-lanceolate to lanceolate, long-acuminate, to elongate-triangular in apices, ± twisted; margins recurved at base, plane above, serrate in apices, serrulate to entire below; costae broad at base, tapering above, ending near middle (57%)

with an inconspicuous dorsal spine. Branch leaves slightly smaller. Median leaf cells fusiform to linear 62.7-116.3 (x=89.7) X 5.7-8.0 (x=6.5) μm; apical cells similar 59.3-114.0 (x=82.2) X 3.4-8.0 (x=6.0) μm; basal cells shorter, rectangular to hexagonal, pitted 34.2-68.4 (x=52.8) X 6.8-11.4 (x=9.3) μm; alar cells forming small discrete groups, quadrate to irregularly quadrate or rectangular, 11.4-28.5 (x=22.3) X 8.0-11.4 (x=10.6) μm. Autoicous. Perichaetia cylindrical, leaves sheathing at base, ecostate, outer leaves short, ovate-acute to acuminate, inner leaves longer and ovate, slenderly acuminate; margins plane, remotely serrate above, entire below, not bordered. Perigonia pyriform, leaves ecostate, ovate, long-acuminate; margins plane, serrate at apices and entire below, ± bordered by a single row of rectangular cells. Seta 12.0 mm long, red-brown, weakly papillose. Capsule 1.5 X 0.9 mm horizontal, short-ovoid, slightly curved, orange-brown; exothecial cells rectangular, forming vertical rows, end walls thinner than side walls. The rest unknown.

TYPIFICATION: The type of this species consists of five syntypic specimens, "Hermite Island, Cape Horn, Antarct. Exp. 1839-1843, *J.D. Hooker*," one each in the herbaria at H-BR and NY (both *s.n.*) and three in the herbarium at BM (two *170* and one *169*). The 169 specimen at BM is labeled *Hypnum paradoxum*, whereas the specimens at H-BR, NY, and the two *170* at BM are all labeled *Hypnum paradoxum* var. β. I designate the Hooker specimen 169 at BM as the lectotype since it fits the protologue description and is from the author's herbarium. Since the var. β on the specimens at BM, H-BR, and NY is not mentioned in the protologue, it is uncertain what the author's intentions were for these specimens. I

consider them to be original material (ICBN art. 7.5) and designate them as paratypes.

COMMENTS: The gametophytic and sporophytic characters of this specimen indicate an affinity with other taxa in the section *Velutina*.

* * *

Brachythecium parvulum Dus. in Par., Ind. Bryol. ed. 2, 1: 151. 1904. *nom. nud.*

Cited specimen: "Chile australis ad lac. Llanquihue in terra, Jun. 28, 1897, *P. Dusén 763*." [!]

COMMENTS: This binomial was proposed and distributed by Dusén as one of his exsiccate specimens. Dusén's herbarium name, although effectively published later (ICBN 31.1) by Paris (1904, p. 151) was not validly published since it lacked a description (ICBN 32.1). Hence, *Brachythecium parvulum* Dus. in Par. is considered to be *nom. nud.*

Specimens of *Dusén 763* that I have seen from FI, M, NY, S(3), and WU are all referred to *Brachythecium conostomum* (Tayl.) Jaeg.

* * *

Brachythecium patagonicum Card. *et* Broth., Kongl. Svenska Vetenskapsakad. Handl. 63(10): 68. 1923.

Type specimen (lectotype *des. mihi*) UPS: "Patagonia australis Canal Fitzroy., Los Amigos, in paludosis calcareis, 19/4/1908, *Halle 827*." [!]

Plants small-sized, pale yellow-green above dark green below. Stems to 4.0 cm long, erect, julaceous, apices tapering, irregularly branched; branches to 1.0 cm long, erect, julaceous, apices tapering; central strand narrow, inner cortex cells large and thin-walled,

becoming smaller with slightly thickened walls at stem surface; pseudoparaphyllia orbicular. Leaves 1.4-2.3 (x=2.0) X 0.3-0.8 (x=0.6) mm, erect-imbricate to erect-patent when dry, becoming more open when moist, slightly concave and decurrent, strongly plicate, ovate-lanceolate to lanceolate, long-acuminate, widest slightly above base; margins reflexed at base, plane above, entire; costae broad at base, gradually tapering above, ending near middle (53%). Median leaf cells fusiform to linear, walls slightly thickened and pitted 51.3-91.2 (x=76.8) X 6.8-9.1 (x=7.5) μm, apical cells similar 51.3-91.2 (x=74.7) X 5.7-8.0 (x=7.1) μm; basal cells elongate-ovate to rectangular, with thickened and pitted walls 30.8-51.3 (x=39.8) X 9.1-14.8 (x=12.1) μm; alar cells in a distinct groups, forming columns 4-15 cells high between margins and plicae, and extending into decurrencies 13.7-28.5 (x=18.4) X 9.1-17.1 (x=13.2) μm. Autoicous. Perichaetia cylindrical, leaves ecostate, outer leaves ovate-acute, inner leaves longer acuminate; margins plane, not bordered. Perigonia pyriform, leaves ecostate, outer leaves orbicular, inner leaves ovate-acute to abruptly long-acuminate; margins plane, ± bordered by rectangular cells. The rest unknown.

TYPIFICATION: The type of this species is represented by two isotypic specimens, "Patagonia austr., Canal Fitzroy, Los Amigos, in paludosis calcareis, *Halle 827*," one each at S and UPS. No specimens of this species were made available to me from either author's herbarium. I designate the specimen at UPS as the lectotype since this specimen fits the protologue description, was determined by Cardot, and has more plant material than the specimen from S. The duplicate specimen at S is considered to be a isolectotype.

COMMENTS: Cardot and Brotherus considered this species to belong in the section *Salebrosa*, an opinion with which I agree.

The growth form, leaf morphology, and areolation of this specimen fit within the accepted range of variation for *B. austro-glareosum*.

* * *

Brachythecium peruvianum Broth., Mitt. Inst. Alleg. Bot. Hamburg. 8: 406. 1931.

Type specimen (lectotype *des. mihi*) H-BR: "Süd-Peru, Arequipa 2000-2500 m, 19/2/1923, *E. Guenther et O. Buchtien 1998*." [!]

Plants medium-sized, yellow-green. Stems to 5.0 cm long, prostrate, densely foliate and terete, irregularly branched with tufted rhizoids where attached to substrate; branches to 2.0 cm long, terete, ascending to erect; central strand narrow, inner cortex cells large and thin-walled, outer 2-3 layers of cortex cells smaller and thin-walled; pseudoparaphyllia ovate-acute. Leaves 1.4-2.0 (x=1.7) X 0.7-0.9 (x=0.8) mm, erect-imbricate when dry, open-erect when moist, concave, slightly decurrent, biplicate and keeled, broad at base, long triangular to ovate-lanceolate, acuminate with short-twisted apices; margins plane, serrulate to serrate throughout; costae stout, tapering above, ending near middle ± in an inconspicuous spine (62%). Median leaf cells linear highly variable in length 35.3-79.8 (x=60.2) X 4.6-6.8 (x=6.0) µm; apical cells shorter, 34.2-59.3 (x=48.5) X 3.4-13.7 (x=6.6) µm; basal cells shorter and broader with thickened-porose walls rectangular to irregular-rectangular 28.5-57.0 (x=36.9) X 5.7-9.1 (x=7.3) µm; alar cells quadrate to rectangular, forming small distinct groups 9.1-37.6 (x=17.4) X 6.8-11.4 (x=10.0) µm. Autoicous/synoicous. Perichaetia

cylindrical, leaves ecostate, sheathing at base, outer leaves short ovate-acuminate, inner leaves longer, acuminate; margins plane, serrate in apices, entire and bordered by a narrow row of cells below. Hermaphroditic perigonia ovoid, leaves ecostate, outer leaves short and ovate-acuminate, entire and completely bordered by a single row of rectangular cells, inner leaves longer, ovate narrowly acuminate, bordered only below acumen; margins plane and serrate in apices. Setae 11.0-16.0 mm long, coarsely papillose throughout, red-brown. Capsules 1.2-1.5 X 0.8-1.0 mm, inclined cylindrical and curved, ± slightly constricted below the mouth red-brown; exothecial cells quadrate to rectangular in vertical rows, lateral cell walls thicker than end walls; cilia 1-2, nodose and appendiculate. The rest unknown.

TYPIFICATION: This species is represented by two isotypic specimens, "Süd-Peru: Arequipa, 2000-2500 m *E. Guenther et O. Buchtien 1998*," one each in the herbaria at H-BR and HBG. I designate the specimen at H-BR as the lectotype since it fits the protologue description and is from Brotherus' herbarium. The duplicate specimen at HBG is considered to be an isolectotype.

COMMENTS: Brotherus (1931, p. 406) considered this species to be part of the section *Rutabula* (≡*Brachythecium*); however, I find that the gametophytic and sporophytic characters ally this species with others of the section *Velutina*. The growth form, leaf morphology, areolation, autoicous/synoicous condition, and sporophyte characters of this specimen fit within the accepted range of variation for *B. praelongum*.

* * *

Brachythecium plicifolium C. Müll., Hedwigia 40: 76. 1901.

Type specimen (lectotype *des. mihi*) PC: "Brasilia, Santa Catarina, Serra Geral in terra araucarieti, Majo 1890, *E. Ule 886*." [!]

≡ [*Brachythecium plicaefolium* C. Müll.. *ex* Broth., Nat. Pfl. 1(3): 1143. 1908 *orthogr. pro. fide* Vander Wijk et al. 1959 vol. 1, p. 216.]

Plants slender, medium-sized, yellow-green, forming an open mat. Stems to 4.0 cm long, prostrate, terete, densely foliate, irregularly to subpinnately branched; branches to 0.8 cm, unequal in length, terete, ± tapering, spreading to erect; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate-acuminate. Leaves 0.9-1.3 (x=1.1) X 0.4-0.8 (x=0.5) mm, erect-imbricate when dry, erect to patent when moist, concave, decurrent, slightly plicate, ovate to ovate-lanceolate, acuminate to long-acuminate with ± twisted tips; stem leaves similar, larger and more decurrent; margins plane or recurved below, serrulate to serrate in upper 2/3; costae broad at base, tapering above and ending near middle (55%). Median leaf cells rhomboidal to linear 57.0-74.1 (x=66.2) X 5.7-8.0 (x=6.6) µm; apical cells similar 45.6-91.2 (x=66.5) X 3.4-8.0 (x=5.4) µm; basal cells irregularly rectangular 22.8-68.4 (x=36.0) X 9.1-13.7 (x=11.5) µm; alar cells lax, quadrate to rectangular extending into decurrencies 13.7-28.5 (x=21.4) X 11.4-22.8(x=16.9) µm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate and long-acuminate, inner leaves longer and slenderly acuminate; margins plane, entire, and bordered by a single row of rectangular cells below.

Perigonia not observed. Setae 20.0-32.0 (x=25.8) mm long, red-brown, smooth. Capsules 1.3-1.8 (x=1.5) X 0.5-0.8 (x=0.6) mm, inclined to erect, cylindrical and curved, ± constricted below mouth when dry, dark red-brown, blackening with age; exothecial cells rectangular, in vertical rows with thickened lateral and somewhat thinner end walls; annuli not differentiated; cilia 2-3, nodose and papillose; opercula 0.7-1.0 (x=0.9) X 0.6-0.8 (x=0.7) mm, long-conic to conic-subrostrate, apiculate. Spores 11.0-17.6 (x=14.4) µm, finely papillose.

TYPIFICATION: This species is represented by four isotypic duplicates, "Brasilia, Sa Catharina, Serra Genal, in terra arancarieti, Majo 1820., *E. Ule 886*," one each in the herbaria at H-BR, HBG, M, and PC. With the loss of the C. Müller's herbarium at B, I designate the specimen in the herbarium at PC as the lectotype. This specimen fits the protologue description and bears a handwritten label in Müller's cursive style. Duplicate specimens at H-BR, HBG, and M are considered isolectotypes.

COMMENTS: The lectotype specimen is mixed with *Mittenothamnium sp.* The dioicous condition, growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato.*

* * *

Brachythecium plicifolium var. ***tenuipinnatula*** C. Müll., Hedwigia 40: 77. 1901.

Type specimen (lectotype *des. mihi*) HBG: "Brasilia, Santa Catarina, Serra Geral ad terram in Capaos, Majo 1890, *E. Ule 1216*." [!]

Plants slender, medium-sized, yellow-green, forming an open mat. Stems 3.0-4.0 cm long, prostrate, terete, densely foliate, with tufted rhizoids where attached to substrate, pinnately to subpinnately branched; branches to 0.5 cm long, equal in length, spreading to erect, terete ± tapering; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate-acuminate. Leaves 1.0-1.4 (x=1.2) X 0.4-0.8 (x=0.5) mm, erect-imbricate when dry, erect to patent when moist, concave, decurrent, slightly plicate, ovate to ovate-lanceolate, acuminate to long-acuminate; stem leaves similar, distinctly larger and more decurrent; margins plane throughout or reflexed at base, serrulate to serrate in upper 2/3; costae broad at base, tapering above and ending near middle (55%). Median leaf cells rhomboidal to linear 45.6-79.8 (x=65.4) X 5.7-6.8 (x=6.7) μm; apical cells similar 39.9-83.2 (x=66.2) X 4.6-6.8 (x=5.9) μm; basal cells irregularly rectangular 36.5-57.0 (x=48.7) X 8.0-17.1 (x=11.3) μm; alar cells lax, quadrate to rectangular extending into decurrencies 17.1-45.6 (x=26.4) X 12.5-20.5 (x=15.7) μm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate and long-acuminate, inner leaves longer and slenderly acuminate; margins plane, entire, and bordered by a single row of rectangular cells below. Perigonia not observed. Setae 18.0-26.0 (x=23.6) mm long, red-brown, smooth. Capsules 1.1-2.0 (x=1.5) X 0.5-0.8 (x=0.6) mm, inclined to erect, cylindrical and curved, ± constricted below mouth when dry, dark red-brown; exothecial cells rectangular, in vertical rows, with thickened lateral and somewhat thinner end walls; annuli not differentiated; cilia 2-3, nodose and

papillose; opercula 0.7-1.0 (x=0.8) mm long X 0.5-0.9 (x=0.7) mm wide, long-conic to conic-subrostrate, apiculate. Spores 12.1-16.5 (x=14.1) μm, finely papillose.

TYPIFICATION: In the protologue Müller cited three E. Ule specimens from Brazil to typify this variety "Sa. Catharina, Serra Geral, in terra araucarieti, Majo 1890 (sub. *Brachythecium tenui-pinnatulo* C. Müll.), *E. Ule 887*; Serra Geral, ad terram in Capaos, Majo 1891, (sub *B. tenui-pinnatulo* C. Müll.), *E. Ule 1216*; Serra do Oratorio prope Orleans, in solo sylvae montanae, sterile, Sept. 1889, *E. Ule 796*." I have seen only three syntypic examples, two *E. Ule 1216* from the herbaria at HBG and WU, and one *E. Ule 796* from HBG. With the loss of Müller's herbarium at B, I designate the specimen *1216* from HBG as the lectotype. This specimen most completely represents the protologue description since it contains sporophytes. *E. Ule 1216* at WU is considered to be an isolectotype and the *E. Ule 796* is considered to be a paratype.

COMMENTS: The original labels of the lectotype, isolectotype, and paratype bear the name *Hypnum (Brachythecium) tenui-pinnatum* which is a *nomen nudum* (see type study of *B. tenui-pinnatum*, p. 428). One other specimen *Ule Exsicc. 196* labeled *Hypnum (Brachythecium) tenui-pinnatum* C. Müll. bears the same collection information as *Ule 887* of the protologue; but this exsiccate specimen can only be regarded as a representative specimen since its original Ule collection number is 886.

The dioicous condition, growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. stereopoma* (Spruce *ex* Mitt.) Jaeg. *sensu lato*. *B.*

stereopoma is notoriously variable throughout its range and the *tenuipinnatum* expression, with its slender growth form, and smaller, short pinnate branches of equal length, still falls within my broadly drawn concept of the species.

* * *

Brachythecium plumosum var. ***sublaevipes*** Card., Rev. Bryol. 37: 70. 1910.

Type specimen (lectotype *des. mihi*) PC: "Mexico, District fédéral, Canada, vallé de Mexico, 8500 ft, Nov. 4, 1908, *C. G. Pringle 10552*." [!]

Plant medium-sized, light green to yellow-green, caespitose. Stem to 3.0 cm long, decumbent to erect, terete, densely foliate, irregularly branched; branches to 0.8 cm long, erect, not tapering, densely foliate, unequal in length, longer branches with short secondary branches; central strand narrow, inner cortex cells large, gradually becoming smaller and thick-walled toward stem surface; pseudoparaphyllia orbicular. Leaves 1.2-1.6 (x=1.5) X 0.7-1.1 (x=0.9) mm, imbricate when dry, patent when moist, concave to cochleariform, decurrent, not plicate, ovate to broadly ovate with acute or short-acuminate apices, apices blunt and ± bent to one side; margins reflexed in decurrencies, plane above, smooth or serrulate in apices; costae broad at base, tapering above, sometimes with few short lateral spurs, extending into the base of apices (65%) and ± ending in a minute inconspicuous dorsal spine. Median leaf cells short to long rhomboidal 41.0-79.8 (x=55.7) X 5.7-9.1 (x=6.8) µm; apical cells gradually becoming shorter, fusiform 25.1-51.3 (x=37.2) X 5.7-11.4 (x=7.9) µm; basal cells hexagonal to rectangular, ± pitted 20.5-58.1 (x=39.6) X 9.1-25.1 (x=13.5) µm; alar

cells forming a distinct cluster of quadrate to rectangular cells extending into decurrencies, 22.8-34.2 (x=26.6) X 11.4-17.1 (x=13.8). Autoicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves obovate, inner leaves longer and short-acuminate; margins plane, entire, bordered below by a single row of rectangular cells. Perigonia similar to perichaetia. Setae 10.0-12.0 (x=11.5) mm long, red-brown, papillose above, gradually becoming smooth toward base or nearly smooth throughout. Capsules 1.0-1.7 (x=1.4) X 0.5-0.9 (x=0.7) mm, suberect to horizontal, cylindrical, curved, red-brown; exothecial cells rectangular or irregular, in vertical rows, lateral walls thicker than end walls; annuli not differentiated; cilia 2, nodose and lightly papillose; opercula 0.6-0.9 (x=0.7) X 0.6-0.8 (x=0.7) mm, conic-apiculate to conic with short rostrate tip. Spores 13.2-18.7 (x=15.5) µm, finely papillose.

TYPIFICATION: Cardot cited three Pringle "Plantae Mexicanae" exsiccate specimens; "District Federal, Canada, Valle de Mexico, 1908, *10552, 15112*; and Etat de Puebla, Honey-station, 1908, *15123*" in the protologue. I have examined 26 syntypic specimens from various herbaria and designate the *Pringle 10552* at PC as the lectotype (specimen having a printed exsiccate label with the label information handwritten in Pringle's cursive style using a heavy black ink, the species name handwritten in Cardot's cursive style using a thinner black ink, and "Herb. J. Cardot" rubber-stamped at the front-bottom of the packet) since it fits the protologue description and is in Cardot's herbarium. Duplicates of this specimen at BM, C, CANM, FI, G, H-BR, L, M, MO, NY(2), S(4), TENN, UPS, US, and VT are considered isolectotypes.

Specimens of Pringle's 15112 at JE, MICH, VT, and 15123 at VT are considered paratypes; and Pringle's 10552 at FH and 15112 at US are referred to *Rhynchostegium riparioides* (Hedw.) Card.

COMMENTS: Cardot proposed this variety of *Brachythecium plumosum* on the basis of the nearly smooth seta. This character is neither consistent throughout specimens of this variety nor of the species. *Brachythecium plumosum* is notoriously variable throughout its cosmopolitan range. The erect growth form and broadly ovate short-acuminate, deeply concave leaves of this variety still fall within my broadly drawn concept of this species.

* * *

Brachythecium poadelphus C. Müll., Hedwigia 40: 76. 1901.

Type specimen (lectotype *des. mihi*) H-BR: "Brazilia, Minas Geraës, Serra de Caraca, zwischen Gras auf Erdboden, *E. Ule 1473*." [!]

Plants medium-sized, yellowish green, shiny, forming an open mat. Stems to 8.5 cm long, prostrate, terete with tufted rhizoids in older portions, subpinnately branched; branches to 1.3 cm long, terete, tapering at the ends; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia triangular. Leaves 1.4-1.9 (x=1.7) X 0.4-0.9 (x=0.6) mm, erect, ± imbricate and heteromallous, young branches with leaves occasionally complanate when dry, becoming erect and homomallous when moist, slightly concave, not to slightly decurrent, not plicate, ovate-lanceolate, acuminate, older stem leaves broadly ovate-acuminate, ± cordate at base; margins slightly reflexed at base, plane above, serrate in upper 2/3, serrulate to smooth below,

older leaves less sharply serrate; costae slender, ending near middle (51%) in an inconspicuous spine. Median leaf cells linear 68.4-123.1 (x=99.5) X 5.7-9.1 (x=7.1) μm; apical cells similar 62.7-108.3 (x=86.1) X 5.7-6.8 (x=6.5) μm; basal cells irregularly rectangular, ± pitted 43.3-85.5 (x=55.1) X 9.1-20.5 (x=12.3) μm; alar cells rectangular, forming small inconspicuous groups 22.8-45.6 (x=31.2) X 11.4-17.1 (x=13.7) μm. Dioicous. Perichaetia not observed. Perigonia pyriform, leaves, ecostate, ovate-acuminate; margins plane, entire or serrate in apices, and ± bordered by a single row of elongate cells below. The rest unknown.

TYPIFICATION: The type of this species is represented by three isotypic specimens, "Brasilia, Minas Geraës, Serra de Caraca, Martio 1892, *E. Ule 1473*," one each, in the herbaria at H-BR, HBG, R, and US. With the loss of Müller's herbarium at B, and given that none of the three isotypic specimens have unique informational ties to the Müller's herbarium, I designate the specimen in the herbarium at H-BR as the lectotype. Duplicates at HBG, R, and US are considered isolectotypes.

COMMENTS: The gametophytic characters of this specimen ally it with other specimen of the section *Stereopoma* of which I consider it to be a member.

* * *

Brachythecium praelongum Schimp. *ex* C. Müll., Nuovo Giorn. Bot. Ital n. ser. 4(2): 155. 1897.

Type specimen (lectotype *des. mihi*) BM: "Bolivia, prov. Larecaja, Sorata, via ad Lacutia prope rivum Aparasiri, reg. temperata, 3400 m, November. 1857 *G. Mandon 1704*." [!]

Plants small-sized and delicate, yellow-green, forming loose open mats. Stems to 2.0 cm long, prostrate with many short branches, densely foliate, julaceous, irregularly to subpinnately branched; branches to 2.0 cm long; central strand narrow, inner cortex cells large and thin-walled, outer cortex of 2-3 layers of small, thick-walled cells; pseudoparaphyllia ovate-apiculate. Leaves 0.8-1.4 (x=1.1) X 0.2-0.4 (x=0.3) mm, loosely imbricate to erect when dry, more open when moist, concave, ± decurrent, plicate, ovate to lanceolate, acuminate; margins reflexed at base, plane above, serrate in upper 1/2 to 2/3, serrulate to base; costae broad at base, gradually tapering above, ending near middle (57%) with an inconspicuous dorsal spine. Median leaf cells linear 45.6-71.8 (x=58.7) X 4.6-6.8 (x=5.4) μm; apical cells shorter 22.8-77.5 (x=44.5) X 3.4-6.8 (x=5.1) μm; basal cells shorter, rectangular to hexagonal 17.1-34.2 (x=26.1) X 5.7-9.1 (x=7.3) μm; alar cells irregularly quadrate forming small discrete groups 11.4-22.8 (x=15.7) X 6.8-9.1 (x=8.2) μm. Autoicous. Perichaetia cylindrical, leaves sheathing at base, ecostate, outer leaves short ovate-acuminate, inner leaves longer, ovate long-acuminate; margins plane, serrate above, entire below, bordered by a single row of rectangular cells. Perigonia pyriform, leaves ecostate, ovate-acute to short-acuminate; margins plane, entire, bordered by a single row of rectangular cells. Setae 12.0-17.0 (x=14.5) mm long, reddish brown, with low papillae throughout. Capsules 1.5-1.7 (x=1.6) X 0.5-1.0 (x=0.9) mm, erect to inclined, oblong-ovoid to cylindrical and slightly curved, ± constricted below the mouth, light red-brown; exothecial cells quadrate to rectangular, in vertical rows, cell walls uniformly thickened; cilia 2-3 nodose to

subappendiculate. Spores 10.2-17.1 (x=13.9) μm, finely papillose. The rest unknown.

TYPIFICATION: The type of this species is represented by five isotypic specimens, "Bolivia, prov. Larecaja, Sorata, via ad Lacutia prope rivum Aparasiri, reg. temperata, 3400 m. Sept. 1857, cum fructibus supramaturis, *G. Mandon 1704*," one in the herbarium at BM and two each in the herbaria at G and PC. With the loss of the Müller's herbarium at B, I designate the single specimen at BM as the lectotype since it fits the protologue description and is in Schimper's herbarium. Duplicate specimens at G(2) and PC(2) are considered isolectotypes.

COMMENTS: The gametophytic and sporophytic characters of this specimen indicate an affinity with other taxa in the section *Velutina*.

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Brachythecium prasophyllum (Hamp.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 327. 1878 (Ad. 2: 393).

Basionym: *Hypnum prasophyllum* Hamp., Ann. Sc. Nat. Bot. ser. 5. 5: 315. 1866.

Type specimen (lectotype *des. mihi*) L: "Colombia, Bogota, Tequendama, 2500 m., Herb. Lindig, *A. Lindig*" *s.n.* [!]

Plants small- to medium-sized, light green, in loose, open mats. Stems to 3.5 cm long, prostrate, densely foliate, irregularly to subpinnately branched; branches to 2.0 cm long, unequal, prostrate; central strand narrow, inner cortex cells large and thin-walled, outer cortex 2-3 layers of small thick-walled cells; pseudoparaphyllia ovate-acuminate. Leaves 1.0-1.8 (x=1.4) X 0.3-0.4 (x=0.3) open to spreading and generally complanate, ± slightly falcate, ± slightly decurrent, ±

slightly plicate and concave at leaf bases, elongate-lanceolate, slenderly acuminate; margins reflexed at base, plane above, serrate above, serrate to serrulate to near base; costae narrow at base, gradually tapering above, ending near middle (61%) in a dorsal spine; branch leaves noticeably smaller and becoming more sharply serrate toward branch apices. Median leaf cells linear 69.5-114.0 (x=84.0) X 3.4-9.1 (x=6.3) μm; apical cells shorter 39.9-57.0 (x=49.1) X 3.4-5.7 (x=4.9) μm; basal cells shorter, rectangular to hexagonal 28.5-51.3 (x=36.1) X 5.7-13.7 (x=8.7) μm; alar cells forming small discrete groups, irregularly quadrate 13.7-34.2 (x=24.9) X 6.8-11.4 (x=8.8) μm. Autoicous. Perichaetia cylindrical, leaves sheathing at base, ecostate, outer leaves short ovate-acuminate, inner leaves longer, ovate, long and slenderly acuminate; margins plane, entire and ± bordered by a single row of rectangular cells. Perigonia pyriform, leaves, ecostate, ovate-acuminate; margins plane, serrate at apices, entire below and ± bordered by a single row of rectangular cells. Setae 11.0-16.0 (x=13.2) mm long, light orange-brown, smooth. Capsules 0.9-1.5 (x=1.2) X 0.5-0.9 (x=0.7) mm, horizontal to subpendent, cylindrical and slightly curved, ± slightly constricted below mouth, dark red-brown; exothecial cells rectangular, in vertical rows, cell walls uniformly thickened; annuli of 2 rows of inflated cells; operculum 0.5 X 0.6 mm, conic apiculate; cilia 2-3, nodose and appendiculate, papillose. Spores 9.9-14.0 (x=12.3) μm, finely papillose.

TYPIFICATION: In the protologue Hampe cited two type locations for A. Lindig specimens, "Bogota, Tequendama, et Chiquiquia, 2500-2700 m., in sylvis parce inter mixtum aug. Leg A. Lindig." Loan requests for

type specimens from the author's and other herbaria produced only one specimen from Leiden (L). I consider this single specimen at L as the lectotype since it fits the protologue description and was originally from the herbarium of Lindig.

COMMENTS: Hampe described this species as being dioicous; however, the lectotype proved to be autoicous. The growth form, leaf morphology, areolation, autoicous condition, and sporophyte characters of this specimen fit within the accepted range of variation for *B. occidentale*.

* * *

Brachythecium productifolium C. Müll., Hedwigia 40: 77. 1901.

Type specimen (lectotype *des. mihi*) HBG: "Brazil, Estado de St. Catharina am Uferabhang des Tubarao, September 1890, *E. Ule 981*." [!]

Plants small and delicate, yellow-green, forming a loose, open mat. Stems to 3.5 cm long, prostrate, terete, with tufted rhizoids where attached to substrate, subpinnately branched; branches to 1.0 cm long, terete, tapering; central strand narrow, inner cortex cells large and thin-walled, become smaller and thicker walled at outer surface; pseudoparaphyllia triangular. Leaves 0.8-1.5 (x=1.2) X 0.3-0.6 (x=0.4) mm, erect-imbricate when dry, becoming more open-erect to patent when moist, concave, slightly decurrent, plicate at base, ovate to lanceolate, long-acuminate, apices ± twisted; margins plane or recurved at decurrencies and occasionally along acumina, serrulate in upper 2/3, smooth below; costae broad at base, tapering above and ending near middle (55%). Branch leaves slightly smaller and narrower. Median leaf cells fusiform to linear, 51.3-85.5 (x=67.5) X 5.7-9.1 (x=6.7) μm; apical cells longer 57.0-91.2 (x=66.9) X 4.6-6.8 (x=5.8) μm; basal cells

irregularly rectangular 29.6-47.9 (x=38.1) X 8.0-11.4 (x=10.3) μm; alar cells forming a small distinct group of quadrate to rectangular cells 17.1-28.5 (x=24.1) X 9.1-20.5 (x=12.8) μm. The rest unknown.

TYPIFICATION: This species is represented by two isotypic specimens, "Brasilia, Sa. Catharina Tubarao, in declivibus rivuli ad flumen Tubarao, Sept. 1890: *E. Ule 981*" one each at H-BR and HBG. Both specimens comply with the protologue. With the loss of the Müller's herbarium at B, I designate the specimen at HGB as the lectotype and the duplicate specimen at H-BR as the isolectotype.

COMMENTS: Even though the type specimens are sterile, the growth form, leaf shape, and areolation of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium pseudo-laetum C. Müll., Hedwigia 37: 260. 1898.

≡ [*Brachythecium pseudo-laetum* Müll. *ex* Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-1877: 321. 1878. *nom. nud. et comb. superfl.* basionym: *Hypnum pseudo-laetum* C. Müll. *nom. nud.*]

≡ [*Hypnum laetum* Sull., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-1877: 321. 1878. *nom. inval. in synon.*] non *Hypnum laetum* Brid., Bryol. Univ. 2: 479. 1827.

Type specimen (lectotype *des. mihi*) FH: "Cuba, ad rupes rivulorum montanorum, *Charles Wright* 128." [!]

Plants slender, medium-sized, yellow-green. Stems 2.0-3.0 cm long, prostrate, terete, densely foliate, with tufted rhizoids where attached to substrate, irregularly to subpinnately branched; branches to 0.5 cm long, unequal in length, becoming shorter towards stem apices, spreading

to erect, terete ± tapering; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 1.2-1.4 (x=1.2) X 0.4-0.6 (x=0.5) mm, erect when dry, erect to patent when moist, concave, decurrent, slightly plicate, ovate to ovate-lanceolate, acuminate with ± twisted tips; stem leaves slightly larger and more decurrent; margins plane or reflexed at base, serrulate to serrate in upper 2/3; costae broad at base, tapering above and ending near middle (58%). Median leaf cells rhomboidal to linear 53.6-93.5 (x=69.0) X 5.7-8.0 (x=6.7) μm; apical cells similar 57.0-80.9 (x=71.3) X 5.7-6.8 (x=6.4) μm; basal cells irregularly rectangular 25.1-66.1 (x=45.4) X 6.8-16.0 (x=11.1) μm; alar cells lax, quadrate to rectangular extending into decurrencies 13.7-22.8 (x=20.4) X 9.1-17.1 (x=13.0) μm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate and long-acuminate, inner leaves longer and slender acuminate; margins plane, entire, and bordered by a single row of rectangular cells below. Perigonia not observed. Setae 18.0-20.0 (x=18.8) mm long, red-brown, smooth. Capsules 1.1-2.0 X 0.8-0.9 mm, inclined to erect, cylindrical and curved, ± constricted below mouth when dry, red-brown; exothecial cells rectangular, in vertical rows with thickened lateral and somewhat thinner end walls; annuli not differentiated; opercula 1.0-1.1 X 0.7-0.9 mm, long-conic, apiculate. Cilia and spores not examined.

TYPIFICATION: The type of this species is represented by 13 isotypic specimens, "Cuba, ad rupes rivulorum montanorum: Charles Wright Coll 128 sub. *Hypunum laetu* Sull nec. Brid," one each, in the

herbaria at GR, H-BR, HBG, OXF, S, WU and two each in the herbaria at BM, FH, G, and L. With the loss of the C. Müller's herbarium at B, I designate one of the specimens at FH as the lectotype since it fits the protologue description. Duplicate specimens at BM(2), FH, G(2), GR, H-BR, HBG, L(2), OXF, S and WU are considered isolectotypes.

COMMENTS: Nomenclatural inaccuracies in literature associated with this taxon have required re-evaluation and clarification.

The type specimen cited by Müller was also cited 36 years earlier by Sullivant (1862, p. 289) in a published exsiccate list of Charles Wright specimens from Cuba:

128 *H. laetum* Brid.; *Sulliv. Icon. Musc. t. 115, ined.;* non *Bryol. Europ.* - Rocks, mountain rivulets.

Sullivant named this specimen *H. laetum* as circumscribed by Bridel (1827, vol. II, p. 479) and referred to his own illustration of *H. laetum* in his scheduled but unpublished Icones Muscorum (1864). Yet, Sullivant did not consider this specimen to be the same as *H. laetum* as circumscribed in Bryological Europea (Brach et al., 1853, vol. 6, p. 24). Unequivocally, Sullivant gave no direct or indirect indication that he considered this specimen to represent a new species. However, Jaeger's (1878, p. 321) citation of *H. laetum* as the basionym for *Brachythecium pseudo-laetum* implied Sullivant as the authority for the basionym, thus creating in the literature "*H. laetum* Sull." a superfluous nomenclatural name.

Brachythecium pseudo-laetum C. Müll. (*in sched. -- Hypnum*). *Hypnum laetum* Sulliv. Proceed. Amer. Acad. Arts a. Scienc. 1861 p. 289.

Patria: Insula Indiae occidental. Cuba (*Wright Nro. 128*).

Consequently, the following citations in *Index Muscorum* (Van Der Wigh et al. 1964, 1969): vol. 3, p. 90. *H. laetum* Sull.; vol. 5, p. 353. *H. laetum* Sull. *hom. illeg.* as basionym for *B. pseudo-laetum* Jaeg.; vol. 5, p. 719. *H. laetum* Sull. *hom. illeg.*, are incorrect since "*H. laetum* Sull." is not nomenclaturally legitimate (ICBN 6.3). Thus, "*H. laetum* Sull." should be cited *nom. inval. in synon.* and is not the basionym for *B. pseudo-laetum* Jaeg. Similarly, "*H. pseudo-laetum* Müll." in *Index Muscorum* (Wijk, Vol. 1, p. 219) is cited incorrectly as basionym for *B. pseudo-laetum* Müll. and also should be considered a *nom. inval. in synon.* Instead, *H. pseudo-laetum* Müll., is the correct basionym for *B. pseudo-laetum* Jaeg., 1898. The correct citation of *B. pseudo-laetum* Jaeg., 1878, should read *B. pseudo-laetum* Müll. *ex* Jaeg., *nom. nud.*, since Jaeger (1878, p. 321) effected this new combination of Müller's *H. pseudo-laetum nom. nud.*; neither name having been provided with a description.

Later, Müller (1898, p. 260) validated *B. pseudo-laetum* with a Latin description, and with a specimen citation:

Cuba, ad rupes rivulorum montanorum: Charles Wright.

Coll. No. 128 sub Hypno laeto Sulliv. nec. Brid.

Müller indicated that Sullivant had "identified" Wright's specimen 128 as *H. laetum* [*sensu* Sullivant] which he (Müller) did not consider to be the same as *H. laetum* Brid.

The dioicous condition, growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*. I concur with Crum and

Steere (1957, p. 562) in considering *B. pseudo-laetum* C. Müll. as a synonym of *B. stereopoma*.

* * *

Brachythecium pseudo-rutabulum (Hamp.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 332. 1878. (Ad. 2: 398)

Basionym: (*Ptycho*) *Hypnum pseudo-rutabulum* Hamp., Linnaea 32: 160. 1863.

Type specimen (holotype implicit) BM: "Nova Granada, Bog choache in nemor, alt. 2600 m. Sept. 1860, Herb. Lindig, *Lindig*" *s.n.* [!]

Plants medium-sized, yellow-green, forming a loose mat. Stems to 6.0 cm long, terete, prostrate, leaves distant, subpinnately branched; branches to 2.0 cm long, terete, tapering; central strand narrow, inner cortex cells large and thin-walled, becoming smaller toward stem surface; pseudoparaphyllia ovate ± erose. Leaves 1.4-2.1 (x=1.7) X 0.8-1.4 (x=1.0) mm, open erect when dry, becoming erect to spreading when moist, concave, strongly decurrent, not to slightly plicate; stem leaves deltoid to ovate-acuminate, apices short and twisted, branch leaves smaller, ovate-lanceolate, acuminate, apices longer and occasionally twisted; margins reflexed at base, plane above, serrulate in upper 1/2, entire below; costae slender, tapering above the base, reaching to near middle (61%), occasionally ending in a dorsal spine. Median leaf cells linear 69.5-103.7 (x=90.3) X 6.8-10.3 (x=7.8) μm; apical cells slightly shorter 45.6-91.2 (x=67.6) X 6.8-9.1 (x=7.8) μm; basal cells larger and rectangular 49.0-85.5 (x=66.8) X 9.1-30.8 (x=15.0) μm; alar cells quadrate to rectangular becoming lax and inflated, decurrencies composed of inflated rectangular cells, bordered by smaller marginal cells or

long narrow rectangular cells 23.9-70.7 (x=40.4) X 13.7-26.2 (x=19.8) µm. Autoicous. Perichaetia cylindrical, leaves ecostate, outer leaves sheathing at base, short, spreading, inner leaves longer, long-acuminate, squarrose; margins plane, entire or serrulate at apices and ± bordered by a single row of rectangular cells in lower portion. Perigonia ovoid, leaves ecostate, ovate-acuminate; margins plane, entire or serrulate at apices and in lower portions, bordered by a single row of rectangular cells. Setae 29.0 mm long, red-brown, strongly and densely papillose. Capsule 1.4 X 0.7 mm, cylindrical and curved, dark red-brown, horizontal; exothecial cells rectangular, uniformly incrassate, in vertical rows. The rest unknown.

TYPIFICATION: The protologue cited one specimen "Nova Granada, In nemoribus Choache ad terram, 2600 metr., Sept. *Lindigio*" for this species. Only one specimen from the author's herbarium at BM is known to me; hence, I consider it to be an implicit holotype.

COMMENTS: *Ptycho-Hypnum* Hamp., Bot. Zeit. 10: 71. 1852 (="Plicate Hypnum") is a infrageneric group used by Hampe within the genus *Hypnum*. It is synonymous with *Brachythecium fide* Jaeg. (1880, p. 243).

The growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. rutabulum sensu lato*.

* * *

Brachythecium pseudo-sulphureum C. Müll., Hedwigia 40: 75. 1901.

Type specimen (lectotype *des. mihi*) HBG: "Brazil, Minas Geraës, Auf Endboden bei Itabira do Campo, Aprili 1892. *E. Ule 1476*. [!]

Plants medium-sized, young growth yellow, older portions light brown, shiny, forming spreading mats. Stems to 5.5 cm long, densely foliate, prostrate, terete, irregularly branched; branches unequal, to 1.0 cm long, prostrate, terete, ± tapering at tips; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with 2-3 layers of smaller thick-walled cells at stem surface; pseudoparaphyllia ovate-acuminate. Leaves 1.4-2.3 (x=1.9) X 0.4-0.9 (x=0.6) mm, erect-imbricate when dry, open-erect when moist, ovate-lanceolate and acuminate to ovate, long-acuminate, concave, slightly decurrent, plicate; margins plane, ± serrate at apex, serrulate to near base; costae broad at base, tapering and ending near middle (47%). Median leaf cells rhomboidal to linear, 74.1-102.6 (x=90.7) X 6.8-9.1 (x=7.5) μm; apical cells similar 51.3-114.0 (x=77.4) X 5.7-8.0 (x=6.8) μm; basal cells irregularly rectangular 26.2-62.7 (x=44.1) X 11.4-17.1 (x=13.7) μm; alar cells lax, quadrate to rectangular 28.5-68.4 (x=36.9) X 11.4-20.5 (x=15.4) μm. Dioicous. Perichaetia cylindrical, sheathing at base, leaves ovate with long-acumina, inner leaves longer, slenderly acuminate; ecostate; margins plane, entire and ± bordered by a single row of rectangular cells below. The rest unknown.

TYPIFICATION: C. Müller cited two syntypic specimens in the protologue, "Brasilia, Minas Geraës, Serra Itabira do Campo, Aprili 1892 in terra *E. Ule 1476*," and "Caldas, locis umbrosis ad radices arborum, Aug. 1873 *Hj. Mosén* in Hb. Brotheri." Four isosyntypes of the former collection were examined from H-BR, HBG, R, and US. No specimen of the latter collection was found in the Brotherus herbarium. In addition, the loss of the Mosén specimen in Müller's herbarium and the lack of a

cited collection number in the protologue leaves some uncertainty concerning the "type" status of several Mosén duplicate specimens. Of the six different Mosén specimens from Brazilia, Minas Geraës, Caldas, I have examined, four were collected in the month-year cited (*s.n.*, 30/viii/1873 [S]; *325*, 25/viii/1873 [FH, OXF, WU]; *326* 20/viii/1873 [FH]; *330* 25/viii/1873 [FH]) but all differed from the protologue in the substrate information. Even specimen 325 at F labeled "Com. Brotherus" lacks a convincing link to the cited type because this specimen lacks any substrate information on the label. Because of these discrepancies, I do not consider any of these *Hi. Mosén* specimens worthy of type status.

With the loss of Müller's herbarium at B, I designate the E. Ule specimen 1476 from HBG as the lectotype since it fits the protologue description and is from the collector's herbarium. Duplicate specimens at H-BR, R, and US are considered to be isolectotypes.

COMMENTS: The dioicous condition, leaf morphology, areolation, and growth form of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*. Also, all of the Mosén specimens cited above are referred to *Brachythecium stereopoma*.

* * *

Brachythecium pumilum Dus., Bot. Not. 1905: 308. 1905.

Cited specimen: "Chile, australis in terra silvosa" *sine numero et collector*. [*non vidi*]

COMMENTS: Dusén did not include information on the collector of this specimen in the protologue. Yet, I assume the type specimen of the species was collected by him since the labels on type specimens of other

Brachythecium species he described, in the same publication, indicate they were his own. However, no specimens with this binomial were made available to me from the herbaria solicited (page 17), including the author's original herbarium at S. Until an original specimen can be found, I consider this name a *nom. obsc.*

* * *

Brachythecium pusillo-albicans C. Müll., Bull. Herb. Boissier. 5: 218. 1897.

Type specimen (lectotype *des. mihi*) FI: "Guatemala, Alta Vera Paz, in arboribus sylva supra Coban 4800 ped. alt., 14.ii.1886, in Herb. Levier, *H. V. Türckheim 669*." [!]

Plants medium-sized, yellow-green, in a loose mat. Stems to 4.0 cm long, prostrate, terete, densely foliate, subpinnately branched; branches to 0.7 cm long, ± equal in length, terete, ± ascending, tapering; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 1.2-1.5 (x=1.4) X 0.5-0.8 (x=0.6) mm, erect-imbricate when dry, erect to patent when moist, concave, slightly decurrent, plicate, ovate to ovate-lanceolate, acuminate; margins reflexed at base, plane above, entire to serrulate in upper 2/3; costae broad at base, narrow above and ending near middle (50%). Median leaf cells fusiform, elongate-rhomboidal to linear 42.2-82.1 (x=64.8) X 6.8-9.1 (x=7.4) µm; apical cells similar 46.7-74.1 (x=61.3) X 4.6-8.0 (x=6.4) µm; basal cells lax, irregularly rectangular 28.5-74.1 (x=46.6) X 8.0-17.1 (x=11.7) µm; alar cells lax, quadrate to rectangular forming a distinct group 11.4-25.1 (x=18.6) X

9.1-17.1 (x=13.1) µm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate-acuminate, inner leaves longer and acuminate with flexuose apices; margins plane, entire and ± bordered by a single row of rectangular cells near base. The rest unknown.

TYPIFICATION: The type of this species consists of three isotypic duplicates, "Guatemala, Alta Vera Paz, 4800 ped. alt., arcte intermixtum cum *Thuidio Türckheimii* 14 Febr. 1886, *H. v. Türckheim* in Hb. *Levier*.," one in the herbarium at PC and two in the herbarium at FI. With the loss of Müller's original herbarium at B, I designate one of the isotypic specimens at FI as the lectotype. This specimen fits the protologue description and is from the Levier herbarium. Duplicate specimens at PC and FI are considered to be isolectotypes.

COMMENTS: The growth form, leaf morphology, and areolation of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*. I concur with Bartram (1949a, p. 353) in considering *B. pusillo-albicans* a synonym of *B. stereopoma*.

* * *

Brachythecium riparium Schimp. *ex* C. Müll., Nuovo Giorn. Bot. Ital. n. ser. 4(2): 167. 1897. *nom. nud.*

≡ [*Brachythecium riparium* Schimp., (Exsiccate) Plantae Andium Boliviensium. *nom herb.*]

Cited specimen: "Plantae Andium Boliviensium, Prov. Larecaja, Vicinus Sorata rivulo de queliguaya ad rivuli marginem, Reg. temp. 2800 m, Fbr 1858, *G. Mandon 1706*." [!]

COMMENTS: This binomial was published by Müller in a list of Mandon specimens identified by Schimper. Although effectively published (ICBN 30.1), it is not validly published since it lacks a description (ICBN 32.1). Hence, *Brachythecium riparium* Schimp. *ex* C. Müll. is considered to be a *nom. nud.* Specimens of *Mandon 1706* that I have seen from BM, G(3) and PC(2) are all referred to *Brachythecium rutabulum.*

* * *

Brachythecium rivulariforme Schimp. *ex* C. Müll., Nuovo Giorn. Bot. Ital. n. ser. 4(2): 167. 1897. *nom. nud.*

≡ [*Brachythecium rivulariforme* Schimp., (Exsiccate) Plantae Andium Boliviensium. *nom. herb.*]

Cited specimen: "Plantae Andium Boliviensium, Prov. Larecaja, Vicinus Sorata rivulo de Gueluni, partietibus cataractue, Beg. temp. 2800 m, Aug 1858, *G. Mandon 1705.*" [!]

COMMENTS: This binomial published by Müller was taken from a list of Mandon specimens identified by Schimper. Although effectively published (ICBN 30.1), it was never validly published for lack of a description (ICBN 32.1). Hence, *Brachythecium rivulariforme* Schimp. *ex* C. Müll. is considered to be a *nom. nud.*

Specimens of *Mandon 1705* I have seen from BM(2), PC(2) and S are all referred to *Brachythecium rutabulum.*

* * *

Brachythecium rivularioides (C. Müll.) Kindb., Enum. Bry. Exot. p. 8. 1888.

Basionym: *Hypnum (Brachythecium) rivularioides* C. Müll., Linnaea 42: 451. 1879.

Type specimen (lectotype *des. mihi*) H-BR: "Argentinia, Cordobensis an der Zehrngehangen des Rio primero prope Cordoba. *Lorentz*." *s.n.* [!]

Plants small and slender, pale yellow-green. Stems to 3.0 cm long, terete to subjulaceous, decumbent with several long erect branches or erect with only a few short branches toward stem tips irregularly branched; branches to 1.5 cm long, erect, terete and tapering; central strand narrow, inner cortex cells large and thin-walled, smaller at stem surface; pseudoparaphyllia ovate-obtuse, ± erose to apiculate. Leaves 1.1-1.4 (x=1.3) X 0.8-0.9 (x=0.8) mm, erect-imbricate when dry, little changed when moist, deeply concave, slightly decurrent, not plicate ovate to broadly ovate, acute, apiculate to short-acuminate, ± slightly twisted; margin plane, completely entire to serrulate in upper half; costae stout, broad at base, tapering above and ending above middle (67%) in an inconspicuous spine. Median leaf cells fusiform to occasionally linear 36.5-68.4 (x=54.8) X 6.8-8.0 (x=7.2) μm; apical cells shorter 29.6-53.6 (x=36.5) X 5.7-10.3 (x=7.5) μm; basal cells more lax and rectangular 22.8-57.0 (x=44.8) X 10.3-18.2 (x=13.2) μm; alar cells forming a large distinct area of quadrate to rectangular cells in several rows 13.7-36.5 (x=23.7) X 8.0-18.2 (x=14.3) μm. The rest unknown.

TYPIFICATION: The type of this species is represented by two isotypic specimens, "Argentinia Cordobensis, in praeruptis limosis fluminis Rio primero prope cordoba supra 'der Mühle' Junio 1871, *P. G. Lorentz*" *s.n.*, one each in the herbaria at H-BR and NY. With the loss of Müller's original herbarium at B, I designate the specimen at H-BR as the lectotype. This specimen best represents the species as a lectotype

since it fits the protologue description, and was originally from Müller's herbarium. The duplicate specimen at NY is considered an isolectotype.

COMMENTS: Müller noted that this specimen grows in the same habitat as *Brachythecium albicans* (Hedw.) B.S.G., with a growth form similar to tenuis forms of *Brachythecium rivulare* B.S.G., hence, the epithet *B. rivularioides*. This similarity is limited only to the growth form, since this species lacks the strong decurrencies and inflated alar cells typical of *B. rivulare*. The growth form, leaf morphology and areolation of this specimen are unique among the species of this genus. I hesitate to give this species sectional placement in *Brachythecium* as discussed on page 217.

* * *

Brachythecium rutabulum var. ***columbicum*** De Not., Mem. Reale Accad. Sci. Torino ser. 2. 18: 439. 1859.

Type specimen (lectotype *des. mihi*) RO: "Colombia, m America Meridionals ad fl. Napo, *Osculati" s.n.* [!]

Plants medium-sized, pale yellow and glossy. Stems to 3.5 cm long, terete, densely foliate, decumbent, subpinnately branched; branches to 1.5 cm long, of unequal length, terete, tapering; central strand narrow; inner cortex cells large, gradually becoming smaller and thick-walled toward stem surface; pseudoparaphyllia ovate-acute. Leaves 2.0-2.4 (x=2.2) X 0.7-1.2 (x=1.0) mm, erect when dry, becoming more open when moist, concave, slightly plicate, decurrent, broadly ovate, gradually, long-acuminate, apices ± twisted; margins reflexed at decurrencies, plane above, serrulate to serrate along upper margins; costae broad at

base, tapering and slender above, ending near middle (56%), ± in a minute inconspicuous spine. Branch leaves narrower, more serrate along upper margins, not to slightly decurrent. Median leaf cells fusiform to linear 91.2-131.1 (x=105.7) X 6.8-8.0 (x=7.2) μm; apical cells slightly shorter 47.9-119.7 (x=78.5) X 4.6-12.5 (x=7.2) μm; basal cells rectangular to hexagonal with slightly pitted walls at base 47.9-96.9 (x=69.0) X 10.3-17.1 (x=14.1) μm; alar cells lax to inflated, quadrate to rectangular in distinct clusters 22.8-45.6 (x=35.2) X 11.4-31.9 (x=20.3) μm. Autoicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate-acute, inner leaves longer and slenderly acuminate, apices ± reflexed; margins plane and entire, sometimes weakly bordered with a single row of rectangular cells. Perigonia ovoid, leaves similar to perichaetial leaves but slightly shorter and more distinctly bordered along the margin with a single row of rectangular cells. Setae 23.0-25.0 mm, red-brown, densely papillose the full length. Capsules 1.8-2.3 X 0.4-0.6 mm, inclined to horizontal, cylindrical and curved, light red-brown; exothecial cells rectangular, arranged in vertical rows, with uniformly thickened walls; annuli differentiated, in 1-2 rows of inflated cells; opercula 0.8-1.1 X 0.7-1.0 mm conic-apiculate with a darkened apex. Spores 13.2-18.7 (x=15.9) μm, finely papillose. The rest unknown.

TYPIFICATION: This species is represented by two isotypic specimens, "Ad flumen Napo in Columbiae meridionalis, *Osculati*," both at RO. I designate one of the specimens (upper specimen on herbarium sheet) at RO as the lectotype since it fits the protologue description

and is in the author's herbarium. The other specimen at RO is considered to be an isolectotype.

COMMENTS: The growth form, leaf morphology, areolation, and sporophyte morphology of this specimen fit within the accepted range of variation for *B. rutabulum sensu lato*.

* * *

Rhynchostegium saint-pierrei Thér., Smithsonian Misc. Collect. 85(4): 39. 20. 1931.

Type specimen (lectotype *des. mihi*) NY: "Mexico, Valle de Mexico, Contadero, April 13, 1925, *Marium Saint-Pierrei 1298*." [!]

Plants small- to medium-sized, in loose, open, light green mats. Stems to 4.2 cm long, prostrate, loosely foliate, irregularly to subpinnately branched; branches to 1.0 cm long, unequal, prostrate to erect; central strand narrow, inner cortex cells large and thin-walled, outer cortex 2-3 layers of small thick-walled cells; pseudoparaphyllia ovate-lanceolate. Leaves 1.2-1.9 (x=1.6) X 0.3-0.6 (x=0.4) open to spreading and generally complanate, not concave, ± decurrent, ± slightly plicate at leaf base, slenderly lanceolate-acuminate to ovate-lanceolate-acuminate, branch leaves noticeably smaller and more sharply serrate toward branch apices; margins reflexed at base, plane above, serrate in apices and serrate to serrulate to near base; costae tapering, ending near middle (49%) in a dorsal spine. Median leaf cells linear 68.4-108.3 (x=83.7) X 4.6-6.8 (x=5.4) µm; apical cells shorter 39.9-66.1 (x=50.5) X 4.6-6.8 (x=5.1) µm; basal cells shorter, rectangular to hexagonal 22.8-45.6 (x=33.1) X 6.8-20.5 (x=11.3) µm; alar cells irregularly quadrate, in small discrete groups 16.0-25.1 (x=19.6)

X 6.8-13.7 (x=9.7) μm. Autoicous. Perichaetia cylindrical, leaves ecostate, outer leaves short ovate-acuminate, inner leaves longer, ovate, long, and slenderly acuminate; margins plane, entire and ± bordered by a single row of rectangular cells. Perigonia pyriform, leaves ecostate, ovate-acuminate; margins plane, serrate at apices, entire below and ± bordered by a single row of rectangular cells. Setae 18.0-20.0 mm long, red-brown, smooth ± with low papillae at base. Capsule 1.7 X 0.8 mm, suberect, cylindrical-curved, slight constriction below mouth, red-brown; exothecial cells rectangular, uniformly incrassate; cilia 2-3, nodose and appendiculate, papillose. Spores 10.2-17.1 (x=13.3) μm, finely papillose. The rest unknown.

TYPIFICATION: The type of this species is known from three isotypic specimens, "Mexico, Valle de México, Contadero, on bark; leg. *Marius Saint-pierre (Bro. Amable 1298)*," one each at FH, NY, and US herbaria. The presence of a type specimen in Thériot's herbarium [PC] (Sayre, 1977, p. 519) could not be confirmed; however, all three of the specimens listed above indicate they were at one time in Thériot's herbarium. I designate the single specimen at NY to be the lectotype since it fits the protologue description. Duplicate specimens at FH and US herbaria are considered isolectotypes.

COMMENTS: The growth form, leaf morphology, and sporophyte characters of this specimen fit within the accepted range of variation for *B. occidentale*.

* * *

Rhynchostegium saint-pierrei forms ***erectifolia*** Thér., Rev. Bryol. Lichénol. 59: 108. 1932.

Cited specimen: "Mexico, Nevado de toluca, *Marius Saint-Pierrei* 1907." *non. vidi.*

COMMENTS: This form was listed in the Rev. Bryol. Lichénol. Table Générale 1-22: 25. 1954 as "*Brachythecium saint-pierrei* var. *erectifolium*" apparently in error, thus creating an invalid varietal name.

No specimens of this form were made available to me nor did I find any specimens of it among the syntypes of the species at FH, NY, and US. Thus, I consider this form to be a *nom. obsc.*

* * *

Brachythecium salebrosum var. ***polyoicum*** Thér., Smithsonian Misc. Collect. 85(4): 36. 1931.

Type specimen (lectotype *des. mihi*) PC: "Mexico, Vicinity of Puebla, State of Puebla, Hacienda Batan, 2150 m. XII 1908, *Bros. G. Arséne 4937.*" [!]

Plants medium-sized, in a dense mat. Stems to 4.0 cm long, terete, densely foliate, decumbent, subpinnately to irregularly branched; branches to 1.1 cm long, spreading to erect, terete, densely foliate, tapering at tips; central strand narrow, inner cortex cells large and thin-walled, becoming smaller with thickened walls at stem surface; pseudoparaphyllia ovate, acute to short-acuminate. Leaves 1.9-2.7 (x=2.3) X 0.7-0.9 (x=0.8) mm, erect-imbricate when dry, little change when moist, concave, slightly decurrent, plicate, slightly falcate, ovate-lanceolate, slender and long-acuminate, apices ± twisted; margins reflexed at base, plane above, serrulate above, entire below; costae broad at base, tapering above, ending above middle (63%). Median leaf

cells fusiform to linear 79.8-102.6 (x=93.0) X 8.0-10.3 (x=8.4) μm; apical cells similar 51.3-102.6 (x=66.9) X 6.8-9.1 (x=8.4) μm; basal cells irregularly rectangular to rectangular, pitted 28.5-82.1 (x=53.0) X 8.0-17.1 (x=13.0) μm; alar cells quadrate to rectangular, forming discrete groups in columns of 6-8 rows between margins and plicae 14.8-42.2 (x=23.1) X 13.7-22.8 (x=17.6) μm. Autoicous and synoicous (polygamous). Perichaetia ± with one or two antheridia, cylindrical, leaves ecostate, outer leaves ovate-acuminate, inner leaves longer acuminate; margins plane, entire and bordered by a single row of rectangular cells below. Perigonia occasionally with archegonia, pyriform, leaves ecostate, ovate, acute to acuminate; margins plane, entire, and bordered by a single row of rectangular cells. Setae (incomplete) with low papillae, light red-brown. The rest unknown.

TYPIFICATION: The type of this species is represented by 10 isotypic specimens, "Mexico, Puebla, Hacienda Batán, *Arséne 4937*" one each in the herbaria at C, F, FH, H-BR, NY, UPS, and two each at PC and US. I designate one of the specimens at PC as the lectotype (with the binomial, varietal name, and authorship as follows: *Brachythecium salebrosum* (Hfm) Br. Eur. var. *polyoicum* Thér. v. n."). This specimen fits the protologue description and is from the author's herbarium. Duplicates of this specimen at C, F, FH, H-Br, NY, PC, UPS, and US(2) are considered to be isolectotypes.

COMMENTS: Thériot (1931, p. 36) recognized this polygamous biotype as a variety of *Brachythecium salebrosum* (Web. & Mohr) B.S.G., an autoicous species, on the basis of greater gametophyte similarity rather than relating it to other synoicous and polyoicous *Brachythecium* species

known to him at that time, "*B. acutum, B. conostomum*, and *B. mildeanum*." The occurrence of polygamy in specimens of *B. salebrosum* from North America north of Mexico has been documented by Grout (1928, p. 32) [as *Brachythecium acutum* (Mitt.) Sull.], Crum and Anderson (1981, p. 1042) and observed by myself. Similarly, polygamy in European specimens of *B. salebrosum* has been documented by Warnstorf (1906, p. 721), Podpera (1954, p. 605), and Smith (1978, p. 592). Because of the low frequency with which this character occurs in *B. salebrosum*, most recent authors have not given taxonomical status to specimens with this character.

In Mexico, five of the seven specimens recognizable as this biotype are polygamous. Additionally, the setae of these specimens have low papillae that can become prominent at the base of the capsule, whereas in *B. salebrosum* the seta is smooth. The consistency of these two characters with the disjunct distribution of this biotype from the North American populations of *B. salebrosum* leads me to consider *B. salebrosum* var. *polyoicum* Thér. to be a distinct species, and thus I propose *Brachythecium polyoicum* (Thér.) McFarland *stat. nov.*

The great morphological resemblance of the gametophyte in this specimen to *B. salebrosum* allies this species to the other species in the section *Salebrosa*.

* * *

Brachythecium scaberrimum Herz., Biblioth. Bot. 87: 161. 1916. *hom. illeg.*

See *Brachythecium herzogii* Broth., in type studies section page 314.

* * *

Brachythecium scabripes C. Müll., Nuovo Giorn. Bot. Ital. 4(2): 154. 1897.

Type specimen (lectotype *des. mihi*) JE: "Bolivia, provincia Cochabamba prope Choquecamata, June 1889. *Germain 1156*." [!]

Plants medium-sized, pale yellow and glossy. Stems to 13.0 cm long, decumbent terete, densely foliate with tufted rhizoids where attached to substrate, subpinnately branched; branches to 1.5 cm long, of unequal length, terete and tapering; central strand narrow, inner cortex cells large, gradually becoming smaller and thick-walled toward stem surface; pseudoparaphyllia ovate-acute. Leaves 1.4-2.6 (x=2.0) X 0.7-1.1 (x=0.9) mm, erect when dry, becoming more open when moist, concave, long decurrent, slightly plicate, ovate and long-acuminate, with slender ± half-twisted apices; margins reflexed at decurrencies, plane above serrulate to serrate above; costae broad at base, tapering and slender above, ending near middle (55%), ± in an inconspicuous spine; branch leaves similar but smaller, narrower, not to slightly decurrent, more serrate in upper margins. Median leaf cells fusiform to linear, 55.9-108.3 (x=71.5) X 8.0-9.1 (x=8.3) μm; apical cells slightly shorter 53.6-91.2 (x=73.5) X 5.7-8.0 (x=6.8) μm; basal cells rectangular to hexagonal with slightly pitted walls at base 39.9-68.4 (x=56.8) X 11.4-19.4 (x=13.9) μm; alar cells forming an indistinct cluster of quadrate to rectangular cells, 25.1-57.0 (x=33.9) X 11.4-28.5 (x=16.4) μm. Autoicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate-acute, inner leaves longer and slenderly acuminate, apices ± reflexed; margins plane and entire, sometimes weakly bordered with a single row of rectangular cells. Perigonia ovoid,

leaves similar to perichaetial leaves but slightly shorter and bordered along the margin with a single row of rectangular cells. Setae 22.0-29.0 (x=26.4) mm red-brown, densely papillose the full length. Capsules 1.7-2.2 (x=2.0) X 0.5-1.0 (x=0.8) mm, horizontal, cylindrical and curved, light brown; exothecial cells rectangular, arranged in vertical rows, with uniformly thickened walls; annuli differentiated in 1-2 rows of inflated cells; opercula 0.7-0.8 (x=0.7) X 0.5-0.8 (x=0.7) mm, conic-apiculate with a darkened apex. The rest unknown.

TYPIFICATION: Müller's introduction (1897b, fasc. I, p. 5) stated that Germain specimens were used to prepare descriptions of collections from "*Bolivia provincia Cochabamba prop. Choquecamata, 1889*" in the Levier Herbarium at FI. With the loss of Müller's herbarium at B, it is unknown if Müller retained the original specimens in his herbarium or if he returned them to FI. The only type specimen of this species that I have seen is Germain specimen 1156, from the Levier Herbarium at FI. Therefore, the specimen at FI is regarded as an original specimen and is designated here as the lectotype.

COMMENTS: The lectotype consists of only three stems and several sporophytes; therefore, the growth form and peristome are not described.

The leaf morphology, areolation, autoicous condition, and sporophyte characters of this specimen fit within the accepted range of variation for *B. rutabulum sensu lato*.

* * *

Brachythecium sericeolum Card., Rev. Bryol. Lichénol. 37: 66. 1910.

Type specimen (lectotype *des. mihi*) PC: "Mexico, Puebla, Tezuiylan, 1908, *C. G. Pringle 15318*." [!]

Plants delicate, medium-sized, yellow-green. Stems to 2.0 cm long, prostrate, terete, densely foliate with tufted rhizoids where attached to substrate, irregularly and pinnately branched; branches to 0.8 cm long, erect, terete, densely foliate, tapering; central strand narrow, inner cortex cells large and thin-walled, outer 2-3 layers of cells smaller and thick walled; pseudoparaphyllia ovate-acuminate. Leaves 1.2-1.7 (x=1.4) X 0.4-0.5 (x=0.4) mm, erect-imbricate when dry becoming open-erect when moist, concave, slightly decurrent, plicate, ovate to ovate-lanceolate, long-acuminate; margins recurved at base, plane or slightly recurved above, serrulate to serrate in upper portion, smooth below; costae broad at base quickly tapering above and ending near middle (49%) in an inconspicuous spine. Median leaf cells fusiform to long rhomboidal or linear 45.6-79.8 (x=63.6) X 5.7-8.0 (x=6.6) μm; apical cells shorter, fusiform 41.0-79.8 (x=60.6) X 5.7-6.8 (x=5.9) μm; basal cells irregularly rectangular 28.5-45.6 (x=35.0) X 8.0-17.1 (x=12.1) μm; alar cells quadrate to rectangular, forming discrete groups 11.4-36.5 (x=22.6) X 9.1-20.5 (x=13.8) μm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate-acuminate, inner leaves longer, slenderly long-acuminate; margins plane, entire and ± bordered by a single row of rectangular cells below. Perigonia not observed. Setae 12.0-15.0 (x=12.8) mm long, red-brown, smooth. Capsules 1.3-1.8 (x=1.5) X 0.4-0.6 (x=0.5) mm, suberect, cylindrical and curved, yellowish red; exothecial cells rectangular, in vertical rows, lateral walls thicker than end walls; annuli not differentiated; opercula 0.6-0.9 (x=0.8) X 0.3-0.7 (x=0.5) mm, long conic, ± apiculate. Peristome and spores not examined.

TYPIFICATION: This species is represented by six isotypic specimens, "Mexico, Etat de Puebla: Tezuitlan, 1908 *Pringle 15318*," one each in the herbaria at FH, FI, H-BR, NY, PC, and S. I designate the specimen in the herbarium at PC as the lectotype since it fits the protologue description and is from Cardot's herbarium. Duplicate specimens at FH, FI, H-BR, NY, and S are considered isolectotypes.

COMMENTS: The growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato.*

* * *

Brachythecium sericeo-nitens Dus., Rep. Princeton Univ. Exp. Patag. 8(1): 28. 1903. *nom. nud.*

COMMENTS: Dusén introduced this epithet as a "*sp. nov.*" in a discussion of "The Community of Deciduous Beeches" for Patagonia. Even though this epithet was effectively published (ICBN 30.1), it remains a *nom. nud.* since it lacks a description. Of two Dusén specimens labeled with this epithet, each is referred to other taxa as follows: Argentina, Santa Cruz, Lago Argentino XII Kampam ni fugelo, 5/ii/1902, *Dusén 5815* (NY) (=*Brachythecium austro-glareosum*); Argentina, Santa Cruz, Lago Argentina ni truncis, Jan. a. 1905, *Dusén 5683* (B, GL, HBG, M, S) (=*Brachythecium albicans*).

Cardot (1908, p. 170) considered this epithet to be an error for *Brachythecium sericeo-virens* (C. Müll.) Par. *Index Muscorum* (Wijk, 1959, vol. 1, p. 225) and Seki (1974, p. 72) followed Cardot's comment. Cardot's assessment is muted by the fact that this species is neither validated nor typified.

* * *

Brachythecium sericeo-virens (C. Müll.) Kindb., Enum. Bry. Exot. p. 8. 1888.

Basionym: *Hypnum (Brachythecium) sericeo-virens* C. Müll., Flora 68: 427. 1885.

Type specimen: "Fuegia australis, Uhsuvaia ad saxa funeraria in sylvia, Febr. 1882, *Spegazzini*" *s.n.* [*non vidi*]

COMMENTS: Whereas most *Brachythecium* species described by C. Müller from the southern neotropics are represented by duplicates of his original specimens, distributed to other herbaria prior to the destruction of his herbarium at B, no type specimen(s) or duplicates of *B. sericeo-virens* have been found by either Seki (1974, p. 24) or myself. I therefore presume that all type materials were lost or destroyed and refer this species to a *nom. obsc.*

The species name has been applied to specimens cited by Cardot (1908, p. 170), and Seki (1974, p. 72) from Patagonia and several uncited specimens from this same area and Peru. A total of 41 so-named specimens examined in this study can all be accommodated within other previously described taxa. The Patagonia specimens that I have seen (listed below) are referred to either *Brachythecium albicans* (Neck. *ex* Hedw.) B.S.G., *Brachythecium austro-glareosum* (C. Müll.) Par. or *Brachythecium subpilosum* (Hook. *f. et* Wils) Jaeg. The Peruvian specimens are referred to *Brachythecium rutabulum* (Hedw.) B.S.G.

Because of the lack of a type, Seki (1974, p. 72) developed his taxonomic concept of this species on what he termed an "authenticated specimen" H-BR; "Terra-de-Feu: Ushuaia, 1902 *Skottsberg 172*," a topotype which Cardot (1908, p. 170) identified and cited with the original type

specimen for the species. This specimen and Müller's protologue description of *B. sericeo-virens* falls well within the range of variation I know for *B. austro-glareosum* (Müll.) Kindb. +(an older name). Another specimen of *B. sericeo-virens* at S "Chile, Santiago, Cerro de Ranca pa markus 14/8/1896, *P. Dusén 137*" which C. Müller marked as identifier, is actually *B. albicans*.

Neotypification of *B. sericeo-virens* appears entirely superfluous since it immediately becomes a synonym of *B. austro-glareosum*.

Specimens Examined: *Argentina*: Santa Cruz Lago Viedma ni fagato ad terram, Feb. a. 1905 *P. Dusén s.n.* (=*B. albicans*) [G, NY, S, WU]; Tierra del Fuego, San Sebastian, 9/1/1896 (Det. P. Dusén), *P. Dusén 137* (=*B. austro-glareosum*) [UPS]; Tierra del Fuego, Ushuaia, in peninsula, 3/10/1902, (Det. J. Cardot), *Skottsberg 172* (=*B. austro-glareosum*) [H, S(2)].

Chile: Aisén, Patagonia occidentale in valle fluminus Aysen in Truncis arborum, Feb. 24, 1897, *Dusén 570* (=*B. austro-glareosum*) [BM, FH(2), FI, GB, JE(3), M, NY(3), S(6), US, WU]; Magallanes, Fuegia media, Lago Linch, in silva paludosa, 19/XII/1929, (Det, E.B. Bartram), *H. Roivainen 1394* (not *Brachythecium*) [FH]; Magallanes, Fuegia media, bstancia Vicuma, Cerro Fuentes, 19/XII/1929, (Det. E.B. Bartram), *H. Roivainen 729* (=*B. subpilosum*) [FH]; Magallanes, Fuegia media, Lago Linch, in silva paludosa, 19/XII/1928, *H. Roivainen s.n.* (=*B. subpilosum*) [S]; Santiago, Cerro de Ranca pa markus, 14/8/1896, (Det. C. Müller), *P. Dusén 137* (=*B. albicans*) [S].

Patagonia: *J.B. Hatcher E138* (=*B. austro-glareosum*) [S]; Patagonia austr., Mars 1905 *Dusén s.n.* (=*B. subpilosum*) [GB]; Patogonia austr.,

1905, *Dusén s.n.*, (=*B. subpilosum*) [NY]; Patagonia austr, 1905, *P. Dusén B2634* (=*B. subpilosum*) [GL].

* * *

Brachythecium skottsbergii Card., Bull. Herb. Boissier ser. 2, 6: 12. 1906.

Type Specimen (lectotype *des. mihi*) PC: "Géorgie du Sud., baie Cumberland, May harbour, 2/v/1902, Herb J. Cardot., *Skottsberg 405*." [!]

Plants medium-sized, yellow-green above, becoming darker below, densely tufted. Stems to 2.5 cm long, erect, terete, densely foliate, infrequently and irregularly branched; branches to 1.0 cm long, erect, terete; central strand narrow, inner cortex cells large and thin-walled becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovoid ± erose. Leaves 2.1-2.8 (x=2.4) X 1.3-1.6 (x=1.4) mm, erect to erect-imbricate becoming more open and ± tumid when moist, concave, slightly decurrent, not plicate, broadly ovate-cuspidate to ovate-lanceolate, short-acuminate usually with abruptly constricted short apices, 0.1-0.4 (x=0.2); margins reflexed at base, plane above, ± serrulate in apices; costae broad at base, gradually tapering and ending above middle (70%). Median leaf cells fusiform to linear 68.4-110.6 (x=89.9) X 8.0-12.5 (x=9.5) µm; apical cells similar, shorter 39.9-75.2 (x=58.3) X 8.0-11.4 (x=9.6) µm; basal cells rectangular, lax, ± pitted 51.3-96.9 (x=77.3) X 14.8-26.2 (x=20.3) µm; alar cells quadrate to rectangular, forming distinct groups 20.5-57.0 (x=43.3) X 19.4-34.2 (x=26.1) µm. The rest unknown.

TYPIFICATION: In the protologue, Cardot designated an implicit holotype by his statement "Typus in Herb. Cardot" (ICBN 7.3). However, since I did not receive any specimens of this species from Cardot's herbarium at PC, the existence of the specimen is unknown to me. Of the five syntypic specimens examined, "Géorgie du Sud., Cumberland bay; May harbour [405, S(2)], Pot harbour [407, S], Jason harbour, Moraine fiord [406, BA, FI], *Skottsberg*," I designate one of the *Skottsberg 405* specimens at S as the lectotype (distinguishable by having handwritten information on a printed label "Herb. J. Cardot" and the note "e specim-origin"). This specimen best represents the species since it fits the protologue description, and was originally from Cardot's herbarium. The duplicate of this specimen at S is considered to be an isolectotype. Skottsberg specimens 406 at BA and FI, and 407 at S are considered paratypes.

COMMENTS: Newton (1979, p. 128) cited a *Skottsberg 405* specimen from H. I have not seen this specimen and make no judgment on its type status.

Topotypic specimens at S and UPS "*B. skottsbergii* forma *viridis*, Géorgia australis, Cumberland bay, Morian harbour, 18/4/1909, *Skottsberg 67*," are not considered original specimens since they were collected after the publication date of this binomial.

Dixon (1920, p. 67) commented on the close relationship between *B. skottsbergii* and *Brachythecium antarcticum* var. *cavifolium* Card. He was unaware of Müller's *B. austro-salebrosum* known from Kerguelen Island. Newton (1979, p. 128) expanded Dixon's synonymy to include Müller's species which also takes priority. I agree with Newton (*op. cit.*) and

therefore consider *B. skottsbergii* to be a synonym of *B. austro-salebrosum*.

* * *

Brachythecium spegazzinii (C. Müll.) Kindb., Enum. Bry. Exot. p. 8. 1888.

Basionym: *Hypnum (Cupressina) spegazzinii* C. Müll., Flora 68: 428. 1885.

Cited specimen: "Fretum Magellanicum, Brunswich Peninsula Voces Bay, ad ramos *Drymidis Winteri* Majo 1882, *Spegazzini*" *s.n.* [*non vidi*]

COMMENTS: I have not examined any original specimens of this taxon, yet, the combination of characteristics given in the description of the protologue are clearly not *Brachythecium* ("*nervis binis obsoletis brevissimis*"). Thus, I consider Kindberg's combination of *Brachythecium spegazzinii* to be a misapplied combination and remove this taxon from the genus *Brachythecium*.

* * *

Brachythecium spurio-albicans C. Müll., Hedwigia 36: 127. 1897.

Type specimen (lectotype *des. mihi*) NY: "Patagonia, 50/3°, 1882, Museo de La Plata, *F. P. Moreno & Tonini 197*." [!]

Plants medium-sized to large, glossy, in a loose mat. Stems to 4.5 cm long, ascending, terete, subjulaceous, densely foliate, irregularly to branched; branches to 0.8 cm long, terete, densely foliate, tapering; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller and thick-walled toward stem surface; pseudoparaphyllia ovate-acuminate. Leaves 2.0-2.6 (x=2.4) X 0.8-1.0 (x=0.9) mm, imbricate to erect when dry, becoming more open when moist,

concave, long decurrent, plicate, ovate and acuminate to ovate-lanceolate and long-acuminate, ± half-twisted apices; margins reflexed below, plane above, entire or nearly so; costae broad at base, slender tapering above, ending near middle (48%), ± in a minute inconspicuous dorsal spine. Median leaf cells fusiform to linear, slightly porose 58.1-110.6 (x=81.9) X 6.8-11.4 (x=8.9) μm; apical cells similar, 59.3-91.2 (x=78.2) X 6.8-9.1 (x=7.4) μm; basal cells rectangular, pitted 42.2-74.1 (x=54.5) X 11.4-17.1 (x=13.2) μm; with numerous quadrate alar cells extending up the margins, between the margins and plicae, and extending into decurrencies 11.4-29.6 (x=21.4) X 12.5-22.8 (x=15.2) μm. The rest unknown.

TYPIFICATION: Only a single specimen of this species was available for this study. This specimen, from NY, cannot be considered holotypic since it is not from the author's herbarium at B (Sayre, 1977. p. 514). I designate the single specimen at NY as the lectotype since it fits the protologue description.

COMMENTS: The growth form, leaf form, and areolation of this specimen fit within the accepted range of variation for *B. albicans*.

* * *

Brachythecium squalidissimum (C. Müll.) Kindb., Enum. Bry. Exot. p. 8. 1888.

Basionym: *Hypnum (Brachythecium) squalidissimum* C. Müll., Linnaea 42: 452. 1879.

Type specimen (lectotype *des. mihi*) NY: "Argentintia, Cordoba, Sierra de Cordoba Las Peñas, Januarii 1871, *P. G. Lorentz*" *s.n.* [!]

Plants slender, medium-sized, dull yellow-green, forming a dense mat. Stems to 3.8 cm long, prostrate to ascending, terete, densely foliate, irregularly to subpinnately branched; branches to 0.8 cm long of unequal length, terete, ± tapering, spreading to erect; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate-acuminate. Leaves 1.2-1.6 (x=1.4) X 0.5-0.8 (x=0.6) mm, erect-imbricate when dry, erect to patent when moist, concave, plicate, decurrent, ovate, acuminate to long-acuminate, with ± twisted apices; stem leaves slightly broader and longer, more prominently decurrent and plicate; margins plane or recurved below, serrulate to serrate in upper 2/3; costae stout, broad at base, tapering above and ending near middle (51%). Median leaf cells rhomboidal to linear 34.2-73.0 (x=55.6) X 5.7-8.0 (x=6.5) μm; apical cells similar 45.6-74.1 (x=60.9) X 4.6-9.1 (x=5.8) μm; basal cells irregularly rectangular 25.1-44.5 (x=36.3) X 8.0-17.1 (x=12.0) μm; alar cells lax, quadrate to rectangular extending into decurrencies 17.1-34.2 (x=23.3) X 10.3-22.8 (x=16.5) μm. Dioicous. Perichaetia not observed. Perigonia numerous along stems and branches, ovoid, leaves weakly or not costate, sheathing, outer leaves ovate to ovate-acute, inner leaves longer and ovate-acuminate; margins plane, bordered by long rectangular cells at base, serrulate in apices. The rest unknown.

TYPIFICATION: The type of this species is represented by four isotypic specimens, "Argentintia Cordobensis, Sierra de Cordoba, Las Peñas ad rupes, fine Januarii 1871, *Lorentz*," two each in the herbaria at NY, S. With the loss of Müller's herbarium at B, I designate one

specimen at NY as the lectotype. This specimen fits the protologue description, is originally from Müller's herbarium at B, and bears a handwritten label in his cursive style. The duplicate specimens at NY, and S are considered isolectotypes.

COMMENTS: The dioicous condition, growth form, leaf morphology, and areolation of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium stereophyllum C. Müll. in Besch., Miss. Sci. Cap. Horn 5(Bot.): 302. 1889. *nom. inval. in synon.*

COMMENTS: C. Müller's unpublished species, *Brachythecium stereophyllum*, was published in 1889 by Bescherelle as a synonym under *Stereophyllum fuegianum* Besch. *hom. illeg.* (See comments under type study for *Stereophyllum fuegianum* Besch. p. 301.)

* * *

Brachythecium stereopoma (Spruce *ex* Mitt.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 327. 1878. (Ad. 2: 393).

Basionym: *Hypnum stereopoma* Spruce *ex* Mitt., J. Linn. Soc. Bot. 12: 561. 1869.

[*Brachythecium stereopoma* Spruce, Catal. Musc. Amaz. et Andin p. 20. 1867. *nom. nud.*]

Type specimen (lectotype *des. mihi*) BM: "Musci Amazonici et Andini, Andes Quito pr. pontem Banos, ad terraum in declivibus sylvaticis, 6500 ped., *Spruce 1382*." [!]

Plants medium-sized, yellow-green to green, forming loose spreading mats. Stems to 5.0 cm long, prostrate, terete, densely foliate, ±

pinnately branched; branches to 1.0 cm long, terete, ± tapering at tips, becoming shorter and more distant toward stem apices; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 1.4-2.1 (x=1.6) X 0.5-0.8 (x=0.7) mm, erect ± imbricate when dry, erect to patent when moist, concave, decurrent, plicate, ovate-lanceolate to lanceolate gradually acuminate, older stem leaves broadly ovate, abruptly long, narrowly acuminate; margins reflexed at base, plane above, serrulate in upper 2/3, smooth below; costae broad at base, tapering and ending near middle (57%). Median leaf cells fusiform to linear 57.0-87.8 (x=73.6) X 5.7-6.8 (x=6.3) μm; apical cells similar 57.0-91.2 (x=71.4) X 4.6-6.8 (x=5.7) μm; basal cells irregularly rectangular 26.2-57.0 (x=40.1) X 9.1-17.1 (x=12.7) μm; alar cells lax, quadrate to rectangular, extending into decurrencies 17.1-39.9 (x=29.8) X 8.0-22.8 (x=14.8) μm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate, long-acuminate, inner leaves longer, slenderly acuminate; margins plane, entire, and bordered by a single row of rectangular cells below. Perigonia pyriform, leaves ecostate, broadly ovate, gradually to abruptly acuminate; margins plane, entire, bordered by a single row long, narrow, rectangular cells. Setae 15.0-23.0 (x=18.8) mm long, red-brown, smooth. Capsules 1.5-2.5 (x=2.0) X 0.6-0.9 (x=0.7) mm, erect to inclined, cylindrical and curved, light brown; exothecial cells in vertical rows, irregularly rectangular to rectangular, walls thickened, end walls ± thinner than lateral walls; annuli not differentiated; opercula 0.7-0.9 (x=0.8) X 0.6-0.8 (x=0.7) mm conic-apiculate to

elongate-conic and arcuate, cilia 2-3, papillose, nodose. Spores 12.1-16.5 (x=14.0) μm, finely papillose.

TYPIFICATION: This species is represented by 10 syntypes comprising 42 specimens, "Ins. Jamaica, *Purdie*, *Wilds*. Venezuela, Caracas, *Funch et Schlim*. Andes Quitenses, *Jameson*; prope pontem Banos, ad terram in declivibus sylvaticis (6500 ped.), *Spruce* n. *1382*; in montibus Tunguragua (8000 ped.), n. *1388*; et Chimborazo (10,000 ped.), n. *1383*; ad Antombos, secus fl. Patasa (5000 ped.), n. *1384*; prope Quito (9000 ped.), n. *1385*. Andes Peruvianae, prope villam Lamas (2000 ped.), *Spruce* n. *1386*; in lignis prope Tarapoto (2000 ped.), *Spruce*, n. 1387" in several herbaria.

I designate Spruce specimen 1382 at BM as the lectotype, since it fits the protologue, is in the author's herbarium, and is distributed among many herbaria. Duplicates of this specimen at BM, BR, FH(2), G(2), H-SOL, MPU, NY(2), OXF, PC, S(2), and WU are considered to be isolectotypes. The following specimens are considered to be paratypes: Purdie and Wild specimens from Jamaica; Funck et Schlim specimens from Venezuela at NY(4); *Spruce 1383* at BM, G(3), PC; *Spruce 1384* at BM, G(2), PC, S; *Spruce 1385* at BM, G; *Spruce 1386* at BM; and *Spruce 1387* at BM, F, FH, MICH, TENN, US. Jameson specimens from Andes Quitenses at NY are referred to *Brachythecium austro-glareosum* (C. Müll.) Kindb.

The type status of three syntypic specimens [Mich(2), US] labeled "*Hypnum stereopoma*. *Spruce 1382*, Andes Quit. in mont Tunguragua" is questionable because of discrepancies in the collection number vs. location. *Spruce 1382* is from Banos whereas Spruce specimens from Tunguragua are numbered 1388. It is unknown which element of the

transcription is in error. The growth forms of these specimens do not correspond to other *Spruce 1382* specimens.

COMMENTS: The gametophytic and sporophytic characters of this specimen undeniably place this species within the section *Stereopoma*.

* * *

Brachythecium subjulaceum Herz., Biblioth. Bot. 87: 161. 1916.

Type specimen (lectotype *des. mihi*) JE: "In Hohlen unter Felslöchern des Piñasgebietes, ca. 4300 m., August 1911, *Th. Herzog 2613*." [!]

Plants small-sized and delicate, yellow-green, forming soft, shiny, intricate, mats. Stems to 5.0 cm long, prostrate, densely foliate, julaceous, irregularly to subpinnately branched; branches to 2.0 cm long, numerous, short, and erect; central strand narrow, inner cortex cells large and thin-walled, outer cortex of 2-3 layers of small, thick-walled cells; pseudoparaphyllia ovate-lanceolate. Leaves 1.0-1.3 (x=1.1) X 0.3-0.6 (x=0.4) mm, loosely imbricate to erect when dry, erect when moist, concave, ± decurrent, becoming somewhat auriculate in older leaves, plicate, ovate to lanceolate, acuminate; margins reflexed at base, plane above, serrate in upper 1/2 to 2/3, serrulate to base; costae broad at base, gradually tapering above, ending near middle (57%) in a inconspicuous dorsal spine. Median leaf cells linear 34.2-79.8 (x=60.6) X 4.6-8.0 (x=6.3) µm; apical cells shorter 34.2-57.0 (x=42.9) X 3.4-8.0 (x=5.5) µm; basal cells shorter, rectangular to hexagonal with thickened, ± pitted walls 17.1-34.2 (x=23.7) X 5.7-12.5 (x=8.1) µm; alar cells irregularly quadrate forming small discrete groups 9.1-22.8 (x=16.3) X 4.6-11.4 (x=7.4) µm. Autoicous. Perichaetia and perigonia

similar, cylindrical, leaves ecostate, outer leaves short ovate-acuminate, inner leaves longer; margins, plane, entire to serrulate, ± bordered with a single row of rectangular cells. Setae 10.0-12.0 (x=11.1) mm long, reddish brown, strongly papillose throughout. Capsules 1.1-1.2 X 0.7-0.9 mm, erect, oblong-ovoid to cylindrical and curved, ± constricted below the mouth, greenish red (immature); exothecial cells quadrate to rectangular, in vertical rows, uniformly incrassate; annulus differentiated in 1-2 rows of inflated cells; operculum 0.5 X 0.5 mm, conic-apiculate; cilia 2-3 nodose. Spores not examined.

TYPIFICATION: This species is represented by eight syntypic specimens, "An schattigen Felsen und Baumwurzeln im Chocayatal, ca. 3300 m, No. 2591" and "In Felslochern des Pinasgebietes mit *Philonotis scabrifolia* f. *pinnulata*, ca. 4300 m, No. 2613" distributed in the herbaria at H-BR, L, M, PC, S, WU, and JE(2). I designate specimen 2613 in Herzog's herbarium [JE] as the lectotype since it fits the protologue description, contains more sporophyte material and is from the author's herbarium. Duplicates of this specimen at PC, S, and WU are considered isolectotypes. Specimens of *Herzog 2591* in the herbaria at H-BR, L, M, and JE are considered paratypes.

COMMENTS: Herzog placed this taxon in the subgenus *Velutinum* section *Julacea*. However, I consider this species to have a closer sporophytic affinity to species in the Section *Brachythecium*.

The growth form, leaf morphology, areolation, and sporophytic characteristics of this specimen fit within the accepted range of variation for *B. praelongum*.

* * *

Brachythecium subpilosum (Hook. *f. et* Wils.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 342. 1878. (Ad. 2: 408).

Basionym: *Hypnum subpilosum* Hook. *f. et* Wils., London J. Bot. 3: 553. 1844.

Type specimen (lectotype *des. mihi*) BM: "Chile, Magallanes, Hermite Island, Cape Horn, Antart. Exp. 1839-1843, *J. D. Hooker 165*." [!]

Plants medium-sized, shiny yellow-green. Stems to 4.6 cm long, prostrate to ascending, densely foliate and terete, irregularly branched; branches to 1.0 cm long, unequal in length, densely foliate, erect and ± tapering; central strand narrow, inner cortex large and thin-walled, becoming smaller with slightly thickened walls at stem surface; pseudoparaphyllia orbicular to broadly ovate, apices erose. Leaves 1.2-2.6 (x=2.0) X 0.5-1.4 (x=1.0) mm, erect-imbricate when dry, little changed when moist, concave, slightly decurrent, plicate, triangular-ovate to ovate-lanceolate, suddenly narrowed forming shouldered constrictions at the bases of the short-acumina 0.3-0.7 (x=0.5) mm long; margins reflexed at base, plane above, entire or serrulate to near base and ± serrate in apices, ± toothed at shoulder constriction; costae stout, narrowing above from a broad base, ending near middle (63%) ± in a inconspicuous spine. Median leaf cells linear-flexuous 52.4-116.3 (x=88.4) X 5.7-11.4 (x=7.1) µm; apical cells 42.2-94.6 (x=71.6) X 4.6-6.8 (x=5.9) µm; basal cells 39.9-82.1 (x=55.1) X 6.8-20.5 (x=12.9) µm; alar cells forming a large distinct group of quadrate to rectangular cells 11.4-36.5 (x=26.7) X 8.0-25.1 (x=13.7) µm. Autoicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves orbicular to ovate and abruptly acuminate, inner leaves

longer and abruptly long-acuminate; median cells distinctly linear-flexuous; margins plane, entire or serrulate in apices and not to weakly bordered by a single row of rectangular cells. Perigonia pyriform, leaves ecostate, ovate and abruptly acuminate; margins plane, entire and bordered by a single row of rectangular cells. Setae (incomplete) smooth below, with low papillae above, yellowish red. The rest unknown.

TYPIFICATION: In the protologue the type specimen is cited as "Hermite Island, Cape Horn, barren" *s.n.* The William Wilson herbarium at BM contains two sheets of seven specimens, line illustrations and notes designated by number 56 and/or W.165. Three specimens bear the location "Cape Spencer," and four specimens bear the location "Hermite Island," only one of the latter four also reports "Cape Horn." I designate this latter specimen as the lectotype, identified by its position on the middle, right-hand side of the sheet and 165 written on the upper left-hand corner of the specimen packet. The label glued below the packet reads "No. 165 *Hypnum subpilosum* Hermite Island, Cape Horn. Antarct. Exp. 1839-1843. J. D. H." Two additional specimen fragments 165 (label data less complete) at BM may be regarded as isolectotypes; as can be specimens at NY(1) and H-BR(1).

Specimens and illustrations are annotated with two different ink and cursive styles. Number 64 and label data appear to be associated with Hooker's curation of specimens. After Hooker completed his examinations, descriptions, and illustrations, he sent these materials to Wilson who inscribed the epithet "subpilosum" and added the number 165.

COMMENTS: The gametophyte and seta characteristics of this specimen are typical of section *Reflexa* where I have placed it in my taxonomic treatment.

* * *

Brachythecium subplicatum (Hamp. *in* C. Müll.) Jaeg., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876-77: 333. 1878. (Ad. 2: 390).

Basionym: *Hypnum subplicatum* Hamp. *in* C. Müll., Syn. Mus. Frond. 2: 363. 1851.

≡ [*Hypnum rutabulum* var. 5 Hook. *et* Wils., Flora Antarct. I. p. 418. 1847 *nom. illeg.*]

Type specimen (lectotype *des. mihi*) OXF: "Falkland Islands, Antarct. Exp. 1839-1843, *Hypnum rutabulum* var. *5*, *J. D. Hooker*" *s.n.* [!]

Plants robust, forming a deep tuft. Stems to 10.0 cm long, erect, densely foliate above ± eroded below, julaceous to tumid, infrequently and irregularly branched; branches 2.0 cm long, erect, julaceous; central strand narrow, inner cortex large and thin-walled, becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia elongate-ovate, acute, ± apiculate. Leaves 2.3-3.0 (x=2.6) X 0.9-1.4 (x=1.0) mm, imbricate to erect when dry, little change when moist, deeply concave (cochleariform), short-decurrent, ± auriculate, not to weakly plicate, broadly obovate, apices rounded to broadly tapered above and abruptly aristate 0.3-0.5 (x=0.4) mm long; margins reflexed at base, plane above, entire; costae broad at base, tapering and slender above, ± with short lateral spurs, ending above middle (60%); branch leaves narrower, ovate gradually acuminate. Median

leaf cells linear to linear-rhomboidal 68.4-136.8 (x=92.1) X 5.7-10.3 (x=8.1) μm; apical cells shorter 51.3-91.2 (x=65.7) X 6.8-8.0 (x=7.2) μm; basal cells lax rectangular, walls pitted 51.3-152.8 (x=91.9) X 12.5-22.8 (x=17.0) μm; alar cells rectangular, inflated in auricles and into decurrencies, 27.4-96.9 (x=51.8) X 17.1-34.2 (x=24.9) μm. Autoicous. Perichaetia cylindrical, leaves clasping at base, ecostate, outer leaves ovate-acuminate, inner leaves longer; margins plane, entire and ± bordered by a single row of rectangular cells. Perigonia pyriform, leaves ecostate, outer leaves orbicular, inner leaves ovate-acute to short-acuminate; margin plane, entire, and bordered by a single row of rectangular cells. Seta 26 mm long, red-brown, smooth. The rest unknown.

TYPIFICATION: The type of this species is represented by nine isotypic specimens, "*Insulae Falklandi, in fontaneis cespites latos sistens, J. D. Hooker*," one each in the herbaria at BR, H-SOL, OXF, RO, 2 at FH and 3 at NY. With the loss of Müller's herbarium at B, and the lack of a specimen from the Hampe, Hooker or Wilson herbaria at BM, I designate the specimen at OXF as the lectotype. This specimen best represents this species since it fits the protologue description and has the most complete sporophyte. Duplicate specimens at BR, FH(2), H-SOL, NY(3), and RO are considered to be isolectotypes.

COMMENTS: Müller cites Hooker's and Wilson's *Hypnum rutabulum* var. 5 as the basionym for *Hypnum subplicatum*. However, *Hypnum rutabulum* var. 5 has no nomenclatural status since "var. 5" is contrary to ICBN article 23.6b. The growth form, leaf morphology, and areolation of this

specimen are unique within the genus *Brachythecium*. I have placed this species in a new section, *Subplicata*.

* * *

Brachythecium subplicatum var. ***dilaceratum*** Card., Bull. Herb. Boissier ser. 2, 5: 1010. 1905.

Type specimen (holotype explicit) PC: "Terre-de-Feu, Ushuaia, silvae, reg. infer., inter cespites *Webesae alticaulis* 11/3/1902, Herb. J. Cardot, *Carl Skottsberg 119*." [!]

Plants robust, yellow-green. Stems to 4.0 cm long, prostrate to ascending, densely foliate, julaceous, irregularly branched; branches 1.4 cm long, erect; central strand narrow, inner cortex large and thin-walled, becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia elongate-ovate, acute, ± apiculate. Leaves 2.6-3.1 (x=2.9) X 1.1-1.6 (x=1.4) mm, imbricate to erect when dry, little change when moist, deeply concave (cochleariform), short-decurrent, ± auriculate, not to weakly plicate, broadly obovate, apices rounded and abruptly aristate with large teeth at base of acuminia or gradually tapering and abruptly aristate 0.2-0.4 (x=0.3) mm long; margins reflexed at base, plane above, entire; costae broad at base, tapering and slender above, ± with short lateral spurs, ending above middle (69%); branch leaves narrower, ovate and gradually acuminate. Median leaf cells elongate fusiform to linear 62.7-131.1 (x=100.2) X 6.8-12.5 (x=9.7) μm; apical cells shorter 42.2-79.8 (x=60.5) X 6.8-10.3 (x=8.2) μm; basal cells lax rectangular, walls pitted 62.7-139.1 (x=111.7) X 16.0-34.2 (x=22.8) μm; alar cells rectangular, lax to

inflated in auricles and into decurrencies, 34.2-91.2 (x=62.4) X 17.1-51.3 (x=33.4) μm. The rest unknown.

COMMENTS: Cardot cited the specimen in his herbarium [PC] as the type for this variety. A duplicate of this specimen at S is considered to be an isotype.

The growth form, leaf morphology, and areolation of this specimen fit within the accepted range of variation for *B. subplicatum*.

* * *

Brachythecium subplicatum var. ***minus*** Card. *et* Broth., Kongl Svenska Vetenskapsakad Handl. 63(10): 68. 1923.

Type specimen (lectotype *des. mihi*) UPS: "Malovines, I. oe., Halfway Cove, 21/11/1907, *T. Halle 869*." [!]

Plants robust, yellow-green, forming an open tuft. Stems to 3.0 cm long, prostrate to ascending, densely foliate, terete, irregularly branched; branches 1.5 cm long, erect, terete; central strand narrow, inner cortex large and thin-walled, becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia elongate-ovate, acute, ± apiculate. Leaves 2.3-2.8 (x=2.5) X 0.8-1.3 (x=1.0) mm, imbricate to open-erect when dry, little changed when moist, deeply concave (cochleariform), short-decurrent, ± auriculate, not to weakly plicate, broadly obovate, gradually tapering and abruptly aristate 0.3-0.5 (x=0.4) mm long, straight; margins reflexed at base, plane above, entire, occasionally with a single large tooth in upper portion; costae broad at base, tapering and slender above, ± with short lateral spurs, ending above middle (65%); branch leaves narrower, ovate gradually acuminate. Median leaf cells elongate fusiform to linear 70.7-142.5

(x=99.5) X 6.8-10.3 (x=8.7) μm; apical cells shorter 42.2-102.6 (x=67.9) X 6.8-9.1 (x=7.5) μm; basal cells lax rectangular, walls pitted 51.3-131.1 (x=86.8) X 17.1-25.1 (x=19.5) μm; alar cells rectangular, becoming lax to inflated in auricles and decurrencies, 19.4-96.9 (x=56.8) X 12.5-57.0 (x=31.8) μm. The rest unknown.

TYPIFICATION: The type of this species is represented by two isotypic specimens "W. Falkland, Port Philomel, Halfway Cove, *Halle et Skottsberg 369*," one at S and one at UPS. I designate the specimen at UPS as the lectotype since it fits the protologue description and has the larger portion of plant material. The duplicate specimen at S is considered to be an isolectotype.

COMMENTS: The growth form, leaf morphology and areolation of this specimen fit within the accepted range of variation for *B. subplicatum*.

* * *

Brachythecium subtilicaule Dus., Rep. Princeton Univ. Exp. Patag. 8: 125. 1903. *nom. nud.*

COMMENTS: Although Dusén effectively published this name (ICBN 30.1), the lack of a description or diagnosis, or any earlier reference to one constitutes a *nom. nud.* (ICBN Art. 32.1).

Five specimens of this so-named taxon were examined, one each from BM, FI, H-BR, M, and labeled, "Patagonia occ. in valle fluminis Aysen in truncia putridis m. Januario. a. 1897 *P. Dusén 421 + a.5*," and one specimen from NY labeled "Patagonia occid, Rio Ayrens, pa ruttna ornobunker, Jan. 1897, *P. Dusén" s.n.* All five specimens represent the same species, which, in my opinion, belong to the genus *Kindbergia* Ochrya [Basionym: *Stokesiella hom. illeg.: Brachythecium*]. Noteworthy

characteristics supporting my opinion include the open growth form, dimorphic stems and branches, pinnate to bipinnate branches; leaves ovate, cordate and strongly decurrent at bases, acuminate, twisted apices; stout, percurrent costae; short median cells, and horizontal capsules with long smooth setae. I therefore exclude this taxon from further consideration here.

* * *

Brachythecium sulphureum (Geheeb & Hamp.) Par., Ind. Bryol. 146. 1894.

Basionym: *Hypnum sulphureum* Geheeb & Hamp., Flora 64: 415. 1881.

Type specimen (lectotype *des. mihi*) FH: "Brazilia, prov. Sao Paulo. Apiahy, 1879, *J. I. Puiggari 421*." [!]

Plants medium-sized, yellow-green, becoming yellower toward apices, forming loose spreading mats. Stems to 4.0-5.0 cm long, prostrate, terete, densely foliate, ± pinnately branched; branches to 1.0 cm long, terete, ± tapering at tips, becoming shorter and more distant toward stem apices; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 1.0-2.1 (x=1.6) X 0.4-0.9 (x=0.7) mm, erect ± imbricate when dry, erect to patent when moist, concave, decurrent, plicate, ovate to lanceolate, acuminate; older stem leaves broadly ovate with a longer and narrower tips; margins reflexed at base plane above, serrulate in upper 2/3, smooth below; costae broad at base, tapering and ending near middle (50%). Median leaf cells fusiform to linear 62.7-102.6 (x=81.7) X 5.7-8.0 (x=6.6) μm; apical cells similar 62.7-114.0 (x=84.4) X 4.6-6.8 (x=6.0) μm; basal cells irregularly rectangular 34.2-70.7 (x=52.1) X

9.1-22.8 (x=13.9) µm; alar cells lax, quadrate to rectangular extending into decurrencies 17.1-62.7 (x=30.8) X 11.4-22.8 (x=15.8) µm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate and long-acuminate, inner leaves longer and slender-acuminate; margins plane, entire, and bordered by a single row of rectangular cells below. Perigonia not observed. Setae 18 mm long, red-brown, smooth. Capsules 1.5-1.7 X 0.7-0.8 mm, inclined, cylindrical and curved; dark red-brown; exothecial cells in vertical rows, rectangular, walls thickened with end walls ± thinner than lateral walls; annulus not differentiated; cilia not observed. Operculum 0.6 X 0.8 mm, conic-apiculate. Spores 12.1-16.5 (x=14.4) µm, finely papillose.

TYPIFICATION: In the protologue seven syntypic specimens are cited "Brazilia, prov. Sao Paulo, prope Apiahy, ad truncos arborum; *Puiggari 66, 285a, 421, 609, 657, 904a:* prope Iporaga; idem *66a*." Because of the loss of the Geheeb herbarium at G and the lack of type specimens in Hampe's herbarium at B, I designate Puiggari specimen 421 at FH (labeled and filed under *Brachythecium salebrosum*) as the lectotype, since it fits the protologue description and its label data can be directly linked to the protologue.

Overall, I examined nine other Puiggari specimens, one each from BM, FH, G, and S, and two each from H-BR, JE, and L. None of these could be directly linked to the protologue citation of specimens due to inconsistencies in specimen numbers and dates. They are considered topotypic representatives.

According to Sayre (1975, p. 382) Puiggari specimens cited in the protologue were collected in 1879. Six of the topotypic specimens, four of which were collected in 1879 (two from L and one each from BM and JE) and two that were collected in 1881 (one each from JE and S), lack collection numbers. The remaining three specimens, one from G and two from H-BR, have the protologue-cited number 66 on their labels but are disputed because of their collection dates or lack thereof. The two H-BR specimens were gathered after the date cited in the protologue. Puiggari continued collecting mosses from this type area until his death in 1900 (Urban, 1906, p. 83). Although they have the same collection number, their collection dates are eight years apart (V-1881 and VII-1889) and their labels are written in Brotherus' rather than Geheeb's cursive style. The specimen at G lacks a collection date.

COMMENTS: In the protologue this specimen is described as being monoicous; however, the lectotype and representative specimens are dioicous. The dioicous condition, growth form, areolation, leaf morphology, and sporophyte character of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Hypnum taylori Spruce *ex* Mitt., J. Linn. Soc. Bot. 12: 559, 1869. nom. illeg. incl. spec. prior.

Cited specimens: "Andes Ouitenses, Ouito, *Jamenson* [!]; Ouito, Chilligallo ad arbores vetustas (9500 ped), *Spruce 1389* [!]; ad aggeres in ascensu monte Pinchincha (11,000 ped), *Spruce 1390*. Bolivia, Bridges in Herb. Hooker." [*non vidi*]

COMMENTS: Even though this name was validly published (ICBN 32.1), it is in contravention of Article 63.1 because the protologue includes in synonymy *H. conostomum* Tayl. in Hooker, an earlier valid name. Thus *H. taylori* is considered *nom. illeg. incl. spec. prior.*

The following specimens that I have examined for this taxon are referred to *Brachythecium conostomum* (Tayl) Jaeg.: Quito, *Jamison 267* (OXF); Bolivia, Bridges, *Hb. Hooker s.n.* (NY); Pichincha (11,000 ped) *Spruce 1390* (BM); and Quito, Chilligallo (9500 ped) *Spruce 1389* (BM).

* * *

Brachythecium tenuinerve Card., Rev. Bryol. Lichénol. 37: 65. 1910.

Type specimen (lectotype *des. mihi*) PC: "Mexico, Mexico, Amecameca, 8500 ft, 13 Oct, 1905, *C. G. Pringle 10585*." [!]

Plants medium-sized, light yellow-green, in a dense mat. Stems to 5.0 cm long, prostrate, terete, densely foliate, with tufted rhizoids where attached to substrate, ± pinnately branched; branches to 1.0 cm long, terete, erect, tapering at tips; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller toward stem surface, with two or three layers of small thick-walled cells at stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 1.2-1.5 (x=1.4) X 0.6-0.7 (x=0.6) mm, appressed-imbricate when dry, erect to patent when moist, concave, slightly decurrent, slightly plicate, ovate to lanceolate, acuminate, apices ± twisted; margins reflexed at base, plane above, serrulate in upper 2/3, smooth below; costae slender, broad at base, tapering and ending above middle (57%); branch leaves slightly smaller. Median leaf cells fusiform to linear 44.5-63.8 (x=54.5) X 5.7-8.0 (x=6.7) μm; apical cells similar 34.2-76.4 (x=51.9) X 3.4-6.8

(x=5.7) µm; basal cells irregularly rectangular 20.5-52.4 (x=34.0) X 9.1-17.1 (x=12.4) µm; alar cells quadrate to rectangular, forming distinct groups of cells arranged in columns 14.8-34.2 (x=22.2) X 11.4-18.2 (x=14.3) µm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate and long-acuminate, inner leaves longer and slender-acuminate; margins plane, entire, and bordered by a single row of rectangular cells below. Perigonia pyriform, leaves ecostate, ovate-acuminate, inner leaves longer than outer; margins plane and bordered by a single row of rectangular cells. Setae 7.0-11.0 (x=8.5) mm long, red-brown, smooth. Capsules 1.1-2.3 (x=1.6) X 0.4-0.7 (x=0.6) mm, erect to slightly inclined, cylindrical, ± curved light red-brown; exothecial cells in vertical rows, irregularly rectangular, walls thickened, end walls ± thinner than lateral walls; annuli not differentiated; cilia 2, nodose and appendiculate, papillose; opercula 0.5-0.8 (x=0.6) X 0.5-0.7 (x=0.6) mm, conic-apiculate, with slightly bent tips. Spores 11.0-16.5 (x=14.0) µm, finely papillose.

TYPIFICATION: Cardot cited six Pringle "Plantae Mexicanae" exsiccate specimens as types, "Mexico, District federal, Canada, vallee de Mexico, 1908, *Pringle 10450*, *15108*, *15278*; Mexico, Etat de Mexico, Amerecameca, 1808, *Pringle 10585*; Mexico, Etat de Hidalgo, Cuzamaloza, 1908, *Pringle 10624*; Mexico, Etat de Michoacan, Morelia, Dr. Manuel Martinez Solorzano, 1908, *Pringle comm.* [*non vidi*]. I have examined 58 syntypic specimens from various herbaria and designate one *Pringle 10585* specimen at PC as the lectotype (specimen having a printed Pringle exsiccate label with the label information handwritten in Pringle's cursive style using a heavy black ink, the species name handwritten in

Cardot's cursive style using a thinner black ink, and "Herb. J. Cardot" rubber-stamped at the front-bottom of the packet). This specimen is most suitable as the type since it fits the protologue description and is from Cardot's Herbarium. Duplicates of this specimen at C, CANM, FH(2), G, GB, HBG, L(2), M, MO, NY(3), PC(2), S(3), TENN, UPS, US, VT, and WU are considered isolectotypes. Specimens of Pringle 10450 at MICH, PC(2), US; 15108 at PC(2); 15278 at FI, H-BR, PC, US, TENN; and 10624 at C, CANM, F, FH, G, L(2), M, MO, NY, PC(3), S(4), TENN, UPS, US, and VT are all considered to be paratypes.

COMMENTS: Brotherus (1925, p. 360) indicated that Cardot considered *Brachythecium tenuinerve* Card., *Brachythecium albulum* Besch. *ex* Card., and *Brachythecium lanceolifolium* Card. as synonyms of *Brachythecium acuminatum* (Hedw.) Aust. I recognize these three taxa as being synonymous with *Brachythecium stereopoma* (Spruce *ex* Mitt.) Jaeg. Little relationship between *B. acuminatum* and *B. stereopoma* is apparent, since the latter two taxa differ from *B. acuminatum* by the presence of cilia on the inner peristome, larger leaf cells and much more slender costae.

The dioicous condition, leaf morphology, areolation, growth form, and sporophyte characters of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium tenui-pinnatum (C. Müll. in Ule) Par., Ind. Bryol. Suppl. 51. 1900. *nom. nud.*

Basionym: *Hypnum (Brachythecium) tenui-pinnatum* C. Müll. in Ule, Hedwigia 38(Beibl.): 59. 1899. *nom. nud.*

Cited specimen (Exsiccate): "E. Ule Bryotheca Brasilinensis, Prov. S. Catharina, Serra Geral, ad terram in araucarieto, m. Maji 1890, *E. Ule 196*." [!]

COMMENTS: This binomial published as an exsiccate by E. Ule (1899, p. 59) was effectively published (ICBN 30.1), yet it is not validly published since it lacked a description (ICBN 32.1). Hence, *B. tenui-pinnatum* (C. Müll. in Ule) Par. and its basionym are considered to be *nom. nuda*.

Specimens of *E. Ule 196* that I have seen from the following herbaria are all referred to *B. stereopoma* BM, BR, C, FH, FI, G(2), GB, H-BR, M, MPH, NY, PC(3), S(3), UPS, and WU(2).

Inside the packet of the *E. Ule 196* exsiccate specimen at H-BR is a small piece of paper with 886 written on it. This number represents Ule collection numbers of a different series apart from his exsiccate numbers. The significance of this information is pertinent to typification and discussion under *Brachythecium plicifolium* var. *tenui-pinnatula* C. Müll.

* * *

Brachythecium tenui-prostratum C. Müll., Hedwigia 36: 128. 1897.

≡ [*Brachythecium tenui-prostratum* C. Müll. *ex* Kindb., Enum. Bry. Exot., Suppl. 2. p. 97. 1891. *nom. nud.*]

Type specimen (lectotype *des. mihi*) NY: "Argentina, Tucumán, 1872, *P. G. Lorentz*" *s.n.* [!]

Plants slender, medium-sized, pale yellow-green. Stems to 2.0 cm long, prostrate, terete, loosely foliate, with tufted rhizoids in older portions freely branched; branches to 1.3 cm long, terete, ± tapering at

tips; central strand narrow, inner cells large and thin-walled, becoming slightly smaller with slightly thickened walls at stem surface; pseudoparaphyllia triangular. Leaves 1.4-1.8 (x=1.5) X 0.4-0.8 (x=0.6) mm, erect to patent when dry, becoming more open when moist, concave, narrowly decurrent, slightly plicate, ovate to ovate-lanceolate, abruptly or gradually tapering into elongate, ± flexuose tips; margins recurved at base, plane above, serrate above, serrulate below; costae broad at base tapering above and disappearing near midleaf (52%) with one or more short lateral spurs. Median leaf cells short to long fusiform 74.1-125.4 (x=98.5) X 6.8-13.7 (x=10.7) μm; apical cells similar 74.1-125.4 (x= 92.3) X 5.7-14.8 (x=8.8) μm; basal cells lax, irregularly rectangular 39.9-96.9 (x=68.6) X 13.7-25.1 (x=19.5) μm; alar cells quadrate to rectangular 27.4-68.4 (x=43.1) X 13.7-25.1 (x=21.0) μm, without sharp demarcation from median and basal cells. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate-acute, inner leaves longer, slenderly acuminate; margins plane, entire, ± bordered by a single row of long, thin-walled rectangular cells. Perigonia not observed. Setae smooth, red-brown, 12.0-14.0 mm long. Capsules 2.0-2.1 X 0.4-0.5 mm, erect to slightly inclined, cylindrical and slightly arcuate, dark red-brown, blackened (aged); exothecial cells rectangular, in rows, with uniformly thickened walls; annuli not differentiated; cilia nodose, 1-3; operculum 0.7 mm X 0.6 mm, conic-apiculate; spores finely papillose 14.3-18.7 (x=16.4) μm.

TYPIFICATION: The type of this species is represented by four isotypic specimens, "Argentinia subtropica Tucumanensis, in cortice arborum Sierrae de Tucumán, Aprili 1872, *P. G. Lorentz*," one each at H-

BR and NY and two at S. With the loss of Müller's herbarium at B, I designate the one specimen at NY as the lectotype, since it fits the protologue description and was originally from the herbarium at B. Duplicates of this specimen at H-BR and S(2) are considered to be isolectotypes.

COMMENTS: Six years prior to Müller's publication of this name, Kindberg (1891, p. 97) had included "*B. tenui-prostratum* C. Müll." in his "*Enumaratio Bryinearum Exoticarum*" without description or cited type. Müller validated the name (ICBN 32.1) in 1897 by providing both a description and type.

The lectotype and isolectotypic specimens consist of two elements, this species and *Rhynchostegium* sp. (*c. fr.*), the latter being the dominant element in the mats. Müller indicated the cilia on the endostome of this specimen were rudimentary. However, the sporophytes examined indicated otherwise.

The dioicous condition, growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*.

* * *

Brachythecium trachychaete Dus., Bot. Not. 1905: 309. 1905.

Type specimen (lectotype *des. mihi*) S: "Patagonia occident., Rio Aysen *P. Dusén A.9.*" [!]

Plants medium-sized, yellow to brown, forming a loose mat. Stems to 6.5 cm long, prostrate, radiculose, terete, densely foliate, subpinnately branched; branches to 1.0 cm long, erect; central strand narrow, inner cortex cells large and thin-walled, outer 2-3 layers of

cells distinctly smaller with very thick walls; pseudoparaphyllia short-lanceolate to ovate-acute. Leaves 1.4-2.1 (x=1.7) X 0.6-0.9 (x=0.7) mm, loosely imbricate when dry, erect when moist, ± falcate, concave, not to slightly decurrent, strongly plicate, ovate to ovate-lanceolate, rounded at base, acuminate, with ± twisted apices; margins plane, reflexed at base, serrate at tips, serrulate below to base; costae broad at base, gradually tapering above, ending above middle (67%) in one or several dorsal spine(s). Median cells linear-flexuose with slightly thickened walls 51.3-68.4 (x=58.9) X 4.6-6.8 (x=6.3) μm; apical cells 34.2-68.4 (x=45.4) X 5.7-10.3 (x=6.8) μm; basal cells shorter with thickened porose walls 19.4-39.9 (x=31.6) X 6.8-13.7 (x=8.5) μm; alar cells forming small discrete groups with irregularly quadrate or rectangular cells with slightly thickened walls 16.0-28.5 (x=21.8) X 8.0-13.7 (x=9.7) μm; basal and alar cells yellowish brown where attached to stem. Polygamous. Autoicous and/or synoicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves short ovate-acuminate, inner leaves longer acuminate; margins plane, serrate in apices, entire and bordered by a row of elongate cells below. Perigonia ovoid, leaves ecostate, outer leaves short ovate-acuminate, inner leaves longer and slenderly acuminate; margins plane, serrate in apices, bordered by a single row of rectangular cells below. Setae 17.0-22.0 mm long, roughly papillose throughout, red-brown. Capsules 2.0-2.6 X 0.6-0.7 mm, inclined cylindrical, curved, ± slightly constricted below the mouth blackened with age; exothecial cells quadrate to rectangular in vertical rows with lateral walls thicker than end walls; cilia 1-2, nodose and appendiculate. The rest unknown.

TYPIFICATION: Dusén's protologue cited specimens from "Patagonia occ. in terra Silvosa." Three specimens I have examined, "Patagonia occid., Rio Aysen, 16/2/1897, *Dusén no. A. 9*" one at PC and two at S are considered isotypic. I designate one of the specimens at S as the lectotype since it fits the protologue description and has the most complete sporophyte. Duplicate specimens at S and PC are considered isolectotypes.

COMMENTS: The polygamous condition, growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. praelongum.*

* * *

Brachythecium trachypodioides Schimp. *ex* C. Müll., Nuovo Giorn. Bot. Ital. n. ser. 4(2): 167. 1897. *nom. nud.*

≡ [*Brachythecium trachypodioides* Schimp. (Exsiccate) Plantae Andium Boliviensium. *nom. herb.*]

Cited specimen: "Plantae Andium Boliviensium, Prov. Larecaja, Vicinus Soratae apacheta de Chuchu, Reg. alpinal 4500 m, Mart. 1856 *G. Mandon 1707*." [!]

COMMENTS: This binomial was published by Müller in a list of Mandon specimens identified by Schimper. Although effectively published (ICBN 30.1), it is not validly published since it lacks a description (ICBN 32.1). Hence, *Brachythecium trachypodioides* Schimp. *ex* C. Müll. is considered to be a *nom. nud.*

Specimens of *Mandon 1707* I have seen from BM(2), and G(2) are all referred to *Brachythecium praelongum.*

* * *

Brachythecium trochalobasis C. Müll., Bull. Herb. Boissier 5: 218. 1897.

Type specimen (lectotype *des. mihi*) FI: "Guatemala, Alta Vera Paz, Pansamala, 3800 ped altum, Dec. 1887, in Hb. Levier, *Türckheim 1556*." [!]

Plants small- to medium-sized, yellow-green, forming loose spreading mats. Stems to 4.5 cm long, prostrate, terete, densely foliate, ± pinnately branched; branches to 1.1 cm long, terete, ± tapering at tips, becoming shorter and more distant toward stem tips; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia ovate, long-acuminate. Leaves 1.4-1.7 (x=1.6) X 0.6-0.9 (x=0.7) mm, erect ± imbricate when dry, erect to patent when moist; older stem leaves broadly ovate (deltoid) with long narrow acumina, stem and branch leaves concave, decurrent, plicate, ovate-lanceolate to lanceolate, acuminate, with narrow apices; margins recurved at base, plane above, serrulate in upper 2/3, smooth below; costae broad at base, tapering above and ending near middle (58%). Median leaf cells fusiform to linear 61.6-91.2 (x=72.7) X 6.8-8.0 (x=7.5) μm; apical cells similar 42.2-74.1 (x=58.0) X 4.6-6.8 (x=6.0) μm; basal cells irregularly rectangular 34.2-68.4 (x=51.3) X 8.0-14.8 (x=12.3) μm; alar cells lax, quadrate to rectangular extending into decurrencies 17.1-31.9 (x=24.2) X 11.4-22.8 (x=16.3) μm. Dioicous. Perichaetia cylindrical, leaves ecostate, sheathing at base, outer leaves ovate, long-acuminate, inner leaves longer, slender-acuminate; margins plane, entire and bordered by a single row of rectangular cells below. Perigonia not observed. Setae 21.0-23.0 (x=21.4) mm long, red-

brown, smooth. Capsules 1.3-2.2 (x=1.7) X 0.4-0.7 (x=0.5) mm, inclined, cylindrical and curved, red-brown; exothecial cells in vertical rows, rectangular, walls thickened, end walls ± thinner than lateral walls; annuli not differentiated; cilia not observed; opercula 0.7-1.1 (x=0.9) X 0.5-0.7 (x=0.6) mm, conic-apiculate to long conic. Spores 12.5-18.2 (x=16.0) µm, finely papillose.

TYPIFICATION: In the protologue Müller specified a Türckheim specimen in the Levier herbarium, "Guatemala, Alta Vera Paz, Pansamala, 3800 ped. altum, Dec. 1887," as the type. In the Levier herbarium at FI there are two Türckheim specimens, 1555 and 1556, which contain the type information. Additionally, duplicates of each are found in other herbaria. The completeness of the sporophyte varies among specimens. Müller described the seta but not the capsule, so I assume that the specimen he described lacked a capsule. With the loss of the Müller herbarium at B, I designate one of the three *Türckheim 1556* specimen at FI as the lectotype. This specimen best represents this species since it fits the protologue descriptions, contains complete sporophytes, and is from the Levier Herbarium. Duplicates of *Türckheim 1556* at FI(2), H-BR and NY are considered to be isolectotypes. *Türckheim 1555* at FI and S are considered paratypes.

COMMENTS: The dioicous condition, growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. stereopoma sensu lato*. I concur with Bartram (1949a, p. 353) in considering *B. trochalobasis* to be a synonym of *B. stereopoma*.

* * *

Brachythecium turgens Dus., Bot. Not. 1905: 308. 1905.

Basionym: *Brachythecium turgens* Dus., Rep. Princeton Univer. Exp. Patag. 8: 125. 1903. *nom. nud.*

Type specimen (lectotype *des. mihi*) S: "Tierra del Fuego, Rio Grande, 23/i/1896, *P. Dusén 153*." [!]

Plants robust, yellow in upper half, brown below, forming a deep, dense tuft. Stems to 3.0 cm long, erect, densely foliate, julaceous to turgid, infrequently and irregularly branched; branches 2.0 cm long, erect, julaceous to turgid; central strand narrow, inner cortex large and thin-walled, becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia elongate-ovate, acute, ± apiculate. Leaves 2.4-2.9 (x=2.7) X 1.0-1.4 (x=1.2) mm, imbricate when dry, becoming more tumid and erect when moist, deeply concave (cymbiform), short-decurrent, ± auriculate, not to weakly plicate, broadly obovate, gradually tapering and abruptly aristate 0.2-0.4 (x=0.3) mm long; margins reflexed at base, plane above, entire; costae broad at base, tapering, slender above, ± with short lateral spurs, ending above middle (48%); branch leaves narrower, ovate and gradually acuminate. Median leaf cells linear to linear-rhomboidal 82.1-136.8 (x=105.1) X 5.7-11.4 (x=8.4) μm; apical cells shorter 57.0-99.2 (x=72.5) X 5.7-10.3 (x=7.6) μm; basal cells lax rectangular, walls pitted 57.0-125.4 (x=85.8) X 14.8-22.8 (x=19.0) μm; alar cells rectangular, inflated in auricles and into decurrencies 39.9-104.9 (x=66.9) X 23.9-39.9 (x=30.9) μm. Autoicous. Perichaetia cylindrical, leaves clasping at base, ecostate, outer leaves ovate-acute, inner leaves longer, ovate-acuminate; margins plane, entire and ± bordered by a single row of rectangular cells.

Perigonia pyriform, leaves ecostate, outer leaves orbicular, inner leaves ovate-acute to short-acuminate; margin plane, entire, and bordered by a single row of rectangular cells. Setae 26.0-27.0 mm long, dark red-brown, smooth. Capsules 1.6-1.7 X 0.65-0.67 mm, horizontal, oblong-ovoid and slightly curved, dark red-brown. The rest unknown.

TYPIFICATION: The designation of original specimens is hampered by the brevity of information given in the protologue "Fuegia australis in paludosis, *Dusén*." Three different Dusén collections have been distributed with this name. Dusén specimens 5865 at GB, H-BR(2), NY, and S, are not considered "original specimens" since they were identified by V.F. Brotherus and were collected after the binomial was published. Two other collections, *Dusén 153* [FI, H-BR(2), S(3)] and *Dusén 167* [UPS], are considered syntypic since they were identified by Dusén, collected from the same location, and collected before the publication date. Substrate information is lacking on all of these specimens except for one *Dusén 153* specimen at H-BR, which is in close agreement with the protologue. However, I do not consider it to be the best choice for a lectotype because it consists of only four short stems. Instead, I designate one of the *Dusén 153* specimens at S to be the lectotype (identifiable by having the label on the outside of the packet) since it fits the protologue description, was identified by Dusén, and has sporophytes (not mentioned in protologue description). Duplicates of this specimen at FI, H-BR(2) and S(2) are considered to be isolectotypes. Dusén specimen 167 at UPS is considered to be a paratype. A *Dusén 153* specimen at GB is referred to as *Drepanocladus* sp. (Amblystegiaceae) and is not considered type material.

COMMENTS: Dusén (1903, p. 125) originally published this name in a list of *Hatcher* specimens he (Dusén) had identified; however, the name only became valid (ICBN 45.1) when Dusén gave a description and cited specimens in 1905.

The growth form, leaf morphology, areolation, and sporophyte characters of this specimen fit within the accepted range of variation for *B. subplicatum*.

* * *

Brachythecium zanonii Buck. *sp. nov.* in press.

Type specimen (holotype, explicit) NY: "Jardin Botanico Nacional Dr. Rafael M. Moscoso, Santo Domingo, Rebublica Dominicana, Haiti, Det. Sud'est, about 2 to 3 km. E of Seguin (on road to More Rouge); humid *Pinus occidentalis* forest with understory of ferns and a few shrubs, on S. side on road many mosses and lichens everywhere. 18°20'N, 72°13'W, alt. 5800 m. February 19, 1981. *R. P. Adams, T. Zanoni 11277*." [!]

Plants medium-sized, yellow-green in younger portions, becoming brown below, forming a loose spreading mat. Stems to 5.0 cm long, prostrate, terete, densely foliate, ± pinnately branched; branches to 0.8 cm long, erect, terete, tapering at tips; central strand narrow, inner cortex cells large and thin-walled, gradually becoming smaller with slightly thickened walls toward stem surface; pseudoparaphyllia elongate-triangular. Leaves 1.6-2.9 (x=2.3) X 0.5-1.0 (x=0.8) mm, erect ± imbricate when dry, patent to open when moist, concave, decurrent, distinctly plicate, ovate to elongate-triangular, gradually narrowing into long apices, with sharp rounded shoulders at base; margins reflexed at base, plane above, serrulate throughout to serrulate in apices and

smooth below; costae broad at base, tapering above and ending near middle (49%). Median leaf cells fusiform to linear 45.6-91.2 (x=77.2) X 5.7-8.0 (x=6.8) μm; apical cells elongate-linear 54.7-139.1 (x=90.9) X 3.4-6.8 (x=5.7) μm; basal cells irregularly rectangular, pitted, ± with a single row of enlarged cells at insertion 36.5-66.1 (x=47.7) X 11.4-25.1 (x=16.8) μm; alar cells lax, forming distinct groups, quadrate to rectangular, becoming subinflated in decurrencies, 14.8-46.7 (x=31.1) X 16.0-27.4 (x=22.2) μm. Dioicous. Perichaetia cylindrical, leaves generally ecostate, sheathing at base, outer leaves ovate, long-acuminate, inner leaves longer, slender-acuminate; margins plane, entire, and bordered by a single row of rectangular cells below. Perigonia not observed. Setae 8.5-10.0 mm long, dark red-brown, smooth. Capsules 1.1-1.8 X 0.4-0.5 mm, erect to inclined, cylindrical and curved, red-brown; exothecial cells in vertical rows, irregularly rectangular to rectangular, walls thickened, end walls ± thinner than lateral walls; cilia 2, papillose, nodose. Spores 12.1-16.5 (x=14.1) μm, finely papillose. The rest unknown.

COMMENTS: The medium-sized plant, leaf morphology, areolation, and smooth seta of this specimen ally it with other taxa of the section *Salebrosa*, of which I consider this species to be a member.

* * *

Synonymic Listing of Brachythecium

Included in Type Studies

Brachythecium alboflavens = *B. stereopoma*

B. alboviride = *B. stereopoma*

B. albulum = B. stereopoma

B. altareane nom. nud. = B. austro-glareosum

B. amazonicum nom. nud. = nom. obsc.

B. andrieuxii nom. nud. in parte = B. stereopoma p. p.

B. antarcticum = B. austro-salebrosum

B. antarcticum var. *cavifolium = B. austro-salebrosum*

B. arenarium = B. collium

B. argyrocaulon nom. nud. = nom. nud. B. rutabulum and B. subplicatum

B. asperulum = B. plumosum

B. austro-glareosum var. *diffusum = B. austro-glareosum*

B. bolivio-plumosum = B. plumosum

B. brunneo-alar = B. plumosum

B. byssicladum nom. inval. err. cit. pro. ≡ Rhynchostegium byssicladum nom. nud.

B. calerae = B. stereopoma

B. camptocladium nom. nud. = B. plumosum

B. chrysocladon = B. plumosum

B. cladoneuron = B. conostomum

B. cochleare = B. plumosum

B. comtifolium = nom. obsc.

B. condensatissimum = B. stereopoma

B. corbieri = B. occidentiale

B. costaricense = B. stereopoma

B. crinitifolium = nom. obsc.

B. crinitirameum = B. poadelphus

B. crocatum = B. conostoum

B. cuspidarioides = B. subplicatum

B. delicatum = B. occidentale

B. duriusculum = B. plumosum

B. espinosae = B. rutabulum

B. eupopulum = B. stereopoma

B. euryodictyum = B. austro-salebrosum

B. fasciculato-caudatum = B. stereopoma

B. filirameum = B. stereopoma

B. fissidentoides = B. conostomum

B. flaccum = B. occidentale

B. flexinerve = B. stereopoma

B. flexiventrosum = B. occidentale

B. fossarum = B. stereopoma

B. fuegianum = nom. dub. et illeg.

Stereophyllum fuegianum Besch. 1885 = *nom. superfl. in synm.*

Stereophyllum fuegianum Besch. 1889 *hom. illeg. incl. spec. prior. = B. majusculum* Newton

Brachythecium georgico-glareosum = B. austro-salebrosum

B. grandirete = B. conostomum

B. grandirete var. *robustum nom. nud. = B. comostomum*

B. hastifolium = B. stereopoma

Heterophyllium hastifolium comb. nov. superfl. = Heterophyllium affine

Brachythecium helvolum = B. rutabulum

B. herzogii = B. praelongum

B. hirtipes = B. rutabulum

B. hylocomioides = B. stereopoma

B. immersum = *Kindbergii immersum*

B. integrifolium = *Drepanocladus aduncus* var. *polycarpus* f. *gracilescens*

B. jamaicense = *B. stereopoma*

B. jamaicense var. *albidum* = *nom. obsc.*

B. julaceum nom. nud. = *B. praelongum*

B. laevifolium = *B. plumosum*

B. lanceolifolium = *B. stereopoma*

B. lanceolifolium var. *gracile* = *B. stereopoma*

B. laxireticulatum = *B. conostomum*

B. lepidopiloides ≡ *Stereophyllum lepidopiloides*

B. lescuraeoides = *B. praelongum*

B. longidecurrens = *B. filirepens*

B. longidens = *nom. obsc.*

B. longisetum = *B. stereopoma*

B. macroconum = *B. plumosum*

B. macroconum var. *robustius* = *nom. obsc.*

B. macrogynum = *B. subpilosum*

B. macromitriadelphus nom. nud. = *B. stereopoma*

B. majusculum Dus. nom. nud. ≡ *B. majusculum* Newton

B. meridense = *B. plumosum*

B. minusculifolium = *B. stereopoma*

B. mollirameum = *B. stereopoma*

B. mollirameum var. *delicatulum* = *B. stereopoma*

B. morenoi = *B. austro-glareosum*

B. nematogonium = *B. stereopoma*

B. parvulum nom. nud. = *B. conostomum*

B. patagonicum = B. austro-glareosum

B. peruvianum = B. praelongum

B. plicifolium = B. stereopoma

B. plicifolium var. *tennipinnatula = B. stereopoma*

B. plumosum var. *sublaevipes = B. plumosum*

B. prasophyllum = B. occidentale

B. productifolium = B. stereopoma

B. pseudo-laetum = B. stereopoma

B. pseudo-rutabulum = B. rutabulum

B. pseudo-sulphureum = B. stereopoma

B. pumilum = nom. obsc.

B. pusillo-albicans = B. stereopoma

B. riparium nom. nud. = B. rutabulum

B. rivulariforme nom. nud. = B. rutabulum

B. rutabulum var. *columbicum = B. rutabulum*

Rhynchostegium saint-pierrei = B. occidentale

R. saint-pierrei f. *erectifolium = nom. obsc.*

Brachythecium salebrosum var. *polyoicum = B. polyoicum*

B. scaberrimum hom. illeg. = B. praelongum

B. scabripes = B. rutabulum

B. sericeolum = B. stereopoma

B. sericeo-nitens nom. nud. = B. austro-glareosum and B. albicans

B. sericeo-virens = nom. obsc.

B. skottsbergii = B. austro-salebrosum

B. spegazzinii = not *Brachythecium*

B. spurio-albicans = B. albicans

B. squalidissimum = B. stereopoma

B. stereophyllum = nom. inval. in synom.

B. subjulaceum = B. praelongum

B. subplicatum var. *dilaceratum = B. subplicatum*

B. subplicatum var. *minus = B. subplicatum*

B. subtilicaule nom. nud. = Kindbergii sp.

B. sulphureum = B. stereopoma

Hypnum taylori nom. illeg. incl. spec. prior = B. conostomum

Brachythecium tenuinerve = B. stereopoma

B. tenui-pinnatum nom. nud. = B. stereopoma

B. tenui-prostratum = B. conostomum

B. trachychaete = B. praelongum

B. trachypodioides nom. nud. = B. praelongum

B. trochalobasis = B. stereopoma

B. turgens = B. subplicatum

* * *

Herbarium Names

The following names were neither effectively published (ICBN 30.1) nor validly published (ICBN 32.1) since they were only used on herbarium labels. The specimens for these herbarium names are not unique; thus, validation of these names would be superfluous since they would immediately go into synonymy. The herbarium where each is located and the disposition of the specimen is indicated.

Brachythecium flaccum C. Müll. var. ***nanum*** C. Müll., *in sched.* = ***Brachythecium occidentale***. FI.

Brachythecium fossicola C. Müll. *in sched.* = *Brachythecium subpilosum.* JE.

Brachythecium julirameum Dusén *in sched.* = *Brachythecium subpilosum.* NY.

Brachythecium liebmanni ? *in sched.* = *Brachythecium occidentale.* C.

Brachythecium lorentzii Fleisch. *in sched.* = *Brachythecium stereopoma.* FH.

Brachythecium pseudo-lutescens Hamp. *in sched.* = *Brachythecium plumosum.* NY.

Brachythecium panamense Br. *et* S. *in sched.* = *Brachythecium stereopoma.* M.

Brachythecium pseudo-piliferum Hamp. *in sched.* = *Brachythecium chocayae.* FH.

Brachythecium serribracteatum Dix. *in sched.*

COMMENTS: Information on a handwritten note which accompanied the "Cotype" specimen of this epithet at GL "South Georgia, 1919, *G. Hamilton 543*," indicated H. N. Dixon had intended to publish *B. serribracteatum* as a new species. He noted that the "Cotype" [which he had originally named *Brachythecium subpilosum* (Hook. f. *et* Wils.) Jaeg.], and another specimen [an unidentified specimen which was to become the holotype] of *B. serribracteatum* differed from *B. subpilosum* in the pericheatial leaves. I concur with Newton (1979, p. 129) that the "Cotype" specimen is *B. subpilosum.* Newton (1979, p. 129), indicated the intended holotype specimen "BM; Dawson Island, Fuegia, V. 1910, *Tonelli 13*," (*non vidi*) closely resembled two isotype specimens of *Brachythecium trachychante* Dus., "S: Patagonia occident, Rio Aysen,

16.II.1897, *P. Dusen A9*." (=*B. praelongum fide mihi*). I consider *B. subpilosum* and *B. praelongum* to be valid taxa; therefore, validation of the name *B. serribracteatum* would be superfluous.

Brachythecium standleyi Bartr. *in sched.* = *Amblystegium serpens* (Hedw.) B.S.G. F and FH.

Brachythecium subpilosum var. *macrophyllum* Herz. *in sched.* = Sematophyllaceae. JE.

Brachythecium venezuelanum Broth. *in sched.* = *Rhynchostegium* sp. L.

CHAPTER V

SUMMARY

As the first Latin American mosses were being brought back to Europe in the early to mid 19th century, the recognition of their place in the order of living things and their taxonomic disposition was being established. During this time of resolution, Schimper (in Bruch et al., 1853) segregated several species of *Hypnum* characterized by their straight, costate, leaves, short, thick, capsules, and conic opercula, into a new genus he called *Brachythecium* B.S.G. This generic concept has changed little to the present as the number of species recognized has increased from 20 to approximately 270 species.

During the late 19th and early 20th centuries, botanical exploration of Latin America resulted in the publication of 146 *Brachythecium* taxa of which 103 were new species, 12 were new varieties, 19 were illegitimate names, and eight species were previously known outside of Latin America. The majority of these taxa represented geographical species or forms and constituted approximately 42% of the *Brachythecium* taxa recognized for the world. More recently, three new taxa, two in this study, and one by Buck (pers. comm.) have been described.

In the past 100 years, revisions on the species of *Brachythecium* from Europe, North America north of Mexico, Japan, and Mexico have been undertaken. These studies have synonymized many of the previously established geographic taxa and clarified some of the phytogeography of the genus for these areas. In Latin America *Brachythecium* taxa have

only been treated in regionalized floras: Herzog 1920, Bolivia; Bartram 1949a, Guatemala; Crum 1951, Mexico; Crum and Steere 1957, Puerto Rico; Robinson 1967, Colombia; Newton 1979, South Georgia; Seki 1974 Provincia de Aisén, Chile; and McFarland (unpubl.), Mexico. Mitten's (1869) "Musci Austro-Americani" a compendium of all the known moss species of South America had little impact on *Brachythecium* since only a few species of *Brachythecium* were known at that time.

This study has concentrated on all the species of *Brachythecium* reported and described for Latin America, and, to establish nomenclatural priority, has included species described from the Antarctic peninsula, Falkland Islands (Malvinas), Kerguelen Islands, and South Georgia Islands.

Several objectives were undertaken: (1) typification and modernization of the nomenclatural status of all names; (2) evaluation of the approximately 4500 specimens collected over the past 144 years to develop a modern taxonomical concept and construct keys for identification; and (3) presentation and interpretation of bryogeographical distributions.

From the 116 species and 13 varieties of *Brachythecium* described for Latin America, I recognized 28 taxa in nine sections including two new species and three new sections described here, and one new species described by Buck (pers. comm.). In addition, four taxa were excluded either as synonyms of other non-*Brachythecium* species or by transferred to other genera. Nine taxa were considered to be *nomina obscura* because holo-lectotypification was impossible, and neotypification would only

result in the creation of superfluous names as synonyms of earlier published legitimate names.

In Latin America, of the 28 *Brachythecium* species, 21 are considered indigenous, seven exhibit extralimital distributions, of which three are considered to be cosmopolitan. Of the 21 species unique to Latin America, three, *B. calliergonoides*, *B. cavifolium*, and *B. rivularioides*, are known only from their type collections; and, six, *B. filirepens*, *B. guatemalense*, *B. microcollinum*, *B. poadelphus*, *B. polyoicum*, and *B. zanonii*, have restricted distributions within country or physiographic boundaries. *Brachythecium conostomum*, *B. occidentale*, and *B. stereopoma* have the widest distributions within Latin America; whereas, *B. chocayae*, *B. cirriphylloides*, *B. majusculum*, and *B. praelongum* have more limited distributions within several countries or physiographical regions.

Taxa with distributions extralimital to Latin America have either limited or broad distributions within Latin America. Two of the three cosmopolitan taxa, *B. plumosum*, and *B. rutabulum* are distributed throughout most of the highlands in Latin America, whereas *B. albicans* is limited to a few areas in northern Mexico and found at the southern tip of South America. Species with an affinity for the temperate regions of North America, *B. collinum*, *B. fendleri*, *B. frigidum*, and *B. oxycladon*, have a very limited distribution in northern Mexico. In addition, *B. collinum* is disjunct to the southern tip of South America. *Brachythecium frigidum*, found within Latin America only in Distrito Federal, Puebla, and Veracruz, Mexico, is disjunct from the Pacific Northwest where it is more frequent and widely distributed.

Brachythecium austro-salebrosum, *B. austro-glareosum*, *B. paradoxum*, *B. subpilosum*, and *B. subplicatum* are predominant in the flora of the southern tip of South America and also island-hop as far east as Kerguelen Island. In the cases of *B. subplicatum* and *B. paradoxum*, they extend west to New Zealand.

The taxa of *Brachythecium* have justly earned a reputation among bryologists for being very difficult to differentiate, especially when specimens lack sporophytes. For the most part, this difficulty is related to the broad phenotypic plasticity manifested in morphology and size variations expressed by the gametophyte within an individual taxon. This is accentuated by the lack of well-defined differentiating gametophytic characters. In many cases the determination of the sexuality of the plants (autoicy, synoicy, or dioicy) and knowledge of the sporophyte becomes essential for confident determination of a specimen. Hence, most published keys of *Brachythecium* rely heavily on the sexuality of the plants and sporophytic characters. The species I recognize for Latin America are no exception. Among these taxa, I have found the greatest plasticity in growth habit, plant size, and other measurable characters, leaf shape (especially the apices), degree of decurrency, and leaf margin. I have found the more stable characters to be overall shape of leaf, leaf form at stem insertion, presence or absence of decurrency, concavity and plicae of the leaf, costa length and shape, shape(s) of the median, basal and alar cells, degree of differentiation among the median-basal-alar regions, size relationship of the terminal cell to other apical cells of the leaf, shape of

pseudoparaphyllia, sexuality, texture of the setae, cellular form of the annulus, cilia ornamentation, and operculum shape.

One of the more challenging aspects of studying the taxa of *Brachythecium* has been defining the limits of the gametophytic variability into meaningful taxonomic units given the limited environmental information provided. Thus, in the ignorance of experimentally proven ecotypic or genotypic derived forms, a consistency in relationships among populations of a species was established by relying heavily on observable differences in the stable characters discussed above. Except for Newton's (1979) cytological and taximetric studies of *Brachythecium* species for South Georgia, no experimental studies of form/variation to environmental conditions have been undertaken for the Latin American species. Such efforts might be the next logical tool for a better understanding of the dynamics and definition of *Brachythecium* taxa in this diverse area.

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APPENDIX

APPENDIX

SPECIMENS EXAMINED

Brachythecium albicans

ARGENTINA: Lago Argentina, i.1905, *Dusén s.n.* (as *B. sericeovirens*) (GB, M, S); Lago Viedma, ii.1905, *Dusén s.n.* (as *B. sericeovirens*) (G, NY, S, WU); Lago Argentina, i.1905, *Dusén 5683* (as *B. sericeovirens*) (B, GL, HBG, S).

CHILE: Santiago, 14.viii.1896, *Dusén 137* (as *B. sericeovirens*) (S); Aysen, 18.ii.1977, *Montero 10267* (as *B. turgens*) (US); Aysen, 18.ii.1977, *Montero 10269* (as *B. turgens*) (US); Aysen, [*OKynnye*] *s.n.* (as *B. spurioalbicans*) (H-BR); Magallanes, 19.xi.1928, *Roivainen s.n.* (as *B. spurioalbicans*) (CANM, FH); Magallanes, 20.ii.1929, *Roivainen s.n.* (as *B. spurioalbicans*) (FH); Magallanes, 1.ii.1929, *Roivainen 343* (as *B. spurioalbicans*) (FH); Nuble, 17.iv.1929, *Roivainen 1034* (as *B. plumosum*) (FH); Magallanes, 21.xi.1928, *Roivainen 1454* (as *B. spurioalbicans*) (FH).

FALKLAND ISLANDS: New Island, 3.ii.1968, *Engel 3264* (as *B. patagonicum*) (BA, NY ,S, US).

MEXICO: Nuevo Leon, 4.i.1972, *Manuel 1305* (as *B. stereopoma*) (US); Nuevo Leon, ix.1970, *Norris 17609b* (TENN); Nuevo Leon, ix.1970, *Norris 17638* (TENN).

PATAGONIA: Patagonia 50/3°, 1882, *Mermoreno 197* (as *B. spurioalbicans*) (NY).

Brachythecium austro-glareosum

ANTARCTICA: Baie Marguerite, 30.i.1909, *251* (BM); Beas Cochen Bay, *1192* (BM); Baie Marguerite, Ile Jenny, 30.xii.1909, *249* (as var. *diffusum*) (BM, H-BR, P-C); Cliffs, Galindez L., 14.xii.1935, *1312* (BM); Canal de la Belgica, 1.ii.1898, *Racovitza 230a* (as *B. georgico-glareosum*) (BR); *indidem*, 1.ii.1898, *Racovitza 232c* (as *B. georgico-glareosum*) (BR); *indidem*, 1.ii.1898, *Racovitza 233c* (as *B. georgico-glareosum*) (BR); *indidem*, 1.ii.1898, *Racovitza 234c* (as *B. georgico-glareosum*) (BR); Danco Coast, Argentine Isls., 15-16.i.1969, *Schuster 69-246* (US); Almirante Brown, Danco Coast, opposite Bryde Island, 23.i.1969, *Schuster 69-365* (US); *indidem*, 23.i.1969, *Schuster 69-402* (US); Grahn Coast, Hook Island, 4.ii.1969, *Schuster 69-705a* (US).

ARGENTINA: Buenos Aires, 22.xi.1840, *Kirknemann 5333* (as *B. sericeo-virens*) (BA).

CHILE: Territorio Magallanes, Last Hope Inlet, 10.iv.1936, *Mixia 8001* (as *B. subpilosum*) (B, C, F, FH, G, MO, NY, UPS); Terr. Magallanes, Punta Arenas, 11.xii.1940, *Santesson M610* (as *B. georgico-glareosum*) (FH, S).

COLOMBIA: Boyacá, 2.x.1972, *M.Cleef 5728* (as *B. flexiventrosum*) (FLAS); Meta, 16.i.1973, *M.Cleef 7973* (U); Boyacá, 8.iv.1973, *M.Cleef 9507* (U).

CROZET ISLAND: xii.1907, *Ring 2b* (as *B. subplicatum*) (BM).

ECUADOR: Quito, *Jameson s.n.* (NY); El Altar, vii.1903, *Meyer 5430* (as *B. altarense*) (FT, JE).

FALKLAND ISLANDS: East Falkland Port Harriet, 31.x.1907, *Skottsberg 870* (as *B. austro-salebrosum*) (BM, S, UPS); West Falkland

Islands, 1909-1911, *Vallentine s.n.* (as *B. albicans*) (BM); *indidem*, 1909-11, *Vallentine 274* (as *B. albicans*) (BM).

GOUGH ISLAND: 15.x.1956, *Van der Wereve 12391b* (as *B. subpilosum*) (FH).

KERGUELEN ISLAND: Mont Amery, 27.iii.1952, *Aubert de la Rue s.n.* (US); *indidem*, 27.v.1952, *Aubert de la Rue s.n.* (US); Peninsula Courbet, 25.x.1952, *Aubert de la Rue s.n.* (US); 1913-14, *Bossiere 13* (as *B. subplicatum*) (BM); 1911, *Bossiere 20* (NY); Swains Bay, 20.i.1875 *Eaton s.n.* (as *B. salebrosum*) (BM); *Hooker s.n.* (as *B. austro-salebrosum*) (BM); Betryo Cove, 1874, *Naumann s.n.* (S); 1875, *Naumann s.n.* (BM, WU); 1874, *Naumann 361* (H); iii.1903, *Werth s.n.* (FI).

PATAGONIA: Punta Arenas, 22.iv.1895, *Dusén s.n.* (as *B. subpilosum*) (UPS); Valle Fluminis Aysen, 24.ii.1897, *Dusén s.n.* (as *B. sericeo-virens*) (S, US); Punta Arenas, 22.xi.1895, *Dusén 37* (as *B. subpilosum*) (GB, S); Valle Fluminis Aysen, 24.ii.1897, *Dusén 570* (as *B. sericeo-virens*) (BM, FH, FI, GB, JE, M, NY, S, UPS, WU); Lago Argentino, 5.ii.1905, *Dusén 5815* (as *B. sericeo-virens*) (NY); Canal Fitzroy, 1908, *Halle 827* (as *B. patagonicum*) (S, UPS); Volcanic country, i.1920, *Hamilton 614* (as *B. georgico-glareosum*), (BM, GL); *Hatcher E138* (as *B. sericeo-virens*) (S).

PERU: Cajamarca, 30.viii.1973, *Hegewald & Hegewald 6602* (as *B. chrysocladon*) (EPH); Cajamarca, 30.viii.1973, *Hegewald & Hegewald 6613* (as *B. chrysocladon*) (EPH).

SOUTH GEORGIA: Larsen Harbour, 30.xii.1971, *Bell 1405* (BM); Summit of Mount Hodges, 24.ii.1968, *Clarke CG403* (BM); Bays of Isles, 22.i.1961, *Greene 1180* (B, BA); *indidem*, 22.i.1961, *Greene 1281* (BM);

South of Markham Point, Sunset Fjord, 22.i.1961, *Greene 1291* (NY); Royal Bay, 21.ii.1961, *Greene 2340* (BM); Mainland opposite and slightly west of Sorn and Bernt Islands, 4.iv.1970, *Smith 1719* (BM); Glacial melt stream, vi.1973, *Smith 1723* (BM).

TIERRA DEL FUEGO: St. Sebastian, 7.i.1896, *Dusén 107* (as *B. sericeo-virens*) (UPS); Cape Horn, 1839-1843, *Hooker s.n.* (as *B. albicans*) (BM); Lord Auckland's Island, 1839-1843, *Hooker s.n.* (as *Hypnum rutabulum*) (BM); Cape Horn, *Lyall s.n.* (OXF); *indidem*, *Lyall s.n* (as *B. subplicatum*) (OXF); *Lyall 25* (as *Hypnum rutabulum*) (BM); Ushuaia, 3.xii.1902, *Skottsberg 172* (as *B. sericeo-virens*) (H-BR, S).

Brachythecium austro-salebrosum

- **ANTARCTICA:** Ile Wandel, 20.xi.1904, (as *B. austro-glareosum*) (FI); Ile Wandel, 23.xi.1904, (as *B. antarcticum* (FI); Ile Wandel, 26.xi.1904, (as *B. antarcticum* var. *cavifolium*) (FI).S. Orkneys, 9.vi.1933, *5* (as *B. antarcticum*) (BM); S. Orkneys, 18.vi.1933, *9a* (as *B. antarcticum* var. *cavifolium*) (BM); Green Island, 10.iii.1935, *1084* (as *B. antarcticum* var. *cavifolium*) (BM); S. Shetlands, 10.i.1936, *1357* (BM); S. Shetlands, 10.vi.1936, *1358* (as *B. antarcticum*) (BM); S. Shetlands, 17.i.1936, *1385* (as *B. skottsbergii*) (BM); Adelaide Island, 16.ii.1937, *1565* (as *B. austro-glareosum*) (BM); Macquarie Island, xii.1930, *B.A.N.Z.A.R.E. 996* (BM); Possession Island, 3.xi.1929, *B.A.N.Z.A.R.E. 1732* (BM); Shetland Island, 7.ii.1950, *Belm 9684a* (B); Deception Island, 2.viii.1918, *Bennett 9* (as *B. skottsbergii*) (BM); Deception Island, 1.viii.1918, *Bennett 10* (as *B. skottsbergii*) (BM); Deception Island, 1.viii.1918, *Bennett 11* (as *B. skottsbergii*) (BM); South Orkneys, i-ii.1915, *Bennett*

14 (as *B. antarcticum* var. *cavifolium*) (BM); South Orkneys, 1912-13, *Bennett 18* (as *B. antarcticum* var. *cavifolium*) (BM, G); South Scotland, 12.xii.1922, *Bennett 883* (as *B. skottsbergii*) (GL); Deception Island, 28.xii.1925, *Bennett 1411* (as *B. skottsbergii*) (GL); Deception Island, 1.vii.1926, *Bennett 1413* (as *B. skottsbergii*) (GL); Deception Island, 1918, *Bobino 446* (as *B. skottsbergii*) (GL); Isla Decepción, 1963, *Follmann 2872* (as *B. skottsbergii*) (US); South Shetlands, 16.i.1928, *Olstad 18* (as *B. skottsbergii*) (BM); Sobrel al Sur de Caho Nonjes, i.1952, *Popovici 10675* (as *B. austro-glareosum*) (U); Canal de la Belgica, 1898, *Racovitza s.n.* (as *B. antarcticum* var. *cavifolium*) (PC); Canal de Gerlache, 29.i.1898, *Racovitza 151a* (as *B. antarcticum* var. *cavifolium*) (BR, PC); Canal de la Belgica, 29.i.1898, *Racovitza 205d* (as *B. antarcticum* var. *cavifolium*) (BR, PC); Canal de la Belgica, 26.i.1898, *Racovitza 215a* (as *B. antarcticum* var. *cavifolium*) (BR, FI, H-BR, PC, S); Canal de Gerlache, 1.ii.1898, *Racovitza 230a* (as *B. antarticum*) (PC); Canal de la Belgica, 1.ii.1898, *Racovitza 232a* (as *B. antarcticum*) (BR, FI, H-BR, PC, S); Canal de Gerlache, 1.ii.1898, *Racovitza 232c* (as *B. antarcticum*) (PC); Canal de Gerlache, 1.ii.1898, *Racovitza 234c* (as *B. antarcticum*) (PC); Avian Island, 30.i.1969, *Rastorfer and Gnau PAL-129* (as *B. antarcticum*) (US); Avian Island, 30.i.1969, *Rastorfer and Gnau PAL-145* (as *B. antarcticum*) (US); Danco Coast, 15-16.i.1969, *Schuster 69-215* (as *B. antarcticum*) (US); Gerlache Strait, 18.i.1969, *Schuster, 69-341* (as *B. antarticum*) (US); Danco Coast, 23.i.1969, *Schuster 69-378* (as *B. antarcticum*) (US); Graham Coast, 4.ii.1969, *Schuster 69-511* (as *B. antarcticum*) (US); Livingston I., 28.i.1969, *Schuster 69-807* (as *B. skottsbergii*) (US); *indidem*,

28.i.1969, *Schuster 69-826* (as *B. skottsbergii*) (US); *indidem*, 28.8.1969, *Schuster 69-827* (as *B. skottsbergii* (US); Graham Coast, 4.ii.1969, *Schuster 69-889-b* (as *B. austro-glareosum*) (US); Lysted Island, 1.iii.1941, *Siple 335.2* (as *B. antarcticum*) (U); South Shetland Islands, 11.i.1902, *Skottsberg s.n.* (as *B. antarcticum*) (UPS); Graham Island, 22.xi.1902, *Skottsberg s.n.* (as *B. antarcticum*) (UPS); South Shetland Islands, 1902, *Skottsberg 469* (as *B. antarcticum*) (BA, BM, FI, FT, S); Ile Challenger, 2.xii.1902, *Skottsberg 470* (as *B. antarcticum*) (S); Ile Challenger, 2.xii.1902, *Skottsberg 471* (as *B. antarcticum* var. *cavifolium*) (S); South Shetland Islands, 19.xi.1902, *Skottsberg 473* (as *B. antarcticum*) (S); Terre Louis Philippe, 29.xi.1902, *Skottsberg 474* (as *B. antarcticum* var. *cavifolium*) (FI, S); Terre Louis Philippe, 19.xi.1902, *Skottsberg 475* (as *B. antarcticum*) (S); Graham Archipelago, xi.1903, *Skottsberg 476* (as *B. antarcticum*) (S); Paulet Island, 24.x.1902, *Skottsberg 477* (as *B. antarcticum* var. *cavifolium*) (FI, S); Paulet Island, xi.1903, *Skottsberg 478* (as *B. antarcticum* var. *cavifolium*) (S); Terre Louis Philippe, 1902, *Skottsberg 494* (as *B. antarcticum* var. *cavifolium*) (FI);

ARGENTINA: San Carlos, 19.vii.1897, *Dusén 752* (as *B. patagonicum*) (S); Santa Cruz, 17.ii.1905, *Dusén 5866* (as *B. cuspidarioides*) (FH, GB, NY, S);

CHILE: Salto Laja, i.1929, *Claude-Joseph 5924* (as *B. rutabulum*) (US); Magallanes, i.1963, *Follmann 2873* (as *B. skottsbergii*) (US); Magallanes, 1.iii.1908, *Halle & Skottsberg 826* (UPS); Fuegia Azopardo, 1.iii.1908, *Halle et Skottsberg 924* (S); Hermite Island, *Hooker s.n.* (as *B. rutabulum*) (BM); Hermite Island, *Lyell s.n.* (as *B. rutabulum*) (BM);

Magallanes, 6.iii.1929, *Roivainen 240* (as *B. rutabulum* (FH); Magallanes, 1.ii.1929, *Roivainen 302* (as *B. rutabulum*) (FH); Magallanes, 20.x.1968, *Zalensky Mahu 4808* (as *B. subpilosum*) (US).

FALKLAND ISLANDS (ISLAS MALVINAS): Falkland Islands, *Capt. Abbott* (as *B. subplicatum*) (BM); East Falklands, 5.i.1968, *Engel 2449* (as *B. subpilosum*) (NY, US); Beaver Island, 1925, *Hamilton No.1210* (as *B. subplicatum* var. *minus*) (BM, GL); Low Island, 1925, *Hamilton 1255* (as *B. subplicatum* var. *minus*) (BM, GL); 1922, *Hamilton 1873* (BM, GL); West Falkland Islands, 1909-1911, *Vallentin No.274* (as *B. albicans*) (BM).

KERGUELEN ISLAND: Kerguelen, 1913-14, *Bossiere 3b* (as *B. subplicatum*) (BM); Royal Sorim, 20.x.1874, *Eaton s.n.* (as *B. salebrosum*) (BM); Kerguelen's Land, 1839-1843, *Hooker s.n.* (as *B. rutabulum*) (BM, BR); Kerguelen's Land, 1839-1843, *Hooker s.n.* (as *Hypnum rutabulum* var. 4) (BM, BR); Kerguelen's Land, 1839-1843, *Hooker 259* (as *Hypnum rutabulum* var. 3) (BM); Kerguelen Island, *Hooker 745* (as *B. rutabulum*) (BM); *Krone s.n.* (H-BR, S); Mont Amery, 24.iii.1952, *La Rue s.n.* (US); 1875, *Naumann s.n.* (S, WU); no collector given, det. Newton, iii.1973, (H-BR); 13.xi.1902, *Worth, s.n.* (as *B. subpilosum*) (FI).

MARION ISLAND: *97* (as *B. subpilosum*) (OXF).

PATAGONIA: Punta Arenas, xii.1895, *Dusén s.n.* (as *B. georgio-glareosum*) (S); *indidem*, 26.v.1896, *Dusén 9* (as *B. georgio-glareosum*) (M, S); *indidem*, 22.xi.1895, *Dusén 27* (as *B. georgio-glarieosum*) (L, UPS); Rio Fossiles, 5.iv.1905, *Dusén 5975* (as *B. cuspidarioides*) (H-BR); Santa Cruz, 21.xii.1908, *Halle 825* (as *B. subplicatum*) (BM).

SOUTH GEORGIA: Bird Island, 12.xi.1971, *Bell 1003* (BM); Cumberland East Bay, 28.xi.1971, *Bell 1039* (NY); *indidem*, 5.xii.1971, *Bell 1046*

(BM); Right Whale Bay, 4.i.1972, *Bell 1084* (NY); Right Whale Bay, 5.i.1972, *Bell 1086* (BM); *indidem*, 5.i.1972, *Bell 1087* (B, BM); Maiviken Lake, 15.ii.1972 *Bell 1148* (B); Stromness Bay, 17.i.1957, *Bonner 247* (BM); Cumberland East Bay, 31.i.1968, *Clarke CG290* (BM); *indidem* , 5.ii.1968, *Greene CG360* (BM); Cumberland Bay, 13.xii.1960, *Greene 133* (B); Bird Island, 19.xii.1960, *Greene 400* (NY); Undine Harbour, 21.xii.1960, *Greene 467* (B); Cumberland East Bay, 1.i.1961, *Greene 599* (B, NY); *indidem*, 8.i.1961, *Greene 777* (B); Barff Peninsula, 15.i.1961, *Greene 992* (NY); *indidem*, 15.i.1961, *Greene 1018* (BM); Stromness Bay, 27.i.1961, *Greene 1410* (B); Cumberland West Bay, 1.ii.1961, *Greene 1558* (BM); Cumberland East Bay, 6.ii.1961, *Greene 1777* (BA); Cumberland East Bay, 10.ii.1961, *Greene 1788* (B); Royal Bay, 18.ii.1961, *Greene 2153* (B); Royal Bay, *Greene 2375* (BM); Holmestrand Peninsula, 11.iii.1961, *Greene 2718* (NY); South west of Kanin Point, 17.iii.1961, *Greene 3016* (B, NY); Stromness Bay, 24.iii.1961, *Greene 3359* (BM); Cumberland West Bay, 30.iii.1961, *Greene 3452* (BM); Barff Peninsula, 25.i.1964, *Longton 287* (NY); Elsehul, 21.xii.1960, *Nixon 522* (BM); Moraine Fiord, 18.iv.1909, *Skottsberg 67* (as *B.skottsbergii*) (S, UPS); Cumberland Bay, May Harbour, 2.v.1902, *Skottsberg 405* (as *B. skottsbergii*) (S, UPS); Cumberland Bay, 1902, *Skottsberg 406* (as *B. skottsbergii*) (BA, FI); Cumberland Bay, Pot Harbour, *Skottsberg 407* (as *B. skottsbergii*) (S); *indidem*, 21.v.1902, *Skottsberg 408* (as *B. georgio-glareosum*) (S).

TIERRA DEL FUEGO: 23.i.1896, *Dusén 148* (as *B. subpilosum*) (B, GB, S, UPS); Mountainous District, 1920, *Hamilton s.n.* (BM, Ref. 635, 636); *indidem*, 1920 *Hamilton s.n.* (GL, Herb. B8066); 1919, *Hamilton 523* (as *B. georgio-glareosum*) (BM, GL); Hermite Island, Cape Horn, *Hooker 164* (as

Hypnum albicans) (BM); Ushuaia, 11.iii.1902, *Skottsberg 174* (as *B. georgio-glareosum*) (FI, S); Rio Fontane, 1.iii.1908, *Halle & Skottsberg 826* (UPS); Tierra del Fuego, 23.ii.1929, *Roivainen s.n.* (as *B. subplicatum*) (S).

Brachythecium calliergonoides

BOLIVIA: Laguna verde uber Comarapa, *Herzog 4291* (FH, G, H-BR, JE, L, M, PC, S).

Brachythecium cavifolium

BOLIVIA: Hochtal von Choquecote, *Herzog 3175* (H, JE, L, M, S).

Brachythecium chocayae

BOLIVIA: Cochabamba, v.1911, *Herzog 3468* (JE); Cochabamba, v.1911, *Herzog 3616* (FH, H, JE, L, M, PC, WU).

COLOMBIA: Boyacá, 10.ix.1938, *Cuatrecasas 1342b* (as *B. prasophyllum*) (US); Boyacá, 23.x.1967, *Hammen et al. 2698* (as *B. flexiventrosum*) (FLAS); Boyacá, 23.x.1967, *Hammen et al. 2702* (as *B. flexiventrosum*) (FLAS); Cundinamarca, 6.vii.1972, *M.Cleef & Huber 4819* (FLAS); Boyacá, 2.x.1972, *M.Cleef & Florschutz 5728* (as *B. flexiventrosum*) (U).

ECUADOR: Loja, 21.ii.1988, *Panero 1080* (TENN); Guayrafrata, *Spruce s.n.* (as *B. stereopoma*) (NY); Carquaraezo, *Spruce s.n.* (as *B. salebrosum*) (NY); Andes Quito, *Spruce 1379* (BM); Andes Quito, *Spruce 1381* (BM); Loja, 23.ix.1982, *Steere & Balslev 25962* (as *B. pseudorutabulum*) (FLAS).

PERU: Cuzco, ii.1909, *Bues 596* (as *B. sericeo-virens*) (NY); Cuzco, 20.vii.1911, *Foote 42* (as *B. sericeo-virens*) (NY); La Libertad, 16.v.1973, *Hegewald 5942* (as *B. flexiventrosum*) (EPH); Apurimac, 9.v.1973, *Hegewald & Hegewald 5727* (as *B. sulfureum*) (EPH); Cusco, viii.1922, *Herrera 2c* (as *B. sericeo-virens*) (NY, US); Incay, viii.1925, *Herrera 797* (as *B. sericeo-virens*) (NY, US); Cuzco, viii.1930, *Herrera 3119d* (as *B. pseudopiliferium*) (FH); Caraz-Laguna Paron, iv.5.1988, *Panero and Galan 1401* (TENN); Cuzco, 24.xii.1949, *Vargas 8659* (as *B. rutabulum*) (BR, FH).

Brachythecium cirriphylloides

COLOMBIA: Boyacá, 1976, *Aguirre & Rangel 325* (COL); Cundinamarca, 22.vi.1965, *King et al. C-653* (as *B. flexiventrosum*) (US); Cundinamarca, 22.vii.1965, *King et al. C-976* (as *B. flexiventrosum*) (US); Cundinamarca, 22.vii.1965, *King et al. C-1002* (as *B. flexiventrosum*) (COL, US); Cundinamarca, 22.vii.1965, *King et al. C-1034* (as *B. flexiventrosum*) (US); Boyacá, 28.ii.1972, *M.Cleef 1988* (as *B. flexiventrosum*) (U); Boyacá, 4.iii.1972, *M.Cleef 2177* (as *B. flexiventrosum*) (U); Boyacá, 14.vi.1972, *M.Cleef 4502* (U); Cundinamarca, 25.viii.1972, *M.Cleef 5270* (as *B. alboflavens*) (U); Boyacá, 12.xii.1972, *M.Cleef 7110* (as *B. flexiventrosum*) (U); Boyacá, 7.vi.1976, *Rangel and Aguirre 317* (as *B. alboflavens*) (COL, FLAS).

GUATEMALA: Quezaltenango, 21.i.1945, *Sharp 1993* (as *B. flexiventrosum*) (FH, TENN, US); Sacatepequez, 11.ii.1939, *Standley 65190* (as *B. flexiventrosum*) (F).

MEXICO: Michoacan, 29.xii.1911, *Arsène 7537* (as *B. alboflavens*) (FH, US); Mexico, 23.x.1966, *Hermann 20802* (as *B. flexiventrosum*) (MICH, TENN, US); Mexico, 31.vii.1975, *Le Doux et al. 2052* (as *B. salebrosum*) (TENN); Veracruz, 27.viii.1970, *Norris and Taranto 16849* (as *B. flexiventrosum*) (TENN).

VENEZUELA: Merida, vii-viii.1972, *Griffin et al. 1965* (as *B. occidentale*) (FLAS); Merida, 4-5.vii.1984, *Griffin & Griffin PV-326* (FLAS).

Brachythecium collinum

MEXICO: Baja California Norte, 23.vi.1974, *Sharp et al. 5679* (TENN); Baja California Norte, 23.vi.1974, *Sharp et al. 5692* (TENN); Baja California Norte, 23.vi.1974, *Sharp et al. 5693b* (TENN); Baja California Norte, 23.vi.1974, *Sharp et al. 5698b* (TENN); Baja California Norte, 23.vi.1974, *Sharp et al. 6059a* (TENN).

PATAGONIA: Santa Cruz, 21.xii.1908, *Halle 829* (as *B. arenarium*) (PC, S, UPS); Lago San Martin, 18.i.1909, *Skottsberg 438* (as *B. arenarium*) (S).

Brachythecium conostomum

ARGENTINA: Tucuman, 1872, *Lorentz s.n.* (as *B. tenuiprostratum*) (HBR, NY, S).

BOLIVIA: Cochabamba, vi.1889, *Germain s.n.* (as *B. grandirete*) (PC); Cochabamba, vi.1889, *Germain 1154* (as *B. grandirete*) (FI, G, H, NY); Cochabamba, vi.1889, *Germain 1157* (as *B. grandirete*) (FI, G, H, NY, S); Andes, 1910, *Herzog s.n.* (as *B. grandirete*) (FH); Malaga,

vi.1911, *Herzog 4383* (as *B. grandirete*) (FH); Malaga, vi.1911, *Herzog 4395* (as *B. stereopoma*) (JE, L, M, S, WU); Incacorral, vi.1911, *Herzog 4994* (as *B. grandirete*) (BM, NY); Incacorral, vi.1911, *Herzog 5101* (as *B. grandirete*) (L, M, S, WU); Bridges, *Hooker s.n.* (NY).

CHILE: Ceme Spencer, xii.1871, *Ball s.n.* (NY); Lake Llanquihue, 28.vi.1897, *Dusén 763* (as *B. parvulum*) (BM, FI, M, NY, S, WU); Panguipulli, 26.viii.1920, *Hollermayer 276b* (BM, COL, NY); Malleco, 10.v.1970, *Landrum 363* (MO); Malleco, 10.v.1970, *Landrum 417* (as *B. turgens*) (MO); Malleco, 5.x.1970, *Landrum B-37118* (as *B. turgens*) (US); Malleco, 5.x.1970, *Landrum B-37172* (as *B. turgens*) (US); Cautin, 2.xii.1977, *Mahn 11563* (as *B. turgens*) (US); Cautin, 23.i.1937, *Montero 3127* (US); Chiloe, 16.ii.1968, *Montero 8135* (as *B. turgens*) (US); Calbuco, 29.viii.1937, *Schwabe 195* (as *B. subplicatum*) (JE).

COLOMBIA: Boyacá, 22.viii.1957, *Grubb & Guymer 340d* (BM); Norte de Santander, 23.ii.1927, *Killip & Smith 19749* (NY, US).

COSTA RICA: Cartago, 6,7.vii.1941, *Svihla 2745* (as *Blaxireticulatum*) (FH); San Jose, 7.iv.1929, *Valerio 301* (as *B. laxireticulatium*) (FH, US).

ECUADOR: Pichincha, 28.iii.1951, *Bell 37* (BM); Pichincha, 28.iii.1951, *Bell 40a* (BM); Pichincha, 28.iii.1951, *Bell 65* (BM, FH); Pichincha, 1848, *Jameson s.n.* (BM, FH); Andes Quitenses, 1848, *Jameson 74/58* (BM); Quito, *Jameson 267* (as *Hypnum Taylori*) (OXF); Quito, *Jameson 1118* (FH); Pichincha, 1955, *Naundorff s.n.* (as *B. flexiventrosum*) (JE); Pichincha, *Naundorff 4* (as *B. flexiventrosum*) (FH); Pichincha, *Spruce 236* (NY); Quito, *Spruce 1389* (BM); Pichincha, *Spruce 1390* (BM).

GUATEMALA: 1881, *171* (as *B. crocatum*) (BM); 1881, *180* (as *B. crocatum*) (BM); Solala, 6.ii.1975, *Hermann 26338* (as *B. stereopoma*) (TENN); Quezaltenango, 28.i.1945, *Sharp 2328* (as *B. stereopoma*) (FH, TENN, US); Huehuetenango, 4.i.1946, *Sharp 4971* (as *B. stereopoma*) (F, FH, MICH, TENN); Huehuetenango, 4.i.1946, *Sharp 4972a* (as *B. flexiventrosum*) (TENN); Quezaltenango, 8.i.1946, *Sharp 5030* (as *B. flexiventrosum*) (TENN); Sacatepequez, 10.xii.1938, *Standley 59486* (as *B. flexiventrosum*) (F, FH, MICH).

MEXICO: Mexico, 21.i.1926, *Amable 1412* (as *B. lacireticulatum*) (FH, NY, US); Puebla, 5.ix.1907, *Arsène 4696* (as *B. cladoneuron*) (BM, FH, MO, NY, US); Michoacan, 17.viii.1911, *Arsène 4896* (as *B. plumosum*) (US); Puebla, 5.ix.1907, *Arsène 4969* (as *B. cladoneuron*) (FH); Chiapas, vi.1962, *Arzeni 122b* (as *B. cladoneuron*) (TENN); Valle de Mexico, *Bourgeau 1345* (as *B. laxireticulum*) (FH, PC); Jalisco, vii.1949, *Crum 883* (as *B. laxireticulatum*) (CANM, MICH, TENN, US); Jalisco, 22.vii.1981, *De Luna 80* (TENN, XAL); Guerrero, 1.xii.1963, *Dieterle 3196* (MICH); Mexico, 25.viii.1975, *Dull 2/321* (as *B. flexiventrosum*) (MICH); Mexico, 1868, *Hahn s.n.* (as *B. cladoneuron*) (BM, NY, PC); Mexico, 1875, *Hahn s.n.* (as *B. cladoneuron*) (FI); Mexico, 26.x.1966, *Hermann & Crum 20868* (as *B. laxireticulatum*) (US); Mexico, 26.viii.1966, *Hermann & Crum 20880* (Hermann Herbarium); Michoacan, 15.xii.1965, *Iwatsuki & Sharp 2913a* (as *B. cladoneuron*) (TENN); Michoacan, 15.xii.1965, *Iwatsuki & Sharp 2925* (as *B. cladoneuron*) (TENN); Michoacan, 15.xii.1965, *Iwatsuki & Sharp 2968* (as *B. cladoneuron*) (TENN); Oaxaca, 24.xii.1965, *Iwatsuki & Sharp 5212* (as *B. cladoneuron*) (TENN); Oaxaca, 24.xii.1965, *Iwatsuki & Sharp 5212a* (as *B. cladoneuron*) (TENN); Oaxaca, 24.xii.1965, *Iwatsuki*

& Sharp 5287b (as *B. laxireticulatum*) (TENN); Hidalgo, v.1925, *Orcutt 6777* (as *B. laxireticulatum*) (FH); Mexico, *Ruiz & Pavon s.n.* (NY); Guerrero, 27.x.1944, *Sharp 1150* (as *B. alboflavens*) (TENN); Puebla, 15.xi.1944, *Sharp 1207* (as *B. stereopoma*) (US); District Federal, 11.xii.1944, *Sharp 1712* (as *B. cladoneuron*) (CANM, NY, TENN, US); Chiapas, 19.iv.1945, *Sharp 3342* (as *B. laxireticulatum*) (CANM, MICH, TENN); Mexico, 17.vi.1973, *Sharp et al. 53a* (as *B. cladoneuron*) (TENN); Mexico, 17.vi.1973, *Sharp et al. 1725* (as *B. cladoneuron*) (TENN); Hidalgo, 18.vi.1973, *Sharp et al. 1807b* (as *B. cladoneuron*) (TENN); Michoacan, 28.vi.1966, *Sharp et al. 2179* (as *B. cladoneuron*) (TENN); Michaocan, 28.vi.1966, *Sharp et al. 2180* (as *B. cladoneuron*) (TENN); Michoacan, 29.vi.1966, *Sharp et al. 2328c* (as *B. cladoneuron*) (TENN); Oaxaca, 24.vi.1973, *Sharp et al. 2384b* (as *B. cladoneuron*) (TENN); Oaxaca, 24.vi.1973, *Sharp et al. 2520* (as *B. cladoneuron*) (TENN); Oaxaca, 24.vi.1973,*Sharp et al. 2574a* (as *B. cladoneuron*) (TENN); Oaxaca, 24.vi.1973, *Sharp et al. 2879a* (as *B. cladoneuron*) (TENN); Oaxaca, 27.vi.1973, *Sharp et al. 2926a* (as *B. cladoneuron*) (TENN); Oaxaca, 27.vi.1973, *Sharp et al. 3100a* (as *B. cladoneuron*) (TENN); Chiapas, 19.xii.1972, *Sharp et al. 4295* (as *B. cladoneuron*) (TENN).

VENEZUELA: Merida, vii-viii.1972, *Griffin 1185* (FLAS).

Brachythecium fendleri

MEXICO: Durango, 30.xii.1973, *Bowers et al. 5076b* (TENN); Durango, 30.xii.1973, *Bowers et al. 5083b* (TENN); Durango, 30.xii.1973, *Bowers et al. 5288b* (as *B. corbieri*) (TENN); Chihuahua, 31.xii.1973, *Bowers et al.*

5423c (TENN); Chihuahua, 31.xii.1973, *Bowers et al. 5427a* (TENN); Chihuahua, 21.viii.1938, *White 1005* (as *B. collinum*) (MICH).

Brachythecium filirepens

CHILE: Magallanes, 9.xii.1928, *Roivainen 96* (as *B. longidecurrens*) (CANM, F); Magallanes, 3.iii.1929, *Roivainen 480* (as *B. longidecurrens*) (FH); Valdivia, 9.xii.1928, *Roivainen 2018* (as *B. longidecurrens*) (FH, H, S); Magallanes, 9.xii.1928, *Roivainen 2025* (as *B. longidecurrens*) (FH, H); Fuegia occidentalis, 22.ii.1929, (as *Roivainen 2063 B. longidecurrens*) (H, S).

PATAGONIA: Rio Aysen, 1897, *Dusén s.n.* (PC); Rio Aysen, 17.ii.1897, *Dusén s.n.* (S); Rio Aysen, 16.ii.1897, *Dusén A4* (M, NY); Rio Aysen, i.1897, *Dusén A5* (BM, FI, H, M, NY, S); Rio Aysen, 15.i.1897, *Dusén 421* (H-BR, M, NY, S); Rio Aysen, 16.ii.1897, *Dusén 567* (BM, FI, M, PC, S, WU).

Brachythecium frigidum

MEXICO: Near Pueblo, 21.iii.1907, *Arsène s.n.* (S); Federal District, 1.iv.1938, *Balls 4110* (as *B. asperrimum*) (FH, US); Mexico, 13.iv.1938, *Balls 4208* (as *B. asperrimum*) (FH, US); Veracruz, 27.v.1938, *Balls 4634* (as *B. asperrimum*) (CANM, FH, US); Veracruz, 13.x.1981, *De Luna 331* (TENN); Veracruz, 24.ii.1984, *De Luna 898* (TENN); Mexico, 19.ii.1979, *Eggers & Frahm 792738* (as *B. rutabulum*) (FLAS); Michoacan, 24.vii.1940, *Leavenworth 47a* (as *B. hastifolium*) (FH); Ixtaccihuatl, i.1909, *Purpus 3722* (CANM, F, FH, MO, NY, PC, US); *Purpus 3752* (as *B. oxycladon* (TENN); *Purpus 3752* (as *B. salebrosum* (F, FH, MO, NY, US);

Federal District, 28.iii.1965, *Rzedowski 19457* (MICH, US); Federal District, 28.iii.1965, *Rzedowski 19471* (MO, US); Federal District, 28.iii.1965, *Rzedowski 19471a* (TENN); Federal District, 23.vii.1944, *Sharp 152* (MICH, TENN, US); Puebla, 21.x.1945, *Sharp 4272* (MICH, TENN).

Brachythecium guatemalense

GUATEMALA: Quezaltenango, 21.i.1945, *Sharp 1993* (as *B. flexiventrosum*) (FH); Chimaltenango, 3.i.1939, *Standley 61854* (as *B. flexiventrosum*) (F, FH); Chimaltenango, 3.i.1939, *Standley 61908* (as *B. flexiventrosum*) (F, FH); Chimaltenango, 3.i.1939, *Standley 61913* (as *B. rutabulum*) (F); Sacatepequez, 11.ii.1939, *Standley 65190* (as *B. flexiventrosum*) (FH); Sacatepequez, 11,ii.1939, *Standley 65194* (as *B. rutabulum*) (FH); Quezaltenango, 6.iii.1939, *Standley 67672* (as *B. rutabulum*) (F); Quezaltenango, 6.iii.1939, *Standley 67674* (as *B. rutabulum*) (F, FH); Quezaltenango, 13.i.1940, *Steyermark 34075* (as *B. flexiventrosum*) (F, FH, MICH); Huehuetenango, 4.viii.1942, *Steyermark 50047* (as *B. alboflavens*) (F, FH, MICH).

Brachythecium majusculum

ANTARCTICA: Bryophyta Antarctica Exsiccata, *Ochrya 72, 97, 145, 174* (as *B. subpilosum*) (TENN).

CHILE: Magallanes, 8.iii.1929, *Roivainen 810* (as *B. georgico-glareosum*) (FH); Magallanes, 21.ii.1929, *Roivainen 1483* (as *B. subplicatum*) (FH); Magallanes, 1.iii.1929, *Roivainen 1793* (FH); Magallanes, 22.ii.1929, *Roivainen 2071* (as *B. subplicatum*) (FH); Magallanes, 24.ii.1929, *Roivainen 2190* (FH).

SOUTH GEORGIA: Right Whale Bay, 5.i.1972, *Bell 678* (as *B. glaciale*) (NY); Rosita Harbour, 13.xi.1971, *Bell 1013a* (S); Right Whale Bay, 4.i.1972, *Bell 1083a* (B, S); Right Whale Bay, 5.i.1972, *Bell 1088* (NY, S); Right Whale Bay, 6.i.1972, *Bell 1091* (S); Right Whale Bay, 8.1.1972, *Bell 1103* (B, S); Right Whale Bay, 8.i.1972, *Bell 1105* (S); Mt. Krokisius, 15.i.1972, *Bell 1112* (BM); Cape Charlotte, 16.xii.1971, *Bell 1400* (S); East of Hamilton Bay, 29.xii.1971, *Bell 1404* (B, S); Right Whale Bay, 21.xi.1967, *Clarke & Greene CG19* (BM); Sealeopard Fjord, 22.xi.1967, *Clarke & Greene CG47* (S); Bird Island, 2.iv.1970, *Edwards B.A.S. Misc. 66* (BM); Bird Island, 15.xii.1960, *Greene 266* (H, NY, S); Bird Island, 19.xii.1960, *Greene 400* (as *B. austro-salebrosum*) (NY); Bay of Isles, 2.i.1961, *Greene 615* (S); *indidem*, 2.i.1961, *Greene 623* (B, BM, NY, S); Right Whale Bay, 2.i.1961, *Greene 672* (S); Hope Valley, 3.i.1961, *Greene 735* (as *B. glaciale*) (NY); Bay of Isles, 23.i.1961, *Greene 1243* (as *B. glaciale*) (NY); Bay of Isles, 23.i.1961, *Greene 1261* (S); Bay of Isles, 22.i.1961, *Greene 1335* (as *B. glaciale*) (NY); Prince Olav Harbour, 2.ii.1961, *Greene 1660a* (BM); Prince Olav Harbor, 2.ii.1961, *Greene 1678a* (as *B. glaciale*) (BA); Prince Olav Harbour, 2.ii.1961, *Greene 1720* (B, S); Cumberland East Bay, 10.ii.1961, *Greene 1848* (as *B. glaciale*) (NY); Royal Bay, 22.ii.1961, *Greene 2374* (as *B. glaciale*) (NY); Undine South, 10.iii.1961, *Greene 2557a* (B, BM); Esmark Glacier, 11.iii.1961, *Greene 2688a* (S); Stromness Bay, 18.iii.1961, *Greene 3074*) (NY); Johan Harbour, 23.i.1961, *Jones 1086* (BM); Antarctic Bay, 5.iv.1970, *Smith 1707* (BM); Sorn and Bernt Islands, 4.iv.1970, *Smith 1708* (S); Queen Maude Bay, 29.xii.1970, *Smith 1709* (S);

Shallop Cove, 30.xii.1970, *Smith 1715* (NY); 1933, *Troin 71* (as *B. skottsbergii*) (BM).

TIERRA DEL FUEGO: Rio Azopardo, 28.ii.1896, *Dusén s.n.* (GB, NY); *indidem*, 29.ii.1896, *Dusén 189* (as *B. subpilosum*) (FI, NY, S, UPS, WU); *indidem*, 28.ii.1896, *Dusén 269* (S); *indidem*, 6.iii.1896, *Dusén 269* (S, UPS, WU); Hermite Island, 1883, *Hariot s.n.* (as *B. fuegianum*) (NY, PC, S); Hermite Island, 1889, *Hariot s.n.* (as *B. longidens*) (NY); Cameas *Hooker 33* (as *B. subplicatum*) (BM); Hermite Island, 1839-1843, *Hooker 170* (BM); Fuegia media, 20.xii.1928, *Roivainen s.n.* (as *B. subpilosum*) (S); Fuegia occidentalis, 22.ii.1929, *Roivainen s.n.* (as *B. subplicatum*) (S); Magallanes, 5.i.1929, *Roivainen 680* (as *B. subpilosum*) (FH); Magallanes, 20.xii.1928, *Roivainen 1872* (with *B. subpilosum*) (FH); Fuegia occidentalis, 22.ii.1919, *Roivainen 2071* (as *B. subplicatum*) (FH, S); Ushuaia, 6.iii.1902, *Skottsberg 171* (as *B. macrogynum*) (S, UPS).

Brachythecium microcollinum

CHILE: Ñuble, 20.iv.1929, *Roivainen 954* (FH); Ñuble, 20.iv.1929, *Roivainen 955* (FH, H, S).

Brachythecium occidentale

BOLIVIA: La Fabulosa, 27.iv.1950, *Brooke 6341* (as *B. stereopoma*) (FH); Ayopaja, xi.1935, *Gardens 3227* (as *Rhynchostegium scarlosium*) (NY); Cochabamba, vi.1889, *Germain 1158* (as *B. flaccum* var. *nanium*) (FI); Cochabamba, vi.1889, *Germain 1160* (as *B. flaccum*) (FI, G, JE, M, NY, PC, S); Chocayatal, v.1911, *Herzog 3605* (as *B. flaccum*) (H, JE, L, M).

COLOMBIA: Nova Granada Tequendama, 186?, *sine collector* (as *B. prasophyllum*) (L); Cundinamarca, 6.x.1938, *Cuatrecasas 286-B* (as *B. prasophyllum*) (US); Boyacá, 10.ix.1938, *Cuatrecasas 1342b* (as *B. prasophyllum*) (US); Boyacá, 28.vii.1967, *Hammer et al. 2694* (as *B. corbierei*) (EPH); Cundinamarca, 21.vi.1965, *King & Guevara C-632* (as *B. prasophyllum*) (COL, US); Cundinamarca, 22.vii.1965, *King & Guevara C-954* (as *B. prasophyllum*) (US); Cundinamarca, 22.vii.1965, *King & Guevara C-955* (COL, US); Cundinamarca, 8.vii.1965, *King et al. C-802* (US); Tequendama, *Lindig s.n.* (BM); Caldas, 18.iii.1972, *M.Cleef 2457* (U); Cundinamarca, 9.xi.1972, *M.Cleef 6136* (U); Cundinamarca, 15.xi.1972, *M.Cleef 6401* (U); Boyacá, 9.xii.1972, *M.Cleef 6897* (as *B. flexiventrosum*) (U); Villavicencio, xi.1950, *Schultes 11060* (FLAS).

- **COSTA RICA:** Vulcan Irazu, 17.vi.1962, *Berkeley 62-67* (as *B. delicatum*) (US); Volcan Irazu, 26.vi.1949, *Holm & Iltis 1192* (as *B. flexiventrosum*) (G); Volcan Irazu, 26.vi.1949, *Holm & Iltis 1200* (as *B. flexiventrosum*) (G); Volcan Irazu, 7.iv.1929, *Valerio 296* (as *B. costaricense*) (FH, US).

ECUADOR: Pichincha, 29.iii.1951, *Bell 111* (as *B. laetum*) (FH); Pichincha, *Naumdorffe s.n.* (as *B. flexiventrosum*) (FH); Chimbarago, *Spruce 1375* (BM).

GUATEMALA: San Marcos, 24.ii.1946, *Sharp 5450* (as *B. flexiventrosum*) (CANM, F, TENN); Quezaltenango, 13.vi.1940, *Steyermark s.n.* (as *B. flexiventrosum*) (FH); Quezaltenango, 13.i.1940, *Steyermark 34082* (as *B. flexiventrosum*) (F, FH, MICH); Quezaltenango, 12.i.1940, *Steyermark 34094* (as *B. flexiventrosum*) (F, FH); Quezaltenango, 13.i.1940, *Steyermark 34139* (as *B. flexiventrosum*) (F, FH, MICH);

Quezaltenango, 13.i.1940, *Steyermark 34140* (as *B. flexiventrosum*) (F, FH); Quezaltenango, 13.i.1940, *Steyermark 34141* (as *B. flexiventrosum*) (F, FH, US); San Marcos, 19.ii.1940, *Steyermark 36087* (as *B. flexiventrosum*) (F, FH); San Marcos, 19.ii.1940, *Steyermark 36098* (as *B. flexiventrosum*) (F, FH).

MEXICO: Vallee de Mexico, 29.iii.1924, *Amable 1222* (as *B. corbierei*) (NY); Vallee de Mexico, 13.iv.1925, *Amable 1298* (as *Rhynchostegium saint-pierrei*) (NY, US); Vallee de Mexico, 24.i.1926, *Amable 1441* (as *B. corbierei*) (FH, US); Michoacan, 20.iii.1910, *Arsené 4530* (as *B. alboflavens*) (BM, C, F, FH, MO, NY, S, US, WU); Puebla, 18.xi.1907, *Arsène 4674* (as *B. alboviride*) (FH, US); Near Mexico City, 10.viii.1947, *Barkley et al. 578* (as *B. flexiventrosum*) (MICH); West of Durango, 30.xii.1973, *Bowers et al. 5288b* (as *B. corbierei*) (TENN); Chihuahua, 31.xii.1973, *Bowers et al. 5432a* (as *B. saint-pierrei*) (TENN); Mexico, 20.xii.1973, *Bowers et al. 6255-c* (as *B. corbierei*) (TENN); Mexico, 20.xii.1973, *Bowers et al. 6279-b* (as *B. corbierei*) (TENN); Hidalgo, 1.ix.1974, *Conrad & Conrad 3309* (as *B. corbierei*) (TENN); Jalisco, 22.vii.t1981, *De Luna 43* (as *B. corbierei*) (TENN); Veracruz, 29.ix.1981, *De Luna 235* (as *B. corbierei*) (TENN); Jalisco, 20.xi.1981, *De Luna 478a* (as *B. oxycladon*) (TENN, XAL); Jalisco, 21.xi.1981, *De Luna 540* (as *B. corbierei*) (TENN, XAL); Puebla, 26.iv.1982, *De Luna 674* (TENN); Veracruz, 7.ix.1966, *Dull 70* (MICH); Mexico, 25.viii.1975, *Dull 2/321* (as *B. flexiventrosum*) (MICH); Morelos, 3.ii.1932, *Fröderström & Hulken s.n.* (MICH); Hidalgo, 28.viii.1966, *Garcia 10* (as *B. corbierei*) (US); Mexico, 10.iii.1960, *Hale & Soderstrom 19264* (as *B. plumosum*) (CANM, US); Veracruz, *Hale & Soderstrom 19357* (as

B. delicatum) (US); Mexico, 23.x.1969, *Hermann 20834* (Hermann, Herb.) (US); Hidalgo, 30.i.1975, *Hermann 26095b* (as *B. corbierei*) (TENN); Oaxaca, 22.xii.1965, *Iwatsuki & Sharp 3097* (as *B. corbierei*) (TENN); Oaxaca, 22.xii.1965, *Iwatsuki & Sharp 5158* (as *B. corbierei*) (TENN); *Liebmann 8069* (as *B. liebmanni*) (C); Mexico, 13.vii.1962, *Madrigal 1400* (as *Chamberlainia corbierei*) (US); Mexico, 18.vii.1962, *Madrigal 1405* (as *Chamberlainia corbierei*) (US); Tlaxcala, 25.vii.1962, *Madrigal 1412* (as *Chamberlainia corbierei*) (US); Hidalgo, 9.xi.1962, *Madrigal 1419* (as *Chamberlainia corbierei*) (US); Mexico, 22.iii.1962, *Madrigal 1444* (as *Chamberlainia corbierei*) (US); Volcano Popocatepetl, 27.viii.1973, *M.Cleef & Delgadillo 10256* (as *Rhynchostegium saint-pierrei*) (MO); Mexico, *Mohr s.n.* (as *B. flexiventrosum*) (PC); Nuevo Leon, xi.1970, *Norris 17597* (as *B. corbierei*) (TENN); Nuevo Leon, xi.1970, *Norris 17599* (as *B. corbierei*) (TENN); Nuevo Leon, xi.1970, *Norris 17602* (as *B. corbierei*) (TENN); Nuevo Leon, xi.1970, *Norris 17651* (as *B. corbierei*) (TENN); Federal District, 24.viii.1910, *Orcutt 3785* (as *B. lanceolifolium*) (FH); Hidalgo, v.1925, *Orcutt 6646* (as *B. flexinerve*) (FH); Hidalgo, v.1925, *Orcutt 6834* (as *B. corbierei*) (FH); Hidalgo, v.1925, *Orcutt 6835* (as *B. corbierei*) (FH); Hidalgo, 22.xi.1908, *Pringle 10620* (as *B. flexinerve*) (TENN); Mexico, 21.vi.1964, *Russi B-3* (as *B. corbierei*) (US); Federal District, 28.iii.1965, *Rzedowski 19462* (as *B. corbierei*) (US); Mexico, 4.vii.1943, *Santos 2211* (as *B. flexiventrosum*)(MICH, NY, TENN); Mexico, 4.vii.1943, *Santos 2212* (as *B. corbierei*)(MICH); Mexico, 4.vii.1944, *Sharp 73* (as *B. corbierei*) (MICH, TENN, US); Mexico, 30.vii.1944, *Sharp 209* (as *B. corbierei*) (MICH, TENN, US); Mexico, 6.viii.1944, *Sharp 297* (as *B. trochalobasis*) (US); Mexico,

8.viii.1944, *Sharp 330* (as *B. petrophilum*) (CANM, MICH, TENN); Tlaxcala, 21.viii.1924, *Sharp 447* (as *B. corbierei*) (MICH, TENN, US); Tlaxcala, 21.viii.1924, *Sharp 449* (as *B. corbierei*) (MICH, NY, TENN, UBC, US); Puebla, 25.ix.1944, *Sharp 764* (as *B. salebrosum*) (CANM, MICH, TENN); Hidalgo, 1.x.1944, *Sharp 817a* (as *B. stereopoma*) (MICH); Hidalgo, 1.x.1944, *Sharp 817b* (as *B. corbierei*) (TENN); Hidalgo, *Sharp 825* (as *B. corbierei*) (MICH, TENN, US); District Federal, 17.xii.1944, *Sharp 1690* (as *B. salebrosum*) (CANM, MICH, MO, NY, TENN, US); District Federal, 17.xii.1944, *Sharp 1699-b-b* (as *B. corbierei*) (TENN); Mexico, 2.xii.1945, *Sharp 4756a* (as *B. salebrosum*) (MICH); Puebla, 2.xii.1945, *Sharp 4756b* (as *B. salebrosum*) (TENN); Veracruz, 18.viii.1978, *Sharp 8966* (as *B. tenuinerve*) (TENN); Mexico, 17.vi.1973, *Sharp et al. 25* (as *B. corbierei*) (TENN); Mexico, 17.vi.1973, *Sharp et al. 26* (as *B. salebrosum*) (TENN); Hidalgo, 18.vi.1973, *Sharp et al. 75b* (as *B. corbierei*) (TENN); Hidalgo, 18.vi.1973, *Sharp et al. 89* (as *B. corbierei*) (TENN); Hidalgo, 18.vi.1973 *Sharp et al. 92* (as *B. corbierei*) (TENN); Mexico, 17.vi.1973, *Sharp et al. 1242* (as *B. stereopoma*) (TENN); Mexico, 17.vi.1973, *Sharp et al. 1249* (as *B. corbierei*) (TENN); Mexico, 16.vi.1973, *Sharp et al. 1605* (as *B. corbierei*) (TENN); Mexico, 16.vi.1973, *Sharp et al. 1609* (as *B. corbierei*) (TENN); Mexico, 16.vi.1973, *Sharp et al. 1614* (as *B. corbierei*) (TENN); Mexico, 17.vi.1973, *Sharp et al 1772-b* (as *B. corbierei*) (TENN).

PERU: La Libertad, 16.v.1973, *Hegewald 5919* (as *B. corbierei*) (EPH); Near Laguna Llanganuco, 17.x.1973, *Hegewald & Hegewald 7517* (as *B. stereopoma*) (EPH).

VENEZUELA: Merida, vii-viii.1972, *Griffin 863* (FLAS); Merida, 4-5.vii.1984, *Griffin & Griffin PV-336* (FLAS).

Brachythecium oxycladon

MEXICO: Tamaulipas, 1930, *Bartlett 10445* (as *B. hastifolium*) (FH, MICH, US); Nuevo Leon, 28.i.1975, *Hermann 26086b* (TENN); Nuevo Leon, 28.i.1975, *Hermann 26087b* (TENN).

Brachythecium paradoxum

ARGENTINA: Hito XIX, 6.ii.1942, *Castellanos 5429* (NY); Lago Nahuel Huapi, vii.1897, *Dusén s.n.* (FH, HBG, UPS); Lago Nahuel Huapi, 12.vii.1897, *Dusén 760* (B, GB); Buenos Aires, 2.ii.1908, *Halle & Skottsberg 926* (BA); Chubut Esquel, 28.xi.1940, *Kuhnemann 5313* (S, U); Neuquen, P.N.N. Huapi, I. Victoria, 28.1.1957, *Hassel de Menendez 259* (S); Lago Escondido, 30.xi.1969, *Roivainen 597* (B, BA, CANM, MICH, MO, NY, S, UBC); Neuquen, Peninsula Quetrohue, 24.xi.1954, *Yacubson 10735* (S); Rio Negro, 25.xi.1954, *Yacubson 10770* (BA, FLAS, MICH, MO).

AUSTRALIA: Sydney, *Collie s.n.* (NY); Tumberumba, New South Wales, xi.1900, *Forsyth s.n.* (S); Kiandra, New South Wales, xii.1901, *Forsyth s.n.* (S); Gipp's Land, Victoria, 1855, *Müller 158* (NY); Mt. Cook, South Island, 29.i.1934, *Sainsbury s.n.* (S).

CHILE: Cordillera de la Costa, 5.xi.1896, *Dusén 351* (GB, JE, NY, S); *indidem*, 5.iv.1896, *Dusén 353* (MICH); Malleco, 10.v.1970, *Landrum 393* (MO). Parque Naciaonal de Nahuelbuta, 15.iii.1971, *Mahn 5793* (US); Villa Fortales de Sauquiniay, 30.i.1970, *Montero 8316* (US); Magallanes, Fuegia Media, Lago Linch, 19.xii.1928, *Roivainen s.n.* (FH); Ñuble,

Recinto, 14.iv.1929, *Roivainen s.n.* (CANM); Magallanes, Fuegia Media Lago Fagnano, 19.i.1929, *Roivainen 116* (FH); Magallanes, Fuegia occ., Puerto Artoro, 6.iii.1929, *Roivainen 906* (FH); Nuble, Recinto, 14.iv.1929, *Roivainen 1605* (FH); Vulkan Lonquimay, 30.xii.1965, *Ruthsatz s.n.* (GOET); Punta Arenas, 1905-06, *Thaxter 136* (FH, M, MICH, US).

CROZET ISLAND: Possession Island, 3.xi.1929, *B.A.N.Z.A.R.E. 582* (BM).

KERGUELEN ISLANDS: 1913, *Bossiere s.n.* (BM, NY); 1913, *Bossiere 21* (BM); 1913, *Bossiere 28* (BM); *Eaton s.n.* (BM); Near Vulcan Bend, 6.i.1875, *Eaton s.n.* (BM); 1874, *Kidder s.n.* (as *B. frigidum*) (US); xii.1874, *Naumann s.n.* (BM).

MARION ISLAND: Poaetum cookii ass., 31.i.1966, *Hunsley 293a* (BM); *indidem*, 6.xi.1965, *Hunsley 866* (NY).

NEW ZEALAND: Queenstown, 1890, *Bell s.n.* (S); Pine Hill, vi.1893, *Bell s.n.* (FI, NY); Southland, Heathcote River, vii.1896, *Bell s.n.* (FH); *indidem*, viii.1896, *Bell s.n.* (JE); Castle Hill, 1874, *Berggren s.n.* (BM); *indidem*, 1874, *Berggren B581* (FH); Palmer River, ii.1894, *Brownter s.n.* (BM); South Island, *Brownter 149* (BM); Otago, *Huton s.n.* (NY); *Knight s.n.* (NY); Near Lake Wallatigu, 1906, *Mecklejolsen 45* (BM, GL); 1908, *Mecklejolsen 85* (GL); Tasman Glacier, 20.i.1934, *Sainsbury s.n.* (S).

PATAGONIA: Punta Arenas, 22.xi.1895, *Dusén s.n.* (GB, L, NY, S, US); 1896, *Dusén s.n.* (WU); Valle Fluminis Aysen, ii.1897, *Dusén s.n.* (FH); Valle Fluminis Aysen, 23.ii.1897, *Dusén s.n.* (GB, L); Lago Nahuel Huapi, 12.vii.1897, *Dusén s.n.* (M); Punta Arenas, 22.xi.1895, *Dusén 36* (FI, GB, UPS); Punta Arenas, 22.xi.1895, *Dusén 46* (UPS); Valle Fluminis

Aysen, 23.ii.1897, *Dusén 592* (US); *indidem*, ii.1897, *Dusén 595* (BM, M, NY, WU); *indidem*, ii.1897, *Dusén 597* (FH, FI, GB, JE, NY, S, UPS); Puerto Moreno, 12.vii.1897, *Dusén 723* (M); Lago San Martin, 7.iii.1905, *Dusén 6046* (B, GB, NY); Lago Nahuelhuapi, 12.vii.1897, *Dusén 34419* (M); Chabrut, Vallis Frio, 8-9.xi.1908, *Halle s.n.* (S); Chubut, 8-9.xi.1908, *Halle 924* (UPS); Valle, 5.xi.1908, *Halle 927* (UPS); Canal Gajardo, 27.iv.1908, *Halle & Skottsberg 821* (BM); *indidem*, 27.iv.1908, *Halle & Skottsberg 831* (S); Buenos Aires, 1910, *Hamilton s.n.* (BM); *indidem*, 1910, *Hamilton 472* (BM, GL); Cordilleras, 1896-97, *Hatcher s.n.* (FH, NY); 1896-97, *Hatcher 14* (FH, NY); Cordilleras, 22.ii.1897, *Hatcher 76* (NY); Nahuel Huapi, v.-vii.1933, *Llao 1318* (S); Pto. Puyuhuapi, 1939, *Schwabe 1* (JE); S. Martin, 22.i.1909, *Skottsberg s.n.* (UPS); Canal Gujardo, 27.iv.1908, *Skottsberg 831* (UPS); Chubut, 10.vi.1908, *Skottsberg 923* (UPS); Punta Arenas, *Wawra 3176* (WU); *indidem*, *Wawra 3179* (WU).

TASMANIA: *Archer s.n.* (NY); 8.viii., *Archer s.n.* (NY); Aron Rd., vii.1885, *Bastow 49* (OXF); McRobies' Gully, 7.i.1888, *Weymouth s.n.* (NY); Old Beach, *Weymouth 259* (FI, S); Port Arthur, 14.iii.1891, *Weymouth 760* (FI); Darwent Valley, *Weymouth 1264* (GL); Near Robart, 10.iii.1893, *Weymouth 1482* (FI, HBG); McRobies' Gully, 20.viii.1892, *Weymouth 1936* (NY).

TIERRA DEL FUEGO: Bahia Ainsworth, 27.ii.1913, *Deforpen s.n.* (as *B. macrogynum*) (FI); Ushuaia, 1896, *Dusén s.n.* (GB); *indidem*, 7.v.1985, *Dusén 385* (S, UPS, WU); Outer Rio Grande, 20.v.1908, *Halle s.n.* (S); Rio Fontaine, 1.iii.1908, *Halle & Skottsberg 925* (UPS); Uope Bay, 2.ii.1908, *Halle & Skottsberg 926* (BM); 1919, *Hamilton s.n.* (BM); 1906, *Hamilton*

526 (GL); The Hermite, St. Martins, 1.vii.1883, *Hariot s.n.* (as *B. fuegianum*) (PC); *indidem*, 1883, *Hariot s.n.* (as *B. fuegianum*) (PC); Cape Horn, *Hooker s.n.* (BM); Hermite Island, Cape Horn, 1839-1843, *Hooker s.n.* (as *Hypnum paradoxum* var. *B.*) (BM, BR, L, NY, OXF); *indidem*, 1867, *Hooker 170* (BM, H); Punta Arenas, Straits of Magellan, viii.1912, *Hunter 55* (BM); Punta Arenas, 1879, *Racovitza 466* (BR); Fjordo Finlandia, 3.iii.1929, *Roivainen s.n.* (CANM); Estancia Cameron, 9.xii.1929, *Roivainen s.n.* (CANM); Magallanes, 19.i.1929, *Roivainen 116* (FH); Los Acigami, 10.x.1902, *Skottsberg 180* (S); Fuegia orient., 20.v.1908, *Skottsberg 927* (UPS); Hermite Island, Wilson Herbarium *W115*, *W117*, *W169* (BM).

Brachythecium plumosum

ARGENTINA: Nevada de Castillo, *Lorentz s.n.* (as *B. macroconum*) (H, JE, NY, S).

BOLIVIA: Cochabamba, vi.1889, *Germain 1155* (as *B. bolivioplumosum*) (H, JE, M, NY, PC, S); v.1911, *Herzog 2846* (as *B. bolivioplumosum*) (JE, L, M); Rio Sanjana, x.1911, *Herzog 3274* (as *B. bolivioplumosum*) (JE, S); v.1911, *Herzog 4879* (as *B. bolivioplumosum*) (FH, JE); Incacorral, vi.1911, *Herzog 4966* (as *B. bolivioplumosum*) (JE, NY, S); Incacorral, vi.1911, *Herzog 5090* (as *B. bolivioplumosum*) (FH, JE); Titiacum, *Spruce s.n.* (as *B. laevifolium*) (NY); Pelichuco, 30.iv.1902, *Williams 2783* (as *B. bolivioplumosum*) (H, NY, TENN, UBC).

CHILE: Osorno, 20-25.ii.1971, *Landrum 646* (MO); Ñuble, ix.1972, *Queiralo 9247* (as *B. subpilosum*) (US); Magallanes, 19.i.1929, *Roivainen 1198* (FH).

COLOMBIA: Bogota, *sine collector et numero* (as *B. chrysocladon*) (BM); Bogota, ii.1863, *sine collector et numero* (as *B. asperulum*) (BM); Bogota, ii.1863, *sine collector et numero* (as *B. asperulum form gracile*) (BM); Valle, 27.vi.1987, *Churchill et al. 15365* (NY, TENN); Valle, 27.vi.1987, *Churchill et al. 15375* (NY, TENN); Magdalena, 29.ix.1959, *Cuatrecasas & Castaneda 24485B* (as *B. flagellare*) (US); Nova Granada, 1870, *Hampe s.n.* (as *B. pseudolutescens*) (NY); Quito, *Jameson s.n.* (as *B. conostomum*) (NY); Santander, 31.i.1927, *Killip & Smith 18832* (as *B. asperulum*) (NY, US); *indidem*, 31.i.1927, *Killip & Smith 18833* (as *B. asperulum*) (BM, CANM, NY, UBC, US); Santander, 31.i.1927, *Killip & Smith 18835* (as *B. asperulum*) (MO, NY, US); Santander, 31.i.1927, *Killip & Smith 18839* (as *B. asperulum*) (BM, NY, US); *indidem*, 31.i.1927, *Killip & Smith 18883* (as *B. asperulum*) (FH); Bogota Tequendama, *Lindig s.n.* (as *B. asperulum* var. *gracile*) (BM); Nova Granada, *Lindig s.n.* (as *B. asperulum*) (BM, BR); Bogota, 186?, *Lindig s.n.* (as *B. pseudolutescens*) (NY); Bogota, ii.186?, *Lindig s.n.* (as *B. asperulum*) (L, NY, S, WU); Bogota, ii.1863, *Lindig s.n.* (as *B. asperulum*) (BM, G, GOET, L, M, NY, S); Bogota, 1866, *Lindig s.n.* (as *B. asperulum*) (GOET); Bogota, x.1869, *Lindig s.n.* (as *B. asperulum*) (BM); Nova Granada, 20.vi.1872, *Lindig s.n.* (as *B. asperulum*) (NY); Nova Granada, *Lindig 2048* (as *B. asperulum*) (BM, H-BR, MPU, S); Bogota, vi.1860, *Lindig 2048 & 2077* (as *B. asperulum*) (FH, GOET, M, PC, US); Nova Granada, *Lindig 2068* (as *B. asperulum*) (BM); Bogota, vi.1860, *Lindig 2077* (as *B. asperulum*) (BM); *Mutis 2083* (as *B. asperulum*) (FH, US); *Mutis 3378* (as *B. asperulum*) (FH, US); Truando, *Schott s.n.* (F); Cundinamarca, vii.1953, *Schultes 20228* (as *B. flagellare*) (CANM); Andes Bogotenses, *Weir 128* (BM, CANM, FLAS,

H, JE, MO, NY, UBC); Andes Bogotenses, *Weir 201* (BM, NY, US); Andes Bogotenses, *Weir 295* (as *B. laevifolium*) (NY, S); Andes Bogotenses, *Weir 351* (as *Hypnum pseudoplumosum*) (FI, H, NY); Andes Bogotenses, *Weir 364* (F, NY); *Weir 501* (as *B. asperulum*) (NY).

ECUADOR: Sigsig, 22.i.1909, *Allioni 8143* (as *B. pseudoplumosum*) (FI); Pichincha, 27.i.1977, *Fransen 36363* (FLAS); Quito, *Jameson s.n.* (as *B. asperulum*) (NY); *Lindig s.n.* (FH); Andes Quitenses, *Spruce s.n.* (NY); Chimborazo, *Spruce s.n.* (as *B. asperulum*) (NY); Andes Quitenses, *Spruce 1392* (BR); Andes Quitenses, *Spruce 1393* (BM, BR, FH, MPU, NY, OXF, WU); Andes Quitenses, *Spruce 1393b* (BM, BR, H, MPU, NY, OXF, WU); Andes Quitenses, *Spruce 1393d* (F, FH, MICH, NY, TENN, US); Napo River banks, 1869, *Villavicentia 132* (as *B. asperulum*) (FH).

- **GUATEMALA:** Quezaltenango, 24.i.1945, *Sharp 2107* (FH, TENN, US); Quezaltenango, 26.i.1945, *Sharp 2247* (FH, TENN, US); Quezaltenango, 8.i.1946, *Sharp 5027* (CANM, F, FH, MICH, TENN); Quezaltenango, 8.i.1946, *Sharp 5062* (CANM, F, MICH, NY, TENN); Totonicapan, 20.ii.1939, *Standley 65944* (F, FH); Quezaltenango, 16.i.1941, *Standley 83683* (F, FH, MICH, NY); Quezaltenango, 16.i.1941, *Standley 83709* (F, FH).

JAMAICA: St. Thomas, *Krebs s.n.* (as *B. rutabulum*) (C); St. Thomas, 22.xii.1954, *Proctor 9662* (as *B. flagellare*) (CANM); St. Thomas, 18.viii.1954, *Webster 5464* (as *B. flagellare*) (CANM).

MEXICO: Valle de Mexico, 16.ii.1926, *Amable 1640* (FH); Valle de Mexico, 23.xii.1926, *Amable 1668* (FH); Puebla, 17.xi.1908, *Arsené 4856* (FH); Hidalgo, 1908, *Barnes & Land 494* (NY); Hidalgo, 1908, *Barnes & Land 495* (NY); Hidalgo, 19.v.1978, *Cardenas 102* (FLAS); La Ferreria, vii.1949, *Crum 1054* (MICH, TENN); La Ferreria, vii.1949, *Crum 1059*

(MICH); Mexico, 2.iv.1967, *Cruz 1668a* (as *B. stereopoma*) (TENN); Popocetepetl, 17.xii.1981, *Culberson & Culberson 18645* (TENN); Popocatepetl, *Culberson & Culberson 18646* (TENN); Veracruz, 10.vii.1966, *Delgadillo 1079* (TENN); Veracruz, 10.vii.1966, *Delgadillo 1081* (TENN); Veracruz, 21.viii.1975, *Dull 2/234* (TENN); Cerro de los Nabajos, iii.1839, *Ehrenberg s.n.* (as *B. duriusculum*) (B, BM, H-BR, H-Sol, JE, NY,S); Guerrero, 14.v.1939, *Frye & Frye 2754* (MICH); Mexico, 2.iv.1967, *Griffin 1668a* (as *B. stereopoma*) (TENN); Mexico, 1868 *Hahn s.n.* (as *B. camptocladum*) (BM, FI, NY, PC); Mexico, 1869, *Hahn s.n.* (as *Brunneo alar*) (NY); Veracruz, 11.iii.1960, *Halle & Soderstrom 19355* (UBC, US); Mexico, 26.x.1966, *Hermann & Crum 20885* (MICH, TENN, US); Veracruz, 26.vii.1979, *Hermann 28850a* (TENN); Oaxaca, 25.xii.1965, *Iwatsuki & Sharp 5376* (TENN); Oaxaca, 25.xii.1965, *Iwatsuki & Sharp 5402* (TENN); Veracruz, 30.x.1976, *Juarez s.n.* (TENN); Veracruz, 26.xi.1975, *Juarez 428* (TENN); Veracruz, 30.iii.1979, *Juarez 966* (as *B. stereopoma*) (TENN); Veracruz, 9.v.1979, *Juarez 966a* (TENN); Veracruz, *Juarez 1000* (TENN); Hidalgo, 9.xi.1976, *McFarland 1895* (TENN); Oaxaca, 11.viii.1978, *McFarland & Sharp 8617a* (as *B. stereopoma*) (TENN); Chiapas, xii.1907, *Munch 7466* (as *B. pseudoplumosum*) (FH, FI, NY); Puebla, 15.ii.1966, *Nah 1393* (as *B. stereopoma*) (FLAS); Hidalgo, v.1925, *Orcutt s.n.* (FH); Hidalgo, v.1925, *Orcutt 6773* (FH); Hidalgo, v.1925, *Orcutt 6774* (FH); Hidalgo, v.1925 *Orcutt 6775* (FH); Hidalgo, v.1925, *Orcutt 6776* (FH); Hidalgo, v.1925, *Orcutt 6778* (FH); Hidalgo, 12.xii.1907, *Pringle 10426* (BM, C, F, FH, GB, M, MICH, MO, NY, TENN, UPS, US, VT); Federal District, 4.xi.1908, *Pringle 10552* (BM, C, CANM, FI, G, H-BR, L, M, MO, NY, PC, S, TENN, UPS, US, VT); Federal District, 4.xi.1908, *Pringle*

10558 (TENN); Hidalgo, 21.x.1908, *Pringle 10647* (BM, C, F, FH, FI, JE, M, MO, NY, TENN, UPS, US, VT); Hidalgo, 10.v.1904, *Pringle 15064* (FH, FI, H, JE, MICH, MO, NY, TENN, US, VT); Federal District, 7.vi.1908, *Pringle 15112* (JE, MICH, PC, VT); Hidalgo, 21.vi.1908, *Pringle 15123* (VT); Federal District, 4.xi.1908, *Pringle 15278* (as *B. flagellare*) (MICH); Federal District, 28.iii.1965, *Rzedowski 19459* (MICH, TENN, US); Federal District, 28.iii.1965, *Rzedowski 19468* (US); Federal District, 28.iii.1965, *Rzedowski 19472* (TENN); Mexico, *Schaffner 27* (as *B. camptocladum*) (FI); Valle de Mexico, 1875, *Schoftner 3* (NY); Federal District, 23.vii.1944, *Sharp 145b* (as *B. flagellare*) (MICH, TENN); Federal District, 23.vii.1944, *Sharp 147* (MICH); Federal District, 23.vii.1944, *Sharp 147a* (as *B. flagellare*) (TENN); Federal District, 17.xii.1944, *Sharp 1712* (as *B. cladoneuron*) (MICH, MO); Federal District, 17.xii.1944, *Sharp 1738* (MICH, TENN); Durango, 31.xii.1944, *Sharp 1895* (MICH, US); Puebla, 20.v.1945, *Sharp 3633* (as *B. flagellare*) (CANM, MICH, TENN); Mexico, 20.v.1945, *Sharp 3638* (as *B. flagellare*) (CANM, FLAS, MICH, MO, NY, TENN, US); Michoacan, 17.vi.1945, *Sharp 3747* (as *B. flagellare*) (CANM, MICH, TENN, US); Mexico, 26.xii.1970, *Sharp 3831* (TENN); Puebla, 24.xii.1969, *Sharp 6649b* (TENN); Veracruz, 9.vii.1966, *Sharp et al s.n.* (TENN); Hidalgo, 18.vi.1973, *Sharp et al. 88* (TENN); Hidalgo, 18.vi.1973, *Sharp et al. 1690a* (TENN); Mexico, 17.vi.1973, *Sharp et al. 1773* (TENN); Oaxaca, 24.vi.1973, *Sharp et al. 2576* (TENN); Oaxaca, 23.xii.1972, *Sharp et al. 2983* (TENN); Oaxaca, 24.xii.1972, *Sharp et al. 3059b* (TENN); Oaxaca, 23.xii.1972, *Sharp et al. 4114* (TENN); Oaxaca, 23.xii.1972, *Sharp et al. 4600* (TENN); Puebla,

23.ii.1963, *Vela G. 120.1* (US); Veracruz, 21.ii.1976, *Viveros & Juarez 519* (TENN); Oaxaca, 27.xii.1970, *Webster et al. 786* (TENN).

PERU: Mito, 8-18.iv.1923, *Bryan 264* (as *B. asperulum*) (F, MO, NY); Mito, 8-18.iv.1923, *Bryan 296* (as *B. asperulum*) (F, MO, NY); Ollantaytambo, 15.v.1915, *Cook & Gilbert 753a* (as *B. asperulum*) (NY, US); Ancash, 17.x.1973, *Hegewald & Hegewald 7630* (as *B. flexiventrosum*) (EPH); Amazonas, 8.viii.1962, *Wurdack 1685* (US).

PATAGONIA: Patagonia Occident, 5.i.1897, *Dusén 404* (as *B. morenoi*) (M, NY, S, WU).

TRISTAN DA CUNHA: Sandy point, 18.i.1938, *Christophersen & Mejland 1227a* (as *B. subpilosum*) (BM); Upper pond, 24.ii.1935, *Christophersen & Mejland 1256a* (as *B. subpilosum*) (BM); Upper pond, 24.ii.1938, *Christophersen & Mejland 1651* (as *B. subpilosum*) (BM); Middle pond, 19.i.1935, *Mejland 1653* (as *B. subpilosum*) (BM).

VENEZUELA: Merida, 20.ii.1985, *Griffin PV-1004* (FLAS); Merida, vii-viii.1972, *Griffin et al. 599* (as *B. cochlear*) (FLAS); Merida, *Griffin et al. 1282* (FLAS); Merida, 8.vii.1984, *Griffin & Griffin PV-351* (FLAS); Merida, 14.ii.1985, *Griffin & Dugarte PV-880* (FLAS); Trujillo, 6-9.iii.1985, *Griffin & Lopez PV-1280* (FLAS); Trujillo, 6-9.iii.1985, *Griffin & Lopez PV-1280a* (FLAS); Trujillo, 6-9.iii.1985, *Griffin & Lopez PV-1380* (FLAS); Merida, *Moritz s.n.* (as *B. meridense*) (BM); Merida, *Moritz 65 and 65a* (as *B. meridense*) (BM); Merida, 26.v.1975, *Ruiz-Teran & Dugarte 12378* (FLAS); Sucre, 11.v.1945, *Steyermark 62740* (F, FH).

Brachythecium poadelphus

BRAZIL: Mont Serrat, 22.vii.1902, *Dusén s.n.* (R, S); Minas Geraes, 25.viii.1873, *Mosen s.n.* (G, S); São Paulo, 14.vi.1987, *Schafer-Verwimp & Verwimp 8528* (NY, TENN); Minas Geraes, iii.1892, *Ule 1473* (HBG, HBR, R, US); Minas Geraes, ii.1892, *Ule 1475* (as *B. crinitirameum*) (H-BR, HBG, R, US).

Brachythecium polyoicum

MEXICO: Puebla, 18.xi.1907, *Arsène 4515* (as *B. salebrosum*) (US); Puebla, 18.xi.1907, *Arsène 4664* (as *B. salebrosum*) (US); Puebla, 18.xi.1907, *Arsène 4690* (as *B. salebrosum*) (FH, US); Puebla, 17.xi.1908, *Arsène 4856* (as *B. plumosum*) (US); Puebla, xii.1908, *Arsène 4937* (as *B. salebrosum*) (BM, C, F, FH, H-BR, MO, NY, PC, UBC, US); Veracruz, 26.xi.1975, *Juarez 454* (as *B. salebrosum*) (TENN); Veracruz, 25.ii.1976, *Juarez 541* (as *B. salebrosum*) (TENN); Veracruz, 13.ix.1944, *Sharp 658* (as *B. salebrosum*) (MICH, TENN, US).

Brachythecium praelongum

BOLIVIA: LaFabulosa, 27.iv.1950, *Brooke 6341* (F); Cochabamba, i.1908, *Herzog s.n.* (as *B. pseudorutabulum*) (FI, JE); La Paz, 20.vii.1921, *Herzog 62* (as *B. pseudorutabulum*) (JE, UPS); Chocaya Tal, v.1911, *Herzog 2591* (as *B. subjulaceum*) (HBR, JE, L, M); Chocayatal, viii.1911, *Herzog 2613* (as *B. subjulaceum*) (JE, PC, S, WU); Vilosa, x.1911, *Herzog 3141* (as *B. scaberrimum*) (JE, S); Rio Saujana, x.1911, *Herzog 3268* (as *B. scaberrimum*) (JE, L, M, S); Chocayatal, v.1911, *Herzog 3614* (as *B. lescuraeoides*) (JE, L, M, S, WU); Cordillera,

19.iv.1909, *Knoche 61* (as *B. lescuraeoides*) (FH, HBR, JE); Potosi, 22.i.1979, *Lewis 79-370* (as *B. herzogii*) (F, TENN); La Paz, 20.iv.1979, *Lewis 79-1707B* (F); Cheichae, 14.iii.1856, *Mandon s.n.* (as *B. julaceum*) (BM); Churhu, 14.iii.1856, *Mandon s.n.* (as *B. trachypodioides*) (BM); Sorata, xi.1857, *Mandon 1704* (BM, G, PC); Larecaja, iii.1856, *Mandon 1707* (as *B. trachypodioides*) (BM, L, PC).

COLOMBIA: Cordillera Central, 3.xii.1944, *Cuatrecasas 18965-B* (as *B. prasophyllum*) (US); Boyacá, 23.x.1967, *Hammen et al. 2699* (as *B. flexiventrosum*) (FLAS); Cauca, *M.Cleef 632* (U); Meta, 11.i.1973, *M.Cleef 7665* (as *B. plumosum*) (FLAS, U); Boyacá, 26.ii.1973, *M.Cleef 8534* (as *B. conostomum*) (U); Boyacá, 28.ii.1973, *M.Cleef 8622* (as *B. flexiventrosum*) (U); Boyacá, 3.iii.1973, *M.Cleef 8768* (as *B. pseudorutabulum*) (U); Arauca, 7.iii.1973, *M.Cleef 8861* (as *B. conostomum*) (U); Arauca, 9.iii.1973, *M.Cleef 8972* (as *B. rutabulum*) (U); Boyacá, 5.vi.1973, *M.Cleef 9973* (U); Risaralda, 1980, *Van Reenen 560* (as *B. pseudorutabulum*) (FLAS).

ECUADOR: Rusuhinahia; *Espinosa 12* (as *B. altarense*) (JE); Pichincha, 30.v.1973, *Holm-Nielson et al. 6607* (as *B. herzogii*) (AAU, US); Andes Quintenses, *Spruce 1377* (as *B. rutabulum*) (BM).

PATAGONIA: Cerro Colorado, 23.ii.1897, *Dusén 572* (as *B. morenoi*) (S); Rio Aysen, 16.ii.1897, *Dusén A9* (as *B. trachychoeti*) (PC, S); Valle fluminis Aysen, ii.1897, *Dusén A10* (as *B. subpilosum*) (FI, WU).

PERU: Arequipa, 19.ii.1923, *Gudnther & Buchtien 1998* (as *B. peruvianum*) (HBG, HBR); Junin, 28.iv.1973, *Hegewald & Hegewald 5400* (as *B. flexiventrosum*) (EPH); Ancash, 17.x.1973, *Hegewald & Hegewald 7524* (as *B. flexiventrosum*) (EPH); Ancash, 17.x.1973, *Hegewald & Hegewald*

7546 (as *B. pseudorutabulum*) (EPH); Cordillera Blanca, 27.v.1932, *Lukas s.n.* (as *B. pseudorutabulum*) (JE); Cordillera Blanca, 27.v.1932, *Lukas 3012* (as *B. pseudorutabulum*) (JE); Cuzco, 30.vii.1957, *Valcarcel 44* (as *B. asperulum*) (FH).

VENEZUELA: Distrito Libertador, vii-viii.1972, *Griffin 288* (as *B. herzogii*) (FLAS); Distrito Libertador, vii-viii.1972, *Griffin 290* (as *B. herzogii*) (FLAS); Distrito Libertador, vii-viii.1972, *Griffin 295* (as *B. herzogii*) (FLAS); Distrito Libertador, vii-viii.1972, *Griffin 314* (as *B. herzogii*) (FLAS); Distrito Libertador, vii-viii.1972, *Griffin 361* (as *B. herzogii*) (FLAS); Distrito Rangel, vii-viii.1972, *Griffin 1065* (as *B. herzogii*) (FLAS); Distrito Rangel, vii-viii.1972, *Griffin 1077* (as *B. herzogii*) (FLAS); Distrito Miranda, vii-viii.1972, *Griffin 1320* (as *B. herzogii*) (FLAS); Distrito Miranda, vii-viii.1972, *Griffin 1369* (as *B. herzogii*) (FLAS); Distrito Libertador, vii-viii.1972, *Griffin et al. 273* (FLAS); Merida, 14.viii.1975, *Griffin et al. 1443* (FLAS); Merida, 14.viii.1975, *Griffin et al. 1459* (FLAS); Merida, 14.viii.1975, *Griffin et al. 1464* (FLAS); Merida, 14.viii.1975, *Griffin et al. 1510* (FLAS); Merida, 22.v.1976, *Richards 8102* (FLAS); Merida, 7.vi.1968, *Vareschi 8340* (FLAS); Merida, xi.1980, *Vareschi 8755* (as *B. pseudorutabulum*) (FLAS).

Brachythecium rivularioides

ARGENTINA: Cordobensis, *Lorentz s.n.* (H-BR, NY).

BOLIVIA: Cochabamba, i.1889, *Germain 1156* (as *B. scabripes*) (FI); v.1911, *Herzog 2811* (JE, L, WU); Mt. Illampu, 8.iv.1972, *Irahola 9* (as *B. chocayae*) (FLAS); Larecaja, 1864, *Mandon 1703* (as *B. hirtipes*) (BM, G, PC); Larecaja, viii.1858, *Mandon 1705* (as *B. rivulariforme*) (BM, PC, S); Sarosa, 1858, *Mandon 1706* (as *B. riparium schimp*) (BM, G, PC); Larecaja, viii.1888, *Mandon 1708* (as *B. rivularifolium*) (S).

CHILE: Rio Azopardo, 1.iii.1896, *Dusén 201* (with *B. subplicatum*) (as *B. majusculum*) (S); Panguipulli, 20.viii.1923, *Hollermayer 73* (BM, COL, JE); Panguipulli, 30.viii.1929, *Hollermayer 3413* (MO, TENN); Panguepulli, *Joseph 2286* (US); Panguipulli, x.1923, *Joseph 2448* (US); Cautin, vi.1970, *Landrum 231* (as *B. rivulare*) (MO); Malleco, 10.v.1970 *Landrum 405* (as *B. trachychaete*) (MO); Malleco, 5.x.1970, *Landrum B-37160* (as *B. trachychaete*) (US); Chiloe, 15.i.1966, *Mantero 7476* (as *B. subpilosum*) (US); Ñuble, ix.1972, *Queirolo 9241* (as *B. subpilosum*) (US).

COLOMBIA: Boyacá, 1976, *Aguirre & Rangel 324* (COL); Hula, 14.xii.1975, *Bishop 024231* (FLAS); Del Valle, 27.vi.1987, *Churchill & Hollander 15314* (NY, TN); Cauca, 4.xii.1944, *Cuatrecasas 19028Ba* (as *B. flexiventrosum*) (US); Valle, 21,22,23.iii.1946, *Cuatrecasas 20264B* (as *B. flexiventrosum*) (US); 8,iii.1877, *Jacob s.n.* (as *B. salebrosum*) (BR); Caldas, 1-2.viii.1922, *Killip 12098a* (as *B. eupopuleum*) (NY); Cundinamarca, 21.vi.1965, *King C-633* (COL, US); Caldas, 15-16.vii.1965, *King C-887* (as *B. pseudo-rutabulum*) (COL, US); Cundinamarca, 22.vii.1965, *King C-1005* (as *B. flexiventrosum*) (US); Nova Granada, ix.1860, *Lindig s.n.* (as *B. pseudo-rutabulum*) (BM); Boyacá, 8.vi.1972, *M.Cleef 4230* (U); Cundinamarca, 12.xi.1972, *M.Cleef 6267* (U); Cauca,

M.Cleef & Fernandez-P. 630 (U); America Merida, *Osculati s.n.* (as *B. rutabulum* var. *columbianum*) (RO); Risaralda, 16.i.1980, *Van Reenen 554* (as *B. prosophyllum*) (FLAS); Bogotenses, *Weir 50* (as *B. pseudo-rutabulum*) (OXF); Between Bogota and Fusagasuga, *Weir 178* (as *B. pseudo-rutabulum*) (BM, G, NY); Bogota, *Weir 359* (as *B. pseudo-rutabulum*) (BM, MICH, NY).

COSTA RICA: Cartago, 22.vii.1949, *Holm & Iltis 1116* (TENN).

ECUADOR: *Espinosa 33* (as *B. espinosa* (JE); *Espinosa 38* (as *B. espinosa*) (JE); Carchi, 4.iv.1976, *Gradstein et al. Gr. 3484* (as *B. flexiventrosum* (FLAS); Quito, *Jameson s.n.* (MICH); Pichincha, *Jameson s.n.* (as *B. pseudo-rutabulum*) (FH, NY); Chimborazo, *Jameson 33* (as *B. pseudo-rutabulum*) (NY); Chimborazo, *Jameson 35* (as *B. pseudo-rutabulum*) (NY); Quito, *Jameson 77* (BR, MICH); Quito, *Spruce s.n.* (NY); Chimborazo, *Spruce s.n.* (as *B. pseudo-rutabulum*) (NY); Quito, *Spruce 1378* (BM); Quito, *Spruce 1380* (BM); *Spruce 1392* (as *B. plumosum*) (WU); Quito, *Spruce 1397* (as *Hypnum pseudo-rutabulum*) (BM, BR, G, MPU, NY, OXF, WU); Quito, *Spruce 1398* (as *Hypnum pseudo-rutabulum*) (BM); Quito, *Spruce 1399* (BM, BR, MPU, OXF); Quito, *Spruce 1400* (BM); Cotopaxi, 2.x.1982, *Steere & Balslev 26107* (as *B. pseudo-rutabulum*) (FLAS); River Napo, 1869, *Villavicentia s.n.* (FH); River Napo, 1869, *Villavicentia 133* (as *B. pseudo-rutabulum*) (FH); River Napo, 1869, *Villavicentia 134* (as *B. pseudo-rutabulum*) (FH); River Napo, 1869, *Villavicentia 135* (as *B. pseudo-rutabulum*) (FH).

GUATEMALA: Chimaltenango, 3.i.1939, *Standley 61850* (F, FH); Chimaltenango, 3.i.1930, *Standley 61913* (F, FH); Sacatepequez, 11.ii.1939, *Standley 65194* (F, FH, MICH); Quezaltenango, 6.iii.1930,

Standley 67595 (F, FH, MICH); Quezaltenango, 6.iii.1939, *Standley 67607* (F, FH); Quezaltenango, 6.iii.1939, *Standley 67611* (F, FH); Quezaltenango, 6.iii.1930, *Standley 67614* (FH); Quezaltenango, 6.iii.1930, *Standley 67672* (F, FH); Quezaltenango, 6.iii.1930, *Standley 67674* (FH) *indidem*, 6.iii.1939, *Standley 67681* (F, FH, US); *indidem*, 6.iii.1939, *Standley 67750* (F, FH); Quezaltenango, 13.i.1940, *Steyermark 34097* (F, FH); Quezaltenango, 13.i.1940, *Steyermark 34141* (as *B. flexiventrosum*) (US); Quezaltenango, 13.i.1940, *Steyermark 34141a* (F, FH); Quezaltenango, 13.i.1940, *Steyermark 34142* (F, FH); San Marcos, 18.ii.1940, *Steyermark 36011* (FH).

KERGUELEN ISLAND: *Hooker s.n.* (FH).

NEW ZEALAND: Manapouris, vii.1874, *Berggren 2213* (as *B. subpilosum*) (NY, S); Campbells Island, 1839-1843, *Hooker s.n.* (as *Hypnum rutabulum*) (BM).

MARION ISLAND: 11.iii.1965, *Bakker 231* (BM).

PATAGONIA: 5.v.1897, *Dusén s.n.* (GB); Valle fluminis Aysen, 11.i.1897, *Dusén 426* (as *B. argyrocaulon*) (GB, JE, M, PC, S, US).

PERU: Cuzco, 24.xii.1949, *Vargas 8659* (BR); Cuzco, 20.vi.1958, *Vargas 12167* (as *B. chocayae*) (US).

TIERRA DEL FUEGO: Hermite Island, *Hooker s.n.* (FH); Rio Bueno, 10.xii.1928, *Roivainen s.n.* (CANM); Magallanes, 10.xii.1928, *Roivainen 384* (FH).

Brachythecium stereopoma

ARGENTINA: Salta, 7.vii.1946, *Digilio-Grassi 358* (FH); Tucuman, 12.xi.1946, *Digilio-Grassi 882* (FH); Jujuy, 2.vii.1901, *Fries 33* (as *B.*

sulphureum) (S); *indidem*, 2.vii.1901, *Fries 36* (as *B. sulphureum*) (S); Near Salta, v.1902, *Fries 82* (as *B. sulphureum*) (S); Tucuman, 12.viii.1946, *Garolero 6105* (FH); Tucuman, 22.ix.1946, *Garolero 6857* (FH); Tucuman, 20.x.1946, *Garolero 7091* (FH); Tucuman, 20.x.1946, *Garolero 7091* (as *B. sulphureum*) (FH); North of Tucuman, 1920, *Hamilton 637* (as *B. filirepens*) (BM, GL); Aguarai Yacuiba, x.1910, *Herzog 5154* (as *B. mollirameum*) (JE, S); Cordoba, 1.v.1931, *Hosseus 397* (as *B. sulphureum*) (FH, M); Cordoba, 10.v.1931, *Hosseus 413* (as *B. sulphureum*) (FH); Cordoba, 10.v.1931, *Hosseus 414* (as *B. sulphureum*) (FH, M); Cordoba, 10.v.1931, *Hosseus 416* (as *B. sulphureum*) (FH, M); Cordoba, 10.v.1931, *Hosseus 417* (as *B. sulphureum*) (FH, M); Cordoba, 10.v.1931, *Hosseus 418* (as *B. sulphureum*) (FH); Cordoba, 14.v.1931, *Hosseus 419* (as *B. sulphureum*) (B, FH;, Cordoba, 20.v.1931, *Hosseus 427* (as *B. sulphureum*) (FH, M); Cordoba, 21.vi.1931, *Hosseus 453* (as *B. sulphureum*) (FH, M); Cordoba, 21.vi.1931, *Hosseus 457* (as *B. sulphureum*) (FH, M); Cordoba, 21.vi.1931, *Hosseus 466* (as *B. sulphureum*) (FH); Cordoba, 21.vi.1931, *Hosseus 475* (as *B. sulphureum*) (FH); Cordoba, 21.vi.1931, *Hosseus 476* (as *B. sulphureum*) (FH, M); Cordoba, 8.ii.1932, *Hosseus 540* (as *B. sulphureum*) (FH); Cordoba, 27.v.1932, *Hosseus 608* (as *B. sulphureum*) (FH, M); Colon, 27.i.1933, *Hosseus 630* (as *B. sulphureum*) (FH, M); Cordoba, 6.xii.1933, *Hosseus 655* (as *B. sulphureum*) (FH, M); Cordoba, 8.vii.1931, *Hosseus 708* (*B. sulphureum*) (M); Tucuman, *Kicken 32* (as *B. sulphureum*) (FH, JE); Salta, *Lorentz s.n.* (as *B. minisculifolium* (HBR); Sierra de Cordoba, *Lorentz s.n.* (as *B. squalidissimum*) (NY, S); St. Andres, *Lorentz s.n.* (as *B. mollirameum*) (HBG); Sierra de Cordoba, *Lorentz s.n.* (as *B. calerae*) (S); Tucuman,

Lorentz s.n. (as *B. filirameum*) (HBG); Mt. Eutorba, *Lorentz s.n.* (as *B. fasciculatocaudatum*) (JE, H-BR); Sierra de Cordoba, i.1870, *Lorentz s.n.* (as *B. squalidissimum*) (NY, S); Sierra de Cordoba, ix.1871, *Lorentz s.n.* (as *B. calerae*) (S); Sierra de Cordoba, ix.1871, *Lorentz s.n.* (as *B. nematogonium*) (NY, S); Tucuman, iv.1872, *Lorentz s.n.* (as *B. filirameum*) (S); Tucuman, 18.iv.1872, *Lorentz s.n.* (as *B. filirameum*) (S); Chaco, 1873, *Lorentz s.n.* (as *B. mollirameum*) (H, H-BR, WU); Gran Chaco, 1873, *Lorentz s.n.* (as *B. lorentzii fleisch*) (FH); San Andres, 1873, *Lorentz s.n.* (as *B. sulphureum*) (JE); St. Andres, 17.ix.1873, *Lorentz s.n.* (as *B. mollirameum*) (JE); Chaco, ix.1873, *Lorentz s.n.* (as *B. mollirameum*) (S); Cordoba, 1890, *Lorentz s.n.* (as *B. calerae*) (S); Buenos Aires, 1879, *Schliephacke s.n.* (as *B. fossicola*) (JE); Tucuman, 14.x.1948, *Skottsberg 39* (GB, S); Tucuman, 14.x.1948, *Skottsberg 40* (FH, GB); Tucuman, iv.1872, *Lorentz 300* (as *B. filirameum*) (NY); Tucuman, viii.1920, *Venturi 00312* (as *B. tenniprostratum*) (FH); Tucuman, 12.xi.1946, *Wall s.n.* (as *B. sulphureum*) (FH, GL, MO, S, UPS).

BOLIVIA: x.1907, *Herzog s.n.* (as *B. sulphureum*) (JE); xii.1907, *Herzog s.n.* (M); Cochabamba, i.1908, *Herzog s.n.* (as *B. sulphureum*) (FI, JE); Cochabamba, vi.1911, *Herzog 4595* (as *B. longisetum*) (H-BR); Coranital, v.1911, *Herzog 4723* (JE, S); Coranital, v.1911, *Herzog 4723* (as *B. sulphureum*) (FH, US); Incacorral, v.1911, *Herzog 4959* (as *B. longisetum*) (JE, L, M, PC, S, WU); Incacorral, vi.1911, *Herzog 5104* (as *B. sulphureum*) (FH, JE, L, M, S); Incacorral, vi.1911, *Herzog 5105* (as *B. longisetum*) (S); La Paz, 8.iv.1972, *Irahola 3* (US); *indidem*, 8.iv.1972, *Irahola 6* (FLAS, US); Santa Barbara, 24.viii.1902, *Williams 1976* (BM, CANM, F, NY); Apolo, 12.iii.1902, *Williams 1977* (CANM, G,

MICH); Apolo, 9.vii.1902, *Williams 1977* (F, FH, MICH, NY, S, TENN, US); Rio Pelichuco, 28.iv.1902, *Williams 2777* (as *B. tenuipinnatum*) (BM, NY).

BRAZIL: Pedreira, 1934, (R); Maua Serra do Hatiaya Est. Rio, 8.ii.1925, *Bandiera 489* (as *B. poadelphus*) (NY); Rio Grande do Sul, vii.1904, *Bornmuller 6120* (as *B. sulphureum*) (B, FH, FI, JE, M, S, US); Petropolis, *Didricksen s.n.* (as *B. sulphureum*) (C); Petropolis, 1845-87, *Didricksen s.n.* (as *B. eupopulum*) (C); Serra do Itatiaia, vii.1902, *Dusén s.n.* (as *B. poadelphus*) (S); Serra do Itatiaia, vii.1902, *Dusén 1577* (as *B. poadelphus*) (S); Rio de Janeiro, 24.ii.1903, *Dusén 1652* (as *B. pseudosulphureum*) (S); Rio de Janeiro, 27.vi.1974, *Griffin & Vital 259* (FLAS); Minas Geraes, 25.viii.1873, *Mosen s.n.* (as *B. sulphureum*) (BM, G, S); Minas Geraes, 30.viii.1873, *Mosen s.n.* (as *B. pseudosulphureum*) (S); Minas Geraes, 25.xii.1873, *Mosen s.n.* (as *Hypnum pseudosulphureum*) (OXF); Minas Geraes, 25.viii.1873, *Mosen 325* (as *B. psuedosulphureum*) (FH, OXF, WU); Minas Geraes, 20.viii.1873, *Mosen 326* (as *B. pseudosulphureum*) (FH); São Paulo, 20.iii.1874, *Mosen 328* (as *B. pseudosulphureum*) (FH, WU); Minas Geraes, 25.viii.1873, *Mosen 330* (as *B. pseudosulphureum*) (FH); São Paulo, 1879, *Puiggari s.n.* (as *B. sulphureum*) (BM, JE, L); São Paulo, 1881, *Puiggari s.n.* (as *B. sulphureum*) (JE, S); São Paulo, vii.1889, *Puiggari 66* (as *B. sulphureum*) (G, H-BR); São Paulo, 1879, *Puiggari 421* (as *B. sulphureum*) (FH); St. Catarina, 9.vii.1963, *Reitz & Klein 15.088* (as *Chamberlainia poadelphus*) (US); St. Catarina, 16.vii.1963, *Reitz & Klein 15.986* (as *Chamberlainia poadelphus*) (US); São Paulo, 26.v.1901, *Schiffner s.n.* (as *B. fossarum*) (NY); Minas Geraes, 17.ix.1901, *Schiffner 426* (as *B. pseudosulphureum*) (S); São Paulo, 26.v.1901, *Schiffner 581* (as *B. fossarum*) (BM, S);

indidem, 26.v.1901, *Schiffner 584* (as *B. fossarum*) (BM); *indidem*, 26.v.1901, *Schiffner 586* (as *B. sulphureum*) (BM, L); *indidem*, 26.v.1901, *Schiffner 587* (as *B. fossarum*) (WU); Minas Geraes, 19.ix.1901, *Schiffner 621* (as *B. pseudosulphureum*) (S); São Paulo, 20.viii.1901, *Schiffner 1092* (as *B. fossareum*) (BM, S, WU); Brasilia, i.1928, *Sebille 180* (as *B. pseudosulphureum*) (MICH); Uberaba Minos, i.1928, *Sebille 187a* (as *B. pseudosulphureum*) (S); Rio Grande do Sul, ix.1934, *Sehnem 64* (as *B. sulphureum*) (FH); Sta. Catarina, 14.xii.1937, *Sehnem 142* (as *B. sulphureum*) (FH); Rio Grande do Sul, 22.x.1941, *Sehnem 269* (FH, NY); Sta. Catarina, xii.1937, *Sehnem 433* (as *B. sulphureum*) (FH); Montenegro, 18.x.1946, *Sehnem 2265* (as *B. sulphureum*) (FH); Via Oliva, 14.i.1947, *Sehnem 2615* (as *B. sulphureum*) (FH); Rio Grande do Sul, 27.xii.1949, *Sehnem 4731* (FH); St. Catharina, v.1891, *Ule s.n.* (as *B. tenuipinnatum*) (WU); St. Catharina, v.1890, *Ule 196* (as *Hypnum (B.) tenuipinnatum*) (BM, BR, C, FH, FI, G, GB, H, M, MPH, NY, PC, S, UPS, WU); St. Catharina, ix.1890, *Ule 281* (as *B. productifolium*) (H-BR); St. Catharina, vii.1888, *Ule 369* (as *B. fossarum*) (H-BR, HBG); St. Catharina, ii.1888, *Ule 370* (as *B. fossarum*) (FI, H-BR, HBG, M); St. Catharina, 1889, *Ule 796* (as *B. tenuipinnatulum*) (HBG); St. Catharina, v.1890, *Ule 886* (as *B. plicifolium*) (HBG, H-BR, M, PC); St. Catharina, ix.1890, *Ule 981* (as *B. productifolium*) (HBG); St. Catharina, v.1891, *Ule 1216* (as *B. tenuipinnatum*) (HBG); Itabino do Compo, iv.1892, *Ule 1476* (as *B. pseudosulphureum*) (HBG, H-BR, R, US); Rio de Janeiro, 27.vi.1974, *Vita 3637* (SP, TENN); Minas Geraes, 31.vii.1977, *Vital 7582* (FLAS); Minas Geraes, iii.1921, *Zikan 321* (as *B. pseudosulphureum*) (S, SP, TENN).

COLOMBIA: Cundinamarca, 24.v.1959, *Barclay & Juajibioy 7713* (CANM); *Brotherus 14* (L); Cundinamarca, 2.x.1938, *Cuatrecasas 251-B* (as *B. prasophyllum*) (US); Norte de Santander, 30.x.1941, *Cuatrecasas 12805-B* (as *B. prasophyllum*) (US); Boyaca, 27.vii.1957, *Grubb & Guymer B9* (as *B. conostomum*) (BM); Cundinamarca, 15.xii.1967, *Hammen et al. 2002* (U); Santander, 19-24.xii.1926, *Killip & Smith 15547* (FH, NY, US); Santander, 11-27.i.1927, *Killip & Smith 17109* (as *B. prasophyllum*) (NY, US); Santander, 14-31.i.1927, *Killip & Smith 18067* (NY, US); Cundinamarca, 4.vii.1965, *King & Guevara C-784* (as *B. flexiventrosum*) (US); Cundinamarca, 22.vii.1965, *King & Guevara C-958* (as *B. prasophyllum*) (US); Cundinamarca, 18.vi.1965, *King et al. C-604* (as *B. flexiventrosum*) (US); Cundinamarca, 24.vi.1965, *King et al. C-706* (as *B. flexiventrosum*) (US); Cundinamarca, 2.vii.1965, *King et al. C-770* (as *B. prasophyllum*) (US); Cundinamarca, 10.vii.1965, *King et al. C-825* (as *B. prasophyllum*) (US); Cundinamarca, 10.vii.1965, *King et al. C-827* (as *B. flexiventrosum*) (COL, MICH, US); Cundinamarca, 10.vii.1965, *King et al. C-831* (as *B. prasophyllum*) (COL, US); *indidem*, 10.vii.1965, *King et al. C-832* (as *B. prasophyllum*) (US); Caldas, 16.vii.1965, *King et al. C-891* (as *B. prasophyllum*) (US); Tolima, 16-17.vii.1965, *King et al. C-928* (as *B. prasophyllum*) (US); Tolima, 16-17.vii.1965, *King et al. C-936* (as *B. flexiventrosum*) (US); Tequendama, 1929, *Troll 2123* (FH, JE); Tequendama, 1929, *Troll 2125* (S); Tequendama, 1929, *Troll 2130* (FH, JE); Tequendama, 1929, *Troll 2138* (FH, JE); Andes Bogotenses, 1906, *Weir s.n.* (as *B. plumosum*) (NY).

COSTA RICA: Coronada, 17.xii.1933, *Alfaro s.n.* (FH,); Alajuelita, 18.xii.1933, *Alfaro s.n.* (FH, TENN); San Ildefonso, 21.i.1934, *Alfaro*

s.n. (FH); Moravia, 11.ii.1934, *Alfaro s.n.* (FH, US); Alajuelita, 18.xii.1939, *Alfaro 33* (FH, US); Arrias, 22.vi.1934, *Alfaro 92* (F); Tilaran, 30.iii.1934, *Alfaro 112* (FH); Tilaran, 30.iii.1934, *Alfaro 115* (FH, US); Rio Banaus, 20.x.1934, *Alfaro 125b* (F); San Jose, 22,23,26.viii.1967, *Bowers 847-K* (as *B. alboflavens*) (FLAS); San Jose, 30.ix.1973, *Griffin 632* (as *B. tenuinerve*) (FLAS); Cartago, 10.ix.1973, *Griffin & Eakin 301* (FLAS); San Jose, 4.ii.1979, *Griffin & Morales B 86* (FLAS); Tilaran, 30.iii.1934, *Gutierrez s.n.* (as *B. conostomum*) (NY); Tilaran, 30.iii.1934, *Gutierrez 115* (F, FH, NY); Heredia, 6.vi.1965, *Hatheway & Hatheway 1715* (US); Pan American highway, iii.1963, *James s.n.* (as *Chamberlainia flexiventrosum*) (US); San Jose, 24.xii.1881, *Lehmann 1027* (NY, US); San Jose, 26.ix.1971, *Munoz 371* (as *B. flexiventrosum*) (FLAS); Near Alajuelita, 1894, *Pittier & Tonduz 5730* (as *B. costaricense*) (NY, PC, US); Alajuala, 1875, *Polakowsky s.n.* (as *B. macromitriadelphus*) (PC); Cartago, 8-9.ii.1924, *Standley 33484* (as *B. costaricense*) (FH, H-BR, NY, US); San Jose, 20-22.iii.1924, *Standley 38449* (as *B. costaricense*) (FH, US); Cartago, 8-9.ii.1924, *Standley 33611c* (as *B. costaricense*) (FH); San Jose, 14-26.xii.1925, *Standley 42394a* (as *B. costaricense*) (FH, US); Cartago, 8,9.vii.1941, *Svihla 2760* (FH); Heredia, 2-3.xii.1947, *Svihla 3054* (as *B. flexiventrosum*) (FH); Near Alajuelita, 1894, *Tonduz 5730* (as *B. costaricense*) (BM, FI, H-BR, S); Candelaria, 15.viii.1926, *Valerio 41* (as *B. costaricense*) (FH, US); Candelaria, 15.viii.1926, *Valerio B42* (as *B. costaricense*) (US); Candelaria, 15.viii.1926, *Valerio 46* (as *B. costaricense*) (US); Tablazo, 18.i.1928, *Valerio 126* (as *B. costaricense*) (FH, US); San Jose, 30.xi.1928, *Valerio 204* (FH, US); Volcan Irazu, 7.iv.1929, *Valerio 300*

(as *B. laxireticulum*) (FH, US); San Jose, 3.ii.1935, *Valerio 426* (FH); San Jose, 15.i.1937, *Valerio 446* (FH); Tapanti, 24.xii.1936, *Valerio 466* (FH); San Jose, viii.1910, *Werckle s.n.* (as *B. costaricense*) (BM).

CUBA: Rio Turquino, 1-26.vi.1936, *Acuna 394* (as *B. pseudolaetum*) (FH); Sierra Maestra, vii.1921, *Hioram 5074* (F); Loma del Gato, 1933, *Hioram 11862* (F); (as *B. pseudolaetum*) (OXF); Loma del Gato, vii.1933, *Hioram 11902* (as *B. flexinerve*) (F); Loma del Gato, xii.1933, *Hioram 11956* (as *B. pseudolaetum*) (F); Loma del Gato, xii.1933, *Hioram 11972* (as *B. pseudolaetum*) (F); Loma del Gato, xii.1933, *Hioram 12029* (F); Loma del Gato, xii.1933, *Hioram 12041* (as *B. pseudolaetum*) (S); Loma del Gato, xii.1933, *Hioram 12061* (as *B. pseudolaetum*) (BM); Loma San Juan, vii.1935, *Hioram 13672* (F); Loma San Juan, vii.1935, *Hioram 13673* (F); Loma San Juan, vii.1935, *Hioram 13700* (F); La Perla, 6-18.ii.1911, *Shafer 9086a* (CANM); Rocks, mountain rivulets, 1858, *Wright 128* (as *B. laetum*) (BM, FH, G, GR, H-BR, HBG, L, OXF, S, WU).

DOMINICAN REPUBLIC: La Vega, 3.iv.1981, *Buck 5310* (as *B. zanonii*) (NY); Santiago, 16.iv.1946, *Jiminez 6* (FH); La Vega, 2-3.x.1950, *Jiminez M67* (FH); Vic. line between Independencia and San Rafael Provinces, vii.1967, *Norris et al. B5967* (MICH, NY, US); La Vega, viii.1967, *Norris et al. B7212* (MICH, MO, NY, TENN, US).

ECUADOR: Gualaquiza, 10.ix.1910, *Allioni 662* (as *B. trochalobasis*) (FI); Chaupi, 15.iv.1951, *Bell 587* (BM, FH, G); Chaupi, 15.iv.1951, *Bell 611* (BM); Chaupi, 15.iv.1951, *Bell 613* (BM, G); Rumipamba, x.1930, *Benoist s.n.* (S); Pichincha, 8.xi.1930, *Benoist 3233* (as *B. alboflavens*) (F, G, S); Zaruma, 1931, *Espinosa s.n.* (JE); Santa Rosa, 15.ii.1977, *Fransen 168* (FLAS); Santa Rosa, 15.ii.1977, *Fransen 170* (FLAS); Azuay,

4.vii.1942, *Harling 2347a* (S); Azuay, 4.vii.1947, *Harling 2348a* (S); Tungurahua, 31.v.1968, *Holm-Nielsen & Jeppesen 132* (as *B. prasophyllum*) (AAU, EPH, FLAS, MO, US); Tungurahua, 31.v.1968, *Holm-Nielsen & Jeppesen 135* (as *B. prasophyllum*) (AAU, COL, EPH, FLAS, MO, US); Cotopaxi, 30.vi.1968, *Holm-Nielsen & Jeppesen 1064* (as *B. prasophyllum*) (AAU, MO, U, US); Cotopaxi, 7.iv.1973, *Holm-Nielsen et al. 3135* (AAU, GB, US); Cotopaxi, 7.iv.1973, *Holm-Nielsen et al. 3142* (AAU, GB, MO, US); Cotopaxi, 9.iv.1973, *Holm-Nielsen et al. 3415* (AAU, GB, MO, US); Loja, 21.ii.1988, *Panero 1043* (TENN); Loja, 22.ii.1988, *Panero 1087c* (TENN); Lignos, *Spruce s.n.* (NY); Andes Quito, *Spruce 1382* (BM, BR, FH, G, HSOL, MPU, NY, OXF, PC, S, WU); Monte Chinborazo, *Spruce 1383* (BM, G, PC) ; Andes Quito, *Spruce 1384* (BM, G, PC, S); Andes Quito, *Spruce 1385* (BM, G).-

EL SALVADOR: Vol. San Salvador, 28.vii.1945, *Chapman C-9* (MICH); Ahuachapan, 19.i.1947, *Standley & Padilla 2731* (F).

GALAPAGOS ISLANDS: Volcan Cerro Azul, 22.vi.1976, *Gradstein & Sipman M-269* (FLAS);

GUATEMALA: *Godman & Salim s.n.* (NY); Solala, 6.ii.1975, *Hermann 26338* (TENN, US); Solala, 6.ii.1975, *Hermann 26338* (as *B. flexiventrosum*) (NY); Anchitipequez, 10.viii.1948, *Holdridge s.n.* (as *B. flexiventrosum*) (MICH); Huehuetenango,6.i.1946, *Sharp s.n.* (US); Quezaltenango, 21.i.1945, *Sharp 1969* (CANM, FH, FLAS, MICH, MO, TENN, US); Quezaltenango, 21.i.1945, *Sharp 1985a* (TENN); Quezaltenango, 28.i.1945, *Sharp 2326* (FH, MO, TENN, US); Quezaltenango, 28.i.1945, *Sharp 2327* (FLAS, MO, TENN, US); El Quiche, 9.ii.1945, *Sharp 2552* (TENN); Alta Verapaz, 4.iii.1945, *Sharp 2950* (TENN); Alto Verapaz,

4.iii.1945, *Sharp 2951* (TENN, US); Alta Verapaz, 4.iii.1945, *Sharp 2953* (TENN, US); Huehuetenango, 24.xii.1945, *Sharp 4806a* (TENN); Huehuetenango, 2.i.1946, *Sharp 4940b* (TENN); Huehuetenango, 4.i.1946, *Sharp 4972b* (TENN); Huehuetenango, 6.i.1946, *Sharp 5018* (CANM, F, TENN); Sacatepequez, xi.1938-ii.1939, *Standley 58824* (F, FH, S); Sacatepequez, 6.xii.1938, *Standley 58918* (F, FH); Sacatepequez, 10.xii.1938, *Standley 59488* (F, FH, S); Sacatepequez, 10.xii.1938, *Standley 59499a* (F); Sacatepequez, 28.xii.1938, *Standley 61178* (F, FH); Sacatepequez, 20.xii.1938, *Standley 61230* (F, FH, MICH); Chimaltenango, 5-6.i.1939, *Standley 62005* (as *B. flexiventrosum*) (F, FH); Quiche, 12.i.1939 *Standley 62473* (F, FH); Guatemala, 18.i.1939, *Standley 63026* (F, FH); Quezaltenango, 16.ii.1939, *Standley 65501* (F, FH); Quezaltenango, 16.ii.1939, *Standley 65503* (F, FH); Quezaltenango, 18.ii.1939, *Standley 65558a* (F, FH); Huehuetenango, 19.ii.1939, *Standley 65723* (F, FH, MICH); San Marcos, 22.ii.1939, *Standley 66121* (F, FH); Quezaltenango, 18.,ii.1939, *Standley 66481* (F); Quezaltenango, 18.ii.1939, *Standley 66489* (F, FH); Quezaltenango, 6.iii.1939, *Standley 67399a* (F); Quezaltenango, 6.iii.1939, *Standley 67599a* (FH); Alta Verapaz, 26.iii.-15.iv.1939, *Standley 70454* (as *B. flexiventrosum*) (F, FH); Jalapa, 7-18.xi.1940, *Standley 76477* (F, FH, MICH); Chimaltenango, 11-22.xii.1940, *Standley 79818* (F, FH); Chimaltenango, 16.xi.1940, *Standley 80206* (F, S); Chimaltenango, 22,xii.1940, *Standley 80938* (F, FH); Chimaltenango, 14-23.xii.1940, *Standley 81073* (F, FH, NY); Huehuetenango, 27.xii.1940, *Standley 81288* (F, FH); Huehuetenango, 30.xii.1940, *Standley 81569* (F, FH); Huehuetenango, 4.i.1941, *Standley 82409* (F, FH, NY); Huehuetenango, 8.i.1941, *Standley 82785* (F, FH); Huehuetenango, 9.i.1941, *Standley*

83029 (F, FH, NY); Quezaltenango, 13.i.1941, *Standley 83195* (F, FH); Quezaltenango, 15.i.1941, *Standley 83396a* (F); Quezaltenango, 15.i.1941, *Standley 83454* (F, FH, NY, US); *indidem*, 15.i.1941, *Standley 83542* (F, FH, NY); Quezaltenango, 15.i.1941, *Standley 83570* (F, FH); Quezaltenango, 16.i.1941, *Standley 83810* (F, FH, TENN, US); Quezaltenango, 16.i.1941, *Standley 83819* (F, FH); Totonicapan, 19.i.1941, *Standley 84029* (F, FH); Totonicapan, 19.i.1941, *Standley 84123* (F, FH); Quezaltenango, 21.i.1941, *Standley 84164* (F, FH, NY, S, US); Quezaltenango, 5.ii.1941, *Standley 86146* (F, FH, US); Sacatepequez, 11.iii.1941, *Standley 89006* (F, FH); Alta Verapaz, 26-27.iii.1941, *Standley 89851* (as *B. flexiventrosum*) (F, FH); Alto Verapaz, 26,27.iii.1941, *Standley 89872* (F, FH, S); Baja Verapaz, 4.iv.1941, *Standley 91081* (F, FH); Alta Verapaz, 14.iv.1941, *Standley 92585* (as *B. plumosum*) (F, FH, MICH); San Marcos, 15.ii.1940, *Steyermark 35757* (F, FH); San Marcos, 25.ii.1940, *Steyermark 36548* (F, FH, MICH); San Marcos, 26.ii.1940, *Steyermark 36648* (F, FH); Between Solala and Cauajachah., 16.ix.1959, *Tegeuer s.n.* (as *B. flexiventrosum*) (S); Caqineux Plateau, 18.ix.1959, *Tegeuer s.n.* (as *B. flexiventrosum*) (S); Alta Vera Paz, 16.ii.1886, *Türckheim 669* (as *B. pusilloalbicans*) (FI, NY, PC); Alta Verapaz, *Türckheim 1293* (as *B. trochalobisis*) (S); Alta Vera Paz, xii.1887, *Türckheim 1555* (as *B. trochalobasis*) (BM, FI, S); Alta Vera Paz, *Türckheim 1556* (as *B. trochalobasis*) (FI, HBR, NY); Alta Vera Paz, xii.1887, *Türckheim 1558* (as *B. pusilloalbicans*) (BM, FH, FI, H, M, NY, PC); Alta Verapaz, *Türckheim 6642* (as *B. trochalobasis*) (FI, H); Alta Vera Paz, vii.1892, *Türckheim 6646* (as *B. trochalobasis*) (BM, FH, FI, M, NY); Alta Vera Paz, vi.1892, *Türckheim 6726* (as *B. trochalobasis*) (FI);

Alta Verapaz, vii.1892, *Türckheim 6764* (as *B. trochalobasis*) (FI); Alta Verapaz, vii.1892, *Türckheim 6765* (as *B. trochalobasis*) (FI).

HAITI: Chardonette, 11.v.1941, *Bartlett 17610* (CANM, G, MICH, S); *indidem*, 11.v.1941, *Bartlett 17640* (MICH); South of Kenseoff, 18.v.1941, *Bartlett 17726* (as *B. pseudolaetum*) (NY); SE of Milot, 22.v.1941, *Bartlett 17740* (CANM, MICH); N of Morne Jeffrard, 10.vii.1941, *Bartlett 17801* (MICH); Nassif de la Hotte, 8.viii.1917, *Ekman 636* (as *B. pseudolaetum*) (F, FH, G, S, US); N of Savane-Zonbie, 7.vi.1955, *Farr 1641* (CANM); Near Savane Jean Louis, 20.v.1945, *Holdridge 3069* (FH, MICH); *indidem*, 20.v.1945, *Holdridge 3070* (MICH); Jardin Bois, 3.i.1946, *Holdridge 3184* (FH, MICH); Mission, Fonds Varettes, 17.iv-4.v.1920, *Leonard 3715* (US); Vicinity of Furcy, 26.v.-15.vi.1920, *Leonard 4545* (US); Vicinity of Dondon, 7.i.1926, *Leonard 8628* (CANM, US); Vicinity of Pilate, 10.ii.1926, *Leonard 9639* (FH, US); S of Jean Rabel, 4.iii.1929, *Leonard & Leonard 13732* (FH, US); Savanne Zombi, 28.iv.1944, *Mackaness 84* (MICH); Kenskoff, 19.i.1944, *Mackaness 177* (MICH); Port Margot to Correil, 8.viii.1903, *Nash 241* (NY, US); Road Fond Varettes to Bodaric, 6.iii.1929, *Orcutt 8238* (CANM); Above Bodaric, 7.iii.1929, *Orcutt 8327A* (CANM); Near Morue la Selle, 22.iii.1929, *Orcutt 8441* (FH); Constanza, 6.iv.1910, *Türckheim 8447* (as *B. trochalobasis*) (FI).

HONDURAS: Morazan, 29.xi.1975, *Richards et al. 3558* (TENN); Morazan, 7.viii.1947, *Standley 11840* (F); Morazan, 7.viii.1947, *Standley 11857* (F); Morazan, 27.x.1948, *Standley 12633* (F, MICH); Morazan, x-xii.1948, *Standley 13456* (F); Morazan, 2.xii.1948, *Standley 15244* (F, MICH); Choluteca, 2-12.i.1949, *Standley 15863* (F); Choluteca, 12-22.i.1949, *Standley 15869* (F, MICH); Choluteca, 12-22.i.1949, *Standley*

15948 (F); El Paraiso, 19.ii.1949, *Standley 16880* (F, MICH); El Paraiso, 21.ii.1949, *Standley 17022* (F); El Paraiso, 24.ii.1949, *Standley 17174* (F); El Paraiso, 24.ii.1949, *Standley 17181* (F); Olancho, 20-25.iii.1949, *Standley 18725* (F); Intibuca, 31.i-12.ii.1950, *Standley 25511* (F, MICH); El Paraiso, 12.iii.1950, *Standley 25713* (F); Comayagua, 14-27.ii.1928, *Standley 55948* (BM, F, FH, JE, MO, NY, S, US); Comayagua, 25.iii-5.iv.1947, *Standley & Chacon 6241* (F); Comayagua, 25.iii-5.iv.1947, *Standley & Chacon 6420* (F); Comayagua, 25.iii-5.iv.1947, *Standley & Chacon 6777* (F); Morazan, 25.xi-5.xii.1946, *Standley & Williams 114* (F); El Paraiso, 26.ii.1947, *Standley & Williams 4586* (F); Comayagua, 8.iv.1947, *Standley et al. 6978* (F); Comayagua, 8.iv.1947, *Standley et al. 6989* (F).

- **JAMAICA:** 1868, *35* (OXF); 16.ii.1930, *Armitage C3148* (GL); Cinchona, viii.1943, *Barry C 12* (CANM); Belvidere, Montpellier, 1.iii-7.iv.1908, *Britton 602* (CANM, MICH, NY, S); Near Bullstrode, 12.iii-7.iv.1908, *Britton 613* (NY, S); *indidem*, 1.iii.-7.iv.1908, *Britton 616* (MICH, NY); Kempshot, 23.iii.-7.iv.1908, *Britton 690* (MICH, NY); Fern gully, 1.iii.-4.iv.1908, *Britton 761* (NY); Mt. Diabolo, 5.iv.1908, *Britton 777* (BM, C, CANM, FH, L, MICH, NY, WU); St. Helen's and Mina's Gap, 3.x.1908, *Britton 1089pp* (NY); iv.1902, *Dixon 974* (BM); *Eggers 3495* (F); *Eggers 3495b* (F); *Eggers 3565* (F); *Eggers 3577* (F); Trelawny, 23.iii.1955, *Farr 1506* (CANM); Portland Parrish, 24.vi.1968, *Griffin s.n.* (FLAS); Jamaica, 24.vi.1968, *Griffin s.n.* (FLAS); 16.xii.1896, *Harris s.n.* (BM); Content Road, 16.xii.1896, *Harris 10089* (CANM); Content Road, 16.xii.1896, *Harris 10089* (as *B. jamaicense*) (BM, F, US); St. James, 8.xi.1973, *Hegewald 8202* (EPH); Above Rio Minho, 10.iii.1970,

Hermann 22950 (MO); Blue Mts., vii.1922, *Jaderholm s.n.* (FH); Flamstead, 6.vii.1922, *Jaderholm 13* (as *B. jamaicense*) (S); Flamstead, 10.vii.1922, *Jaderholm 70* (S); 18.vii.1922, *Jaderholm 71* (as *B. jamaicense*) (NY, S); Flamstead and Gordon Town, 15.vii.1922, *Jaderholm 72* (S); Abbey Green, 10-13.vii.1926, *Maxon 10071* (BM, FH, NY, US); Along road to Silver Hill Gap, 20.vii.1926, *Maxon 10275* (FH, US); Giddy Hall, 1909, *Maxwell s.n.* (as *B. jamaicense*) (BM); Giddy Hall, iv.1909, *Maxwell 153* (as *B. jamaicense*) (GL); Giddy Hall, 1912, *Maxwell 770* (as *B. jamaicense*) (GL); xii.1896, *Morris s.n.* (as *B. jamaicense*) (H-BR); Balaclava, 4.iii.1927, *Orcutt 627H* (CANM); Manchester Parish, 19.iii.1927, *Orcutt 835* (CANM, US); Maudeville, 3.ii.1930, *Orcutt 890* (FH); Near Balaclava R., 1927, *Orcutt 1064A* (C, CANM); Arntully, 25.viii.1927, *Orcutt 2688* (C); Arntully, 25.viii.1927, *Orcutt 2697* (CANM); Sherwood Forest, 25.viii.1927, *Orcutt 2792* (C); Sherwood Forest, 5.ix.1927, *Orcutt 2954e* (C); Sherwood Forest, 5.ix.1927, *Orcutt 2956* (CANM, LAF); Sherwood Forest, 5.ix.1927, *Orcutt 2957* (CANM); Farm Hill, 8.x.1927, *Orcutt 3274* (TENN); Farm Hill, 12.x.1927, *Orcutt 3390* (C); Farm Hill, 22.x.1927, *Orcutt 3549a* (CANM); Farm Hill, 22.x.1927, *Orcutt 3592* (GL); Westhalia, 1.xi.1927, *Orcutt 3764* (C, CANM); Near Mandeville, 1928, *Orcutt 5044* (C, CANM); Farm Hill Works, 1928, *Orcutt 5204* (C); Farm Hill, 1928, *Orcutt 5215* (LAF, TENN); Portland Gap, 1928, *Orcutt 5414* (C, CANM); Farm Hill Works, 1928, *Orcutt 5454C* (CANM); Arntully, 16.iv.1928, *Orcutt 5674* (LAF); Arntully, 16.iv.1928, *Orcutt 5675A* (G); Moy Hall, 2.xi.1928, *Orcutt 6850A* (CANM); Newmarket, 13.xii.1928, *Orcutt 7304A* (CANM); Newmarket, 14.xii.1928, *Orcutt 7366* (C); Frankfield, 21.i.1929, *Orcutt 7811* (CANM); Near Farm Hill Works, 10.vii.1932, *Patterson 55* (FH, TENN);

Mossmans Peak, 29.xii.1954, *Proctor 9681* (CANM); St. James, 22.iii.1964, *Proctor 24725b* (MO); Port Royal Ranges, 27.xii.1950, *Robbins 18* (CANM, FH); Hardwar Gap, 4.ii.1945, *Simonds 105* (FH, MICH, NY); Road from Cinchona to Morce's Gap, 30.i.1903, *Underwood 292a* (NY); Cinchona Plantation, 1-5.ii.1903, *Underwood 497* (MICH, NY); St. Andrew Parish, xi.1958-i.1959, *Welch 17824* (CANM).

MEXICO: Monte San Felipe, *Adrieno 30* (US); Vallee de Mexico, 18.ix.1924, *Amable 1238* (as *B. comtifolium*) (FH); Vallee de Mexico, 28.i.1926, *Amable 1483* (as *B. tenuinerve*) (FH); Vallee de Mexico, 1.i.1925, *Amable 7280* (as *B. comtifolium*) (BM); Oaxaca, *Andrieux s.n.* (as *B. andrieuxii*) (BM); 1833, *Andrieux 52* (as *B. tenuinerve*) (G); Oaxaca, *Andrieux 72* (as *B. albulum*) (BM); Monte San Felipe, *Arsène Pl. Mex. Exsicc. 30* (as *B. acuminatum*) (NY); Puebla, 18.xi.1907, *Arsène s.n.* (as *B. alboflavens*) (S); Tlaxcala, 10.xi.1908, *Arsène s.n.* (as *B. flexinerve*) (S); Morelia, Cerro Azul, 20.iii.1910, *Arsène s.n.* (as *B. flexiventrosum*) (S); Michoacan, xi.1910, *Arsène s.n.* (as *B. trochalobasis*) (FH); Puebla, 1912, *Arsène s.n.* (as *B. flexinerve*) (G); Puebla, 20.ii.1912, *Arsène s.n.* (as *B. flexinerve*) (F); Puebla, 20.xi.1906, *Arsène 731* (US); Puebla, 20.xi.1906, *Arsène 735* (US); Puebla, 14.ii.1907, *Arsène 740* (as *B. flexinerve*) (US); Puebla, 11.xi.1906, *Arsène 796* (as *B. lanceolifolium*) (US); Puebla, 11.xi.1906, *Arsène 796* (as *B. tenuinerve*) (BM); Puebla, 27.iii.1907, *Arsène 935* (as *B. lanceolifolium*) (BM, US); Michoacan, Cerro Azul, 20.iii.1910, *Arsène 4532* (as *B. flexiventrosum*) (FH, US); Michoacan, 20.iii.1910, *Arsène 4541* (as *B. flexiventrosum*) (BM, C, FH, NY, S, US, WU); Michoacan, 20.iii.1910, *Arsène 4554* (as *B. flexiventrosum*) (BM, US); Michoacan,

16.vii.1911, *Arsène 4582* (as *B. albulum*) (BM, C, F, FH, MO, NY, S, US); Puebla, 18.xi.1907, *Arsène 4666* (as *B. alboflavens*) (NY, US); Michoacan, 9.ii.1911, *Arsène 4713* (as *B. trochalobasis*) (BM, US); Puebla, 5.xi.1907, *Arsène 4760* (as *B. lanceolifolium*) (BM, FH, MO, NY, S, US); Michoacan, iii.1910, *Arsène 4788* (as *B. flexiventrosum*) (US); Puebla, iii.1907, *Arsène 4799* (as *B. lanceolifolium*) (US); Tlaxcala, 10.xi.1908, *Arsène 4855* (as *B. flexinerve*) (BM, C, F, FH, MO, NY, S, US, WU); Puebla, 3.xi.1908, *Arsène 4862* (as *B. flexinerve*) (BM, US); Michoacan, xi.1910, *Arsène 4886* (as *B. trochalobasis*) (US); Puebla, xii.1908, *Arsène 4975* (as *B. sericeolum*) (FH, US); Puebla, ix.1907, *Arsène 4997* (as *B. sericeolum*) (BM, FH, US); Puebla, 4.xii.1907, *Arsène 5003* (as *B. lanceolifolium*) (BM, NY, US); Michoacan, 1910, *Arsène 5089* (as *B. lanceolifolium*) (US); Michoacan, xi.1911, *Arsène 7452* (as *B. lanceolifolium*) (US); Michoacan, 27.xii.1911, *Arsène 7539* (as *B. alboviride*) (BM, C, F, FH, MO, NY, S, US, WU); Michoacan, 18.xi.1907, *Arsène 7546* (as *B. flexiventrosum*) (C, F, FH, H, MO, NY, S, US, WU); Michoacan, xi.1911, *Arsène 7566* (as *B. alboflavens*) (BM, US); Michoacan, 12.ix.1912, *Arsène 7940* (as *B. flexiventrosum*) (US); Michoacan, ii.1909, *Arsène 7951* (as *B. trochalobasis*) (US); Puebla, xii.1907, *Arsène 7988* (as *B. tenuinerve*) (BM, US); Federal District, 11.viii.1913, *Arsène 9453* (as *B. lanceolifolium*) (US); Federal District, 3.vii.1913, *Arsène 9498* (as *B. flexiventrosum*) (BM, F, MO, NY, S, US); Cordoba, 1914, *Arsène 10979* (as *B. flexinerve*) (FH); Mexico, 1908, *Barnes & Land 351* (as *B. tenuinerve*) (NY); Canada San Magdelena, 1908, *Barnes & Land 447* (as *B. flexinerve*) (NY); Cerro Zamora, 22.viii.1930, *Bartlett 11061* (as *B. tenuinerve*) (CANM, FH, MICH, NY, UBC, US); Durango, 30.xii.1973, *Bowers*

et al. 5233-b (TENN); Hidalgo, 3.vii.1939, *Chase 7287* (CANM, F, US, WU); Hidalgo, 3.vii.1939, *Chase 7287-a* (FH); Mexico, 2.iv.1967, *Cisneros 1668* (FLAS); Hidalgo, 1.iv.1953, *Clayton B-573* (F); Coahuila, 22.viii.1948, *Crum s.n.* (as *B. tenuinerve*) (MICH); Jalisco, vi.1949, *Crum 436a* (MICH); *indidem*, vi.1949, *Crum 499* (MICH, NY, TENN); Jalisco, viii.1949, *Crum 521* (F, MICH, NY, S, TENN); *indidem*, viii.1949, *Crum 589* (MICH); Jalisco, 22.vii.1949, *Crum 817* (MICH); Jalisco, 23.vii.1949, *Crum 895* (CANM, F, MICH, NY, S); Jalisco, 23.vii.1949, *Crum 895-1* (as *B. tenuinerve*) (TENN); Jalisco, 24.vii.1949, *Crum 946* (CANM, MICH); Jalisco, 24.vii.1949, *Crum 947* (BR, CANM, G, MICH, NY, TENN, US); Jalisco, vii.1949, *Crum 1055* (MICH); Jalisco, viii.1949, *Crum 1221* (F, MICH, S, TENN); Jalisco, vii.1949, *Crum 1358* (MICH); Michoacan, 1.ix.1949, *Crum 1440* (MICH); Michoacan, 1.ix.1949, *Crum 1442* (MICH); Michoacan, 1.ix.1949, *Crum 1443* (MICH); Mexico, 28.iii.1965, *Cruz 174* (MICH, TENN, US); Michoacan, 26.xii.1981, *Culberson & Culberson 18684* (TENN); Michoacan, 28.xii.1981, *Culberson & Culberson 18789* (TENN); Oaxaca, 4.ii.1966, *Delgadillo 137* (TENN); Oaxaca, 6.ii.1966, *Delgadillo 171b* (TENN); Michoacan, 28.vi.1966, *Delgadillo 474* (as *B. tenuinerve*) (TENN); Jalapa, 8.vii.1966, *Delgadillo 911* (TENN); Veracruz, 24.iv.1982, *DeLuna 590a* (TENN, XAL); Guerrero, 1.xii.1963, *Dieterle 3205* (MICH); Victoria, 11.viii.1975, *Dull s.n.* (as *B. flexiventrosum*) (MICH); Mexico, 22.x.1966, *Dull 53b* (MICH); Hidalgo, 26.ix.1966, *Dull 121* (as *B. flexiventrosum*) (MICH); St. Morelos, 28.xii.1970, *Dunn et al. 17270A* (as *B. tenuinerve*) (TENN); Puebla, 22.ii.1979, *Eggers & Frahm 792581* (as *B. flexiventrosum*) (B, U); Michoacan, 8.i.1941, *Frye & Frye 3017* (FLAS, MICH, TENN); Michoacan, 10.i.1941, *Frye & Frye 3043* (as *B. tenuinerve*)

(FLAS, MICH, TENN); Morelos, 16.i.1941, *Frye & Frye 3127* (as *B. tenuinerve*) (MICH, TENN); Chiapas, 22.viii.1967, *Gittins 4768a* (as *B. tenuinerve*) (TENN); Veracruz, 2.viii.1979, *Guillamia 0023* (TENN); Sonora, 1868, *Hahn s.n.* (as *B. albulum*) (BM, FI, NY, PC); 1868, *Hahn s.n.* (as *B. cladoneuron*) (BM); Orizaba, 1870, *Hahn s.n.* (as *B. alboviride*) (BM, NY); Veracruz, 13,iii.1960, *Hale & Soderstrom 19465* (US); Veracruz, 14.iii.1960, *Hale & Soderstrom 19557* (US); Michoacan, 5.iv.1960, *Hale & Soderstrom 20840* (as *B. flexiventrosum*) (CANM, UBC); Mexico, 23.x.1966, *Hermann 20811* (FLAS, TENN, US); Mexico, 30.i.1975, *Hermann 26095a* (TENN); Mexico, 30.i.1975, *Hermann 26112* (TENN); Toluca, 30.i.1975, *Hermann 26141* (as *B. tenuinerve*) (TENN); Chiapas, 8.ii.1975, *Hermann 26381* (B, GL, TENN); Chiapas, 9.ii.1975, *Hermann 26407* (NY, TENN); Chiapas, 9.ii.1975, *Hermann 26413* (TENN); Chiapas, 9.ii.1975, *Hermann 26415* (CANM, MICH, TENN); Veracruz, 26.vii.1979, *Hermann 28853* (TENN); Michoacan, 14.xii.1965, *Iwatsuki & Sharp 2824* (TENN); Michoacan, 15.xii.1965, *Iwatsuki & Sharp 2852a* (TENN); Michoacan, 15.xii.1965, *Iwatsuki & Sharp 2981* (TENN); Hidalgo, 9.xii.1965, *Iwatsuki & Sharp 5007* (TENN); Mexico City, 11.xii.1965, *Iwatsuki & Sharp 5075* (TENN); Michoacan, 14.xii.1965, *Iwatsuki & Sharp 5145* (as *B. tenuinerve*) (TENN); Oaxaca, 24.xii.1965, *Iwatsuki & Sharp 5292* (TENN); Coahuila, 12-14.ix.1941, *Johnston s.n.* (as *B. flexiventrosum*) (FH); Veracruz, 14.xi.1974, *Juarez 30* (FLAS); Veracruz, 23.v.1975, *Juarez 81b* (as *B. tenuinerve*) (TENN); Veracruz, 23.v.1975, *Juarez 82* (as *B. tenuinerve*) (TENN); Veracruz, 31.iv.1975, *Juarez 129* (as *B. tenuinerve*) (TENN); Veracruz, 7.xi.1975, Michoacan, *Juarez 150* (TENN); Veracruz, 4.xi.1975, *Juarez 182* (TENN); Veracruz, 7.xi.1975, *Juarez 188* (TENN); Veracruz,

7.xi.1975, *Juarez 192* (TENN); Veracruz, 7.xi.1975, *Juarez 202* (as *B. tenuinerve*) (TENN); Veracruz, 8.xii.75, *Juarez 295* (TENN); Veracruz, 23.xii.1975, *Juarez 312* (as *B. tenuinerve*) (TENN); Veracruz, 23.xii.1975, *Juarez 329* (TENN); Veracruz, 12.i.1976, *Juarez 333* (TENN); Veracruz, 7.ii.1976, *Juarez 389* (TENN); Veracruz, 26.ii.1976, *Juarez 429* (TENN); Veracruz, 27.xi.1976, *Juarez 451* (TENN); Veracruz, 28.iii.1979, *Juarez 939* (TENN); Veracruz, 1979, *Juarez 1150* (as *B. tenuinerve*) (TENN); Michocan, 23.x.1980, *Landry 23.1a, 23.2, 23.3a, 23.4, 23.5* (TENN); Oaxaca, 15.viii.1975. *LeDoux et al. 2283b* (TENN); Negro Country, 29.viii.1937, *LeSueur s.n.* (F); Michoacan, 1908, *Lolorzano s.n.* (as *B. trochalobasis*) (HBR, JE); Nuevo Leon, 4.i.1972, *Manuel 1285b* (US); San Luis Potosi, 26.xii.1953, *McGregor 8072* (as *B. sericeolum*) (CANM, NY); Volcan Popocatepetl, 27.viii.1973, *M.Cleef & Delgadillo 10256* (as *Rhynchostegium saint-pierrei*) (U); Jalisco, 22.ix.1958, *McVaugh s.n.* (MICH); Jalisco, i.1976, *McVaugh 10341c* (MICH, TENN); Jalisco, 15.iv.1949, *McVaugh 10341f* (CANM, F, G, MICH, S, TENN, US); Chiapas, 1907, *Munch s.n.* (as *B. alboviride*) (S); Chiapas, x.1907, *Munch 7276* (as *B. alboviride*) (FI); Chiapas, 23.xii.1907, *Munch 7415* (as *B. trochalobasis*) (FI, NY); Orizaba, 10-14.i.1910, *Murrill & Murrill 86* (as *B. alboflavens*) (FH, MICH); Rincon Grande, 10-14.i.1910, *Murrill & Murrill 103* (as *B. tenuinerve*) (FH, MICH); Nuevo Leon, 27,28,29,vii.1977, *Nesom & Wells 23* (as *B. lanceolifolium*) (MO, TENN); Puebla, 20.ii.1912, *Nicolas s.n.* (as *B. flexinerve*) (S); Puebla, 4.xi.1912, *Nicolas s.n.* (as *B. flexinerve*) (BM); San Luis Potosi, ix.1970, *Norris 17527* (TENN); Nayarit, 20.vii.1970, *Norris & Taranto 13206* (TENN); Tepic, 20.vii.1970 *Norris & Taranto 13219* (TENN);

Michoacan, viii.1970, *Norris & Taranto 15565* (as *B. tenuinerve*) (TENN); Oaxaca, 17.viii.1970, *Norris & Taranto 15754* (TENN); Oaxaca, 19.viii.1970, *Norris & Taranto 15978* (TENN); Oaxaca, 20.viii.1970, *Norris & Taranto 16201* (TENN); Oaxaca, 20.viii.1970, *Norris & Taranto 16363* (FLAS); Oaxaca, 21.viii.1970, *Norris & Taranto 16572* (as *B. tenuinerve*) (TENN); Durango, 26.xii.1971, *Norris et al. 20162* (US); Sinaloa, 24.xii.1971, *Norris et al. 20226* (MICH); Sinaloa, 24.xii.1971, *Norris et al. 20229* (CANM); Durango, 26.xii.1971, *Norris et al. 20862* (GL); Durango, 26.xii.1971, *Norris et al. 20897* (C); Durango, 27.xii.1971, *Norris et al. 20948* (TENN); Durango, 26.xii.1971, *Norris et al. 20956* (TENN); Zacatlan Puebla, 8-10.vii.1925, *Orcutt 1371c* (MICH)); Vera Cruz, 10.ii.1910, *Orcutt 5362a* (as *B. flexiventrosum*) (FH); San Luis Potosi, 11-13.xii.1924, *Orcutt 6551* (as *B. alboviride*) (FH); San Luis Potosi, 11-13.xii.1924, *Orcutt 6552* (as *B. alboviride*) (FH); Hidalgo, v.1925, *Orcutt 6777* (FH); Hidalgo, v.1925, *Orcutt 6806* (as *B. tenuinerve*) (FH); Hidalgo, 16.v.1925, *Orcutt 6807* (as *B. tenuinerve*) (C, FH); Hidalgo, v.1925, *Orcutt 6808* (as *B. tenuinerve*) (FH); Amecameca, 13.x.1908, *Pringle s.n.* (as *B. tenuinerve*) (NY); Nuevo Leon, 16.v.1889, *Pringle 723* (as *B. hastifolium*) (FI, H-BR, PC, S); Patzcuaro, 9.xi.1890, *Pringle 743* (as *Rozea petrophila*) (MO, NY, TENN); Patzcuaro, *Pringle 743* (as *B. trochalobasis*) (F, FI, NY,); Federal District, 9.vi.1908, *Pringle 10450* (as *B. tenuinerve*) (MICH, PC, US); Nuevo Leon, 27.v.1908, *Pringle 10453* (as *B. lanceolifolium* var. *gracile*) (PC); Nuevo Leon, 27.v.1908, *Pringle 10453, 10454* (as *B. lanceolifolium* var. *gracile*) (B, BM, CANM, FH, G, GB, H-BR, JE, L, M, MO, NY, PC, S, TENN, US, VT, WU); Nuevo Leon, 27.v.1908, *Pringle 10454* (as *B. lanceolifolium* var. *gracile*) (BM, PC);

Puebla, 12.vi.1908, *Pringle 10474* (as *B. hastifolium*) (PC); Hidalgo, 16.vi.1908, *Pringle 10484* (as *B. hylocomioides*) (BM, CANM, FH, FI, G, H, L, M, MO, NY, PC, S, TENN, UPS, US); Amecameca, 13.x.1908, *Pringle 10585* (as *B. tenuinerve*) (C, CANM, FH, G, GB, HBG, L, M, MO, NY, PC, S, TENN, UPS, US, VT, WU); Hidalgo, 22.ix.1908, *Pringle 10620* (as *B. flexinerve*) (BM, C, CANM, FH, FI, G, GL, H-BR, JE, L, M, MO, NY, PC, S, UPS, US, VT); Hidalgo, 22.ix.1908, *Pringle 10624* (as *B. tenuinerve*) (C, CANM, F, FH, G, L, M, MO, NY, PC, S, TENN, UPS, US, VT); Nuevo Leon, 25.v.1908, *Pringle 15097* (as *B. lanceolifolium* var. *gracile*) (C, PC, TENN, US); Nuevo Leon, 27.v.1908, *Pringle 15098* (as *B. lanceolifolium*) (FI, H-BR, NY, PC, S, US, VT); Federal District, 9.vi.1908, *Pringle 15108* (PC, TENN); Hidalgo, 22.vii.1908, *Pringle 15246* (as *B. alboflavens*) (FH, S, TENN, VT); Federal District, 1908, *Pringle 15278* (as *B. tenuinerve*) (FI, H-BR, PC, TENN); Puebla, 21.x.1908, *Pringle 15317* (as *B. flexinerve*) (PC); Puebla, 27.viii.1908, *Pringle 15318* (as *B. sericeolum*) (FH, FI, H, H-BR, NY, PC, S); Federal District, 7.vi.1908, *Pringle 15108* (as *B. tenuinerve*) (PC); Mexico, 20.ii.1909, *Pringle 15649* (as *B. tenuinerve*) (FH, MICH, US); Veracruz, x.1918, *Purpus s.n.* (FH); Vera Cruz, iv.1908, *Purpus 4305* (as *B. alboflavens*) (F, FH, MO, NY, S, US); Veracruz, xii.1918, *Purpus 8316b* (FH); Vera Cruz, *Purpus 9359* (as *B. flexinerve*) (FH); Vera Cruz, x.1918, *Purpus 9362* (as *B. flexinerve*) (FH, H); Vera Cruz, xii.1918, *Purpus 9363* (as *B. flexinerve*) (FH, H); Sinaloa, 26.vi.1974, *Roberts & Keil K10216* (as *B. tenuinerve*) (TENN, US); Hidalgo, 6.ix.1954, *Robinson s.n.* (as *B. alboflavens*) (US); Oaxaca, 21.xii.1962, *Robinson s.n.* (US); Chiapas, 22.xii.1962, *Robinson 9825* (US); Mexico, 21.ix.1968, *Sanchez 231* (FLAS, TENN); Veracruz, 25-

26.vi.1944, *Santos 3149* (as *B. flexiventrosum*) (CANM, G, MICH); *indidem*, 25-26.vi.1944, *Santos 3153* (as *B. flexiventrosum*) (CANM, FH, MICH, US); Oaxaca, 27.x.1944, *Santos 3480a* (as *B. flexiventrosum*) (MICH); Oaxaca, 21.xii.1962, *Sharp s.n.* (as *B. tenuinerve*) (TENN); District Federal, 23.vii.1944, *Sharp 108* (CANM, MICH, TENN); Above Rio Frio, 30.vii.1944, *Sharp 197* (TENN); Rio Frio, 6.viii.1944, *Sharp 274a* (as *B. tenuinerve*) (TENN); Above Rio Frio, 6.viii.1944, *Sharp 277* (MICH, TENN); Mexico, 6.viii.1944, *Sharp 297* (as *B. trochalobasis*) (MICH); Veracruz, 15.ix.1944, *Sharp* 713 (MICH, TENN); Puebla, 6.x.1944, *Sharp 943* (TENN); Guerrero, 12.x.1944, *Sharp 1065* (MICH); Guerrero, 24.x.1944, *Sharp 1089-b* (as *B. tenuinerve*) (TENN); Guerrero, 27.x.1944, *Sharp 1119b* (TENN); Guerrero, 27.x.1944, *Sharp 1150* (as *B. alboflavens*) (CANM, MICH, MO, TENN, US); Puebla, 15.xi.1944, *Sharp 1192* (as *B. hylocomioides*) (MICH, TENN, VT); Puebla, 15.xi.1944, *Sharp 1207* (CANM, MICH, TENN); Veracruz, 19.xi.1944, *Sharp 1245a* (TENN); Veracruz, 19.xi.1944, *Sharp 1245b* (TENN); Hidalgo, 7.xii.1944, *Sharp 1527A* (CANM, TENN); Hidalgo, 8.xii.1944, *Sharp 1567* (as *B. albulum*) (TENN); Hidalgo, 9.xii.1944, *Sharp 1598* (MICH, NY, TENN); Hidalgo, 9.xii.1944, *Sharp 1605* (as *B. hylocomioides*) (MICH, TENN); Michoacan, 13.vi.1945, *Sharp 3669* (as *B. hylocomioides*) (MICH); Michoacan, 17.vi.1945, *Sharp 3729* (CANM, MICH, TENN); Oaxaca, 28.xii.1970, *Sharp 3875c* (TENN); Oaxaca, 28.xii.1970, *Sharp 3877a* (TENN); Oaxaca, 6.ix.1945, *Sharp 4026* (MICH); Oaxaca, 6.ix.1945, *Sharp 4026-a* (TENN); Puebla, 15.ix.1945, *Sharp 4064* (MICH); Hidalgo, 18.ix.1945, *Sharp 4132a* (as *B. flexiventrosum*) (US); Hidalgo, 19.ix.1945, *Sharp 4150* (MICH, TENN); Chiapas, 6.xi.1945, *Sharp 4440* (MICH); Chiapas, 9.xi.1945, *Sharp 4493a* (CANM, TENN); San Luis Potosi,

21.iv.1946, *Sharp 5899* (MICH, MO, NY, TENN, US); San Luis Potosi, 22.iv.1946, *Sharp 5924* (as *B. hylocomioides*) (MICH, TENN, US); Chiapas, 27.xii.1959, *Sharp M5915A* (TENN); Oaxaca, 3.i.1960, *Sharp M59165* (US); Oaxaca, 3.i.1960, *Sharp M59165i* (TENN); Tlaxcala, 21.viii.1944, *Sharp & Hernandez 427a* (TENN); Veracruz, 30.ix.1979, *Sharp et al. s.n.* (TENN); Hidalgo, 18.vi.1973, *Sharp et al. 79* (TENN); Puebla, 10.vi.1973, *Sharp 1092-b* (TENN); Puebla, 10.vi.1973, *Sharp et al. 1155-b* (TENN); Mexico, 16.vi.1973, *Sharp et al. 1630* (as *B. tenuinerve*) (TENN); Oaxaca, 23.vi.1973, *Sharp et al. 1987* (TENN); Oaxaca, 22.vi.1973, *Sharp et al. 2254-a* (as *B. tenuinerve*) (TENN); Hidalgo, 29.vi.1966, *Sharp et al. 2316* (as *B. tenuinerve*) (TENN); Oaxaca, 4.vii.1966, *Sharp et al. 2411-a* (TENN); Oaxaca, 4.vii.1966, *Sharp et al. 2430a* (TENN); Oaxaca, 4.vii.1966, *Sharp et al. 2435b* (TENN); Oaxaca, 25.vi.1973, *Sharp et al. 2522* (TENN); Oaxaca, 26.vi.1973, *Sharp et al. 2539* (TENN); Oaxaca, 4.vii.1966, *Sharp et al. 2547c* (as *B. tenuinerve*) (TENN); Oaxaca, 26.vi.1973, *Sharp et al. 2624-a* (TENN); Oaxaca, 26.vi.1973, *Sharp et al. 2625* (TENN); Oaxaca, 4.vii.1966, *Sharp et al. 2629b* (TENN); Oaxaca, 26.vi.1973, *Sharp et al. 2630* (TENN); Oaxaca, 26.vi.1973, *Sharp et al. 2643* (TENN); Oaxaca, 26.vi.1973, *Sharp et al. 2645-a* (TENN); Oaxaca, 26.vi.1973, *Sharp et al. 2646-a* (TENN); Jalisco, xi.1976, *Sharp et al. 2706-a* (as *B. tenuinerve*) (TENN); Jalisco, 4.vii.1973, *Sharp et al. 2710* (TENN); Jalisco, 4.vii.1973, *Sharp et al. 2711-a* (TENN); Oaxaca, 26.vi.1973, *Sharp et al. 2820* (TENN); Oaxaca, 26 vi.1973, *Sharp et al. 2844* (TENN); Oaxaca, 26.vi.1973, *Sharp et al. 2847b* (TENN); Oaxaca, 26.vi.1973, *Sharp et al. 2861* (TENN); Oaxaca, 27.vi.1973, *Sharp et al. 2911* (TENN); Oaxaca, 27.vi.1973, *Sharp et al. 2928* (TENN); Oaxaca,

27.vi.1973, *Sharp et al. 2935-a* (TENN); Oaxaca, 27.vi.1973, *Sharp et al. 2989* (TENN); Oaxaca, 27.1973, *Sharp et al. 2990a* (TENN); Veracruz, 9.vii.1966, *Sharp et al. 3012* (TENN); Oaxaca, 27.vi.1973, *Sharp et al. 3055* (TENN); Oaxaca, 27,vi.1973, *Sharp et al. 3056* (TENN); Oaxaca, 27.vi.1973, *Sharp et al. 3071* (TENN); Oaxaca, 27.vi.1973, *Sharp et al. 3088* (TENN); Oaxaca, 27.vi.1973, *Sharp et al. 3104* (TENN); Michoacan, 2.vii.1973, *Sharp et al. 3141* (TENN); Jalisco, 4.vii.1973, *Sharp et al. 3164* (TENN); Oaxaca, 23.xii.1972, *Sharp et al. 4124* (TENN); Hidalgo, 18.ix.1945, *Sharp 4132a* (as *B. flexiventrosum*) (MICH); Oaxaca, 23.xii.1972, *Sharp et al. 4150* (TENN); Oaxaca, 24.xii.1972, *Sharp et al. 4208-b* (TENN); Chiapas, 19.xii.1972, *Sharp et al. 4235* (TENN); Oaxaca, 22.xii.1972, *Sharp et al. 4436* (TENN); Oaxaca, 23.xii.1972, *Sharp et al. 4576a* (TENN); Oaxaca, 23.xii.1972, *Sharp et al. 4576-d* (TENN); Oaxaca, 23.xii.1972, *Sharp et al. 4619-b* (TENN); Oaxaca, 23.xii.1972, *Sharp et al. 4625b* (TENN); Oaxaca, 23.xii.1972, *Sharp et al. 4626* (TENN); Oaxaca, 23.xii.1972, *Sharp et al. 4646-a* (TENN); Oaxaca, 23.xii.1972, *Sharp et al. 4649* (TENN); Oaxaca, 23.xii.1972, *Sharp et al. 4650* (TENN); Oaxaca, 23.xii.1972, *Sharp et al. 4652-b* (TENN); Oaxaca, 28.xii.1970, *Smith et al. 467b* (TENN); Oaxaca, 28.xii.1970, *Smith et al. 479b* (TENN); Oaxaca, 22.xii.1972, *Smith et al. 2960* (TENN); Vallee de Mexico, ix.1924, *St. Pierre s.n.* (as *B. comtifolium*) (S); Salazar, 7.iv.1927, *St. Pierre s.n.* (as *B. tenuinerve*) (S); Huitzilac, iii.1932, *St. Pierre s.n.* (as *B. trochalobasis*) (S); Vallee de Mexico, 29.1929, *St. Pierre 1221* (as *B. tenuinerve*) (FH); Distrito Federal, 3.xi.1963, *Steyermark 91905* (as *Chamberlainia poadelphus*) (US); Distrito Federal, 3.xi.1963, *Steyermark 91908* (as

Chamberlainia poadelphus) (US); Chiapas, 24.i.1957, *Svihla 4855* (as *B. hylocomioides*) (TENN); Tamaulipas, 19.xii.1970, *Webster et al. 52a* (TENN); Queretaro, 22.xii.1970, *Webster et al. 199b* (TENN); Queretaro, 22.xii.1970, *Webster et al. 210c* (as *B. tenuinerve*) (TENN); Oaxaca, 28.xii.1970, *Webster et al. 661* (TENN).

NICARAGUA: Matagalpa, xii.1975, *D'Arcy s.n.* (MO); Managua, *Garnier 710* (FH, US); Matagalpa, 2.xii.1975, *Richards et al. 3678* (MICH, TENN); Jinotega, 21.vi.1947, *Standley 9816* (F); Jinotega, 23.vi.1947, *Standley 9986* (F); Jinotega, 1.vii.1947, *Standley 10567* (F); Jinotega, 5.vii.1947, *Standley 10862* (F).

PANAMA: Chiriqui, 17.iv.1969, *Correa 1220* (MO); Chiriqui, 17.iv.1969, *Correa 1221* (MO); Chiriqui, 1906, *Helion s.n.* (as *B. trochalobasis*) (L, M, NY); Boquete, 7.vii.1906, *Helion 86* (as *B. panamense*) (L).

PERU: Mito, 8-18.iv.1923, *Bryan 296* (as *B. asperulum*) (F); Cuzco, vi.1919, *Bues 1486* (NY); Allantaytambo, 15.v.1914, *Cook & Gilbert 762c* (as *B. flaccum*) (NY, US); Huadquinia, 1.viii.1911, *Foote 41* (as *B. flaccum*) (NY); San Miguel, 24.vii.1911, *Foote 48* (NY); La Libertad, 20.iv.1973, *Hegewald & Hegewald 5138* (as *B. flexiventrosum*) (EPH); La Libertad, 20.iv.1973, *Hegewald & Hegewald 5269* (EPH); La Libertad, 22.v.1973, *Hegewald & Hegewald 6061* (EPH); Cajamarca, 26.v.1973, *Hegewald 6227* (EPH); Amazonas, 31.viii.1973, *Hegewald & Hegewald 6692* (EPH); Amazonas, 31.viii.1973, *Hegewald & Hegewald 6731* (as *B. prasophyllum*) (EPH); Amazonas, 31.vvv.1973, *Hegewald & Hegewald 6744* (as *B. flexiventrosum*) (EPH); Amazonas 31.viii.1973, *Hegewald & Hegewald 6745* (EPH); Huaraz, 16.x.1973, *Hegewald & Hegewald 7470* (EPH); Huanuco,

21.x.1973, *Hegewald & Hegewald 7811* (EPH); Mallepata, xii.1926, *Herrera 1440* (FH); Cuzco, ii.1947, *Marin 836* (FH); Vitor, viii.1944, *Soukup 2446c* (F); Pasco, viii.1944, *Soukup 2667* (FH); Andes, *Spruce 1386* (BM); Tarapoto, *Spruce 1387* (BM, F, FH, MICH, TENN, US); Cuzco, 15.iv.1943, *Vargas 3347* (FH); Macchu Picchu, 5.vii.1962, *Worthley s.n.* (US).

PUERTO RICO: Utuado, 4-6.iii.1915, *Britton 5127* (F, FH, MICH, NY, S); Utuado, 4-6.iii.1915, *Britton 5139* (F, MICH); Utuado, 4-6.iii.1915, *Britton 5139a* (NY); Utuado, 4-6.iii.1915, *Britton 5160* (F, MICH, NY, S); Utuado, 20.ii.1923, *Britton & Britton 7530* (FH, NY, US); Mount Morales, 19.iii.1906, *Britton & Marble 1178* (NY, S); Barranquita, vii.1911, *Hioram s.n.* (NY); Carolina, viii.1911, *Hioram 411* (NY); Trugillo alto, xi.1911, *Hioram 421* (NY); East of Cedra, 9.xii.1963, *King C-301* (US); Adjuntas, 8.viii.1937, *Pagan 424a* (MICH); Barranquitas, 27.x.1939, *Steere 4557* (MICH); Barranquitas, 27.x.1939, *Steere 4590* (MICH); Barranquitas, 28.x.1939, *Steere 4620* (FH, MICH); Cazey, 20.xi.1939, *Steere 4916* (MICH); Cazey, 20.xi.1939, *Steere 4934* (FH, MICH); Utuado, 1.xii.1939, *Steere 5074* (F, FH, MICH, MO, NY, US); Salina, 16.xii.1939, *Steere 5294* (MICH); Moricas Adjuntas Road, 28.xii.1939, *Steere 5429* (MICH); Moricas Adjuntas Road, 28.xii.1939, *Steere 5479* (FH); Villalba, 11.i.1940, *Steere 5999* (MICH); Villalba, 18.i.1940, *Steere 6069* (F, FH, MICH, MO, NY, US); North of Villalba, 19.i.1940, *Steere 6104* (CANM, F, FH, MICH, NY, US); W. of Adjuntas, 25.v.1940, *Steere 7145* (MICH); W. of Adjuntas, 25.v.1940, *Steere 7171* (MICH); W. of Adjuntas, 25.v.1940, *Steere 7244* (FH, MICH).

URUGUAY: Paysanda, *Felippane 37* (NY).

VENEZUELA: Federal District, 6.xii.1938, *Alston 5408* (BM, FH, US); Aragua, 29.xii.1938, *Alston 5843* (BM); Aragua, 29.xii.1938, *Alston 5843a* (US); Aragua, 29.xii.1938, *Alston 5848a* (BM, US); Aragua, 2.viii.1926, *Dall'Aglio 1* (TENN); Aragua, 30.x.1976, *Dall'Aglio 2* (TENN); Aragua, 10.vii.1976, *Dall'Aglio 3* (TENN); Timotes, 3.vii.1934, *Farenholtz 1042b* (JE); *Fendleri 63a* (as *B. eupopulum*) (BM); Tovar, 1854/55, *Fendleri 144* (as *B. eupopulum*) (FH, G, H-BR, H-SOL, NY, OXF, PC, S); Caracas, *Funck & Schlim 353* (NY); *Funck & Schlim 365* (as *Hypnum*) (NY); Monagas, 25.iv.1974, *Griffin & Bermudez 2* (FLAS); Monagas, 25.iv.1974, *Griffin & Bermudez 58* (FLAS); Sucre, 28.iv.1974, *Griffin & Bermudez 77* (FLAS); Lara, 20-24.v.1978, *Griffin & Lopez 292* (FLAS); Trujillo, 14.iii.1985, *Griffin & Lopez PV-1472* (FLAS); Merida, 1.iii.1985, *Griffin & Dugarte PV-1155A* (FLAS); Merida, 1.iii.1985, *Griffin & Dugarte PV-1155B* (FLAS); Merida, 1.iii.1985, *Griffin & Dugarte PV-1173* (as *B. prasophyllum*) (FLAS); Libertador, vii-viii.1972, *Griffin et al. 9* (FLAS); Campo Elias, vii-viii.1972, *Griffin et al. 88* (FLAS); Tachira, viii.1975, *Griffin et al. 110* (FLAS); Campo Elias, vii-viii.1972, *Griffin et al. 127* (FLAS); Campo Elias, vii-viii.1972, *Griffin et al. 152* (FLAS); Campo Elias, vii-viii.1972, *Griffin et al. 153* (FLAS); Libertador, vii-viii.1972, *Griffin et al. 557* (FLAS); Libertador, vii-viii.1972, *Griffin et al. 591* (FLAS); Libertador, vii-viii.1972, *Griffin et al. 635* (FLAS); Libertador, vii-viii.1972, *Griffin et al. 649* (FLAS); Libertador, vii-viii.1972, *Griffin et al. 752* (FLAS); Rangel, vii-viii.1972, *Griffin et al. 1022* (FLAS); Rangel, vii-viii.1972, *Griffin et al. 1087* (FLAS); Rangel, vii-viii.1972, *Griffin et al. 1149* (FLAS); Campo Elias, vii-viii.1972, *Griffin et al. 1422* (FLAS); Campo Elias, vii-viii.1972, *Griffin 1528* (B,

CANM, F, FLAS, MO, NY, U); Libertador, vii-viii.1972, *Griffin et al. 1859* (FLAS); Merida, 23.xii.1974, *Lopez-Figueiras 9166* (FLAS); Trujillo, 27.vii.1958, *Medina & Aristequieta 1410a* (CANM, FH); Aragua, 21.vii.1977, *Owens & Griffin 33* (FLAS); Merida, 9.ii.1928, *Pittier 12690a* (FH); Monagas, 17.iii.1967, *Pursell et al. 8470* (LAF, NY); Monagas, 17.iii.1967, *Pursell 8476* (TENN); Monagas, 26.iv.1967, *Pursell et al. 8804* (FLAS); Monagas, 22.v.1967, *Pursell et al. 8965* (LAF, MO); Lara, 5.viii.1976, *Sharp L7636* (TENN); Aragua, 10.vii.1976, *E. Sharp 28* (TENN); Aragua, 14.vii.1976, *E. Sharp 75* (TENN); Lara, 5.viii.1976, *E. Sharp 265* (TENN); Lara, 5.viii.1976, *E. Sharp 281* (TENN); Aragua, 3.xi.1962, *Steyermark 90981* (FH); Aragua, 7.xii.1967, *Steyermark 100509* (US); Aragua, 7.xii.1967, *Steyermark 100514* (US); Trujillo, 26.ii.1971, *Steyermark 104885* (B, FH, M, MO, U, US); Tachira, 29-30.viii.1966, *Steyermark & Rabe 96925* (as *B. prasophyllum*) (US); Trujillo, 3-4.ix.1966, *Steyermark & Rabe 97234* (US); Trujillo, 3-4.ix.1966, *Steyermark & Rabe 97301* (as *B. prasophyllum*) (US); Portuguesa, 5.ix.1966, *Steyermark & Rabe 97432* (as *B. prasophyllum*) (US); Zulia, Maracaibo, *Tess s.n.* (H-BG); Merida, 29.x.1980, *Vareschi 8792* (FLAS).

Brachythecium subpilosum

ARGENTINA: Sandy Point Freti Magellan, *Lechlor s.n.* (NY); Terre Louis Philippe, 28.xi.1902, *Skottsberg 472* (S).

AUSTRALIA: Cape Spenser, *Hooker s.n.* (BM, NY).

CHILE: 5.vi.1896, *Dusén 105* (FT, NY, S); Punta Arenos, xii.1911, *Herzog 5212* (FH, JE, S); Magallanes, 19.xii.1928, *Roivainen s.n.* (as *B. austro-salebrosum*) (CANM, S); Magallanes, 13.xii.1928, *Roivainen 19* (as

B. rutabulum) (FH); Magallanes, 15.i.1929, *Roivainen 44* (FH); Magallanes, 18.i.1929, *Roivainen 79* (FH); Magallanes, 17.xii.1928, *Roivainen 375* (FH); Magallanes, 17.xii.1928, *Roivainen 382* (as *B. rutabulum*) (FH); Magallanes, 19.xii.1928, *Roivainen 395* (as *B. austro-salebrosum*) (CANM, FH); Magallanes, 3.i.1929, *Roivainen 729* (as *B. sericeovirens*) (FH); Magallanes, 3.i.1929, *Roivainen 742* (as *B. rutabulum*) (FH); Magallanes, 8.iii.1929, *Roivainen 939* (FH); Magallanes, 6.iii.1929, *Roivainen 944* (as *B. rutabulum*) (FH); Vulkan Lonquimay, 1.i.1966, *Ruthsatz* (as *B. longidens*) (GOET); Calbuco, 7.viii.1937, *Scherabe 32* (JE).

FALKLAND ISLANDS (ISLAS MALVINAS): Mount Adams, 13.xii.1907, *Halle & Skottsberg 871* (UPS, S); Port Louis, 6.viii.1902, *Skottsberg 243* (S).

- **PATAGONIA AUSTRALIS:** v.1905, *Dusén s.n.* (as *B. sericeovirens*) (GOT); 1905, *Dusén s.n.* (as *B. sericeovirens*) (BM); 1905, *Dusén B2634* (as *B. sericeovirens*) (GL); Punta Arenas, 22.xi.1895, *Dusén 2* (as *B. majusculum*) (B, GB, S, UPS, US); Punta Arenas, 22.iv.1896, *Dusén 6 p.p.* (UPS).

PATAGONIA OCCIDENTALIS: Valle fluminis, 23.ii.1897, *Dusén s.n.* (as *B. longidens*) (NY); Valle Fluminis Aysen, ii.1897, *Dusén, s.n.* (as *B. longidens*) (BM); Valle Fluminis Aysen, 23.ii.1897, *Dusén A10* (as *B. longidens*) (BM, FI, M, NY, S, WU); Sydpatagonien, 22.ii.1905, *Dusén 6001* (as *B. juliraneum*) (NY).

SOUTH GEORGIA: Cumberland East Bay, 20.xi.1971, *Bell 1019* (S); *indidem*, 24.xi.1971, *Bell 1032a* (B); Cumberland Bay, 26.xi.1971, *Bell 1035* (BM); Cumberland East Bay, 5.xii.1971, *Bell 1045* (S, NY); *indidem*, 5.xii.1971, *Bell 1050* (B); *indidem*, 5.xii.1971, *Bell 1051* (S, NY);

indidem, 5.xii.1971, *Bell 1052* (S); *indidem*, 5.xii.1971, *Bell 1056* (S); Gape Charlotte, 16.xii.1971, *Bell 1070* (B, S); Whale Valley, 23.i.1972, *Bell 1120* (B, BM, S, NY); Whale Valley, Royal Bay, 23.i.1972, *Bell 1122* (BM); Cape Harcourt, 24.i.1972, *Bell 1123* (S); Molthe Harbour, 24.i.1972, *Bell 1126* (B); Mt. Hodges, 10.2.1972, *Bell 1142* (BM); Barff Peninsula, 13.ii.1972, *Bell 1146* (NY, S); Hamilton Bay, 29.xii.1971, *Bell 1397* (S, NY); East of Bjornstadt Bay, 18.xii.1971, *Bell 1398* (B, S, NY); Cumberland East Bay, 5.xii.1971, *Bell 1399* (S); East of Weddell Glacier Snout, 31.iii.1968, *Callaghan, D.M. Greene and S.W. Greene B.A.S. Misc.70* (BM, S); King Edwards Point, 27.xi.1967, *Clarke CG45* (BM, S); Barff Peninsula, 30.xii.1960, *Coleman 536* (S); Cumberland East Bay, 6.xii.1967, *Greene CG54* (BM); East of the Crutch, 14.xii.1967, *Greene CG74* (S); Jumbo Cove, 15.xii.1967, *Greene CG96* (BM); Cumberland East Bay, 27.i.1968, *Greene CG273* (BM); *indidem*, 5.ii.1968, *Greene CG370* (S); *indidem*, 13.xii.1960, *Greene 126* (B); Cumberland Bay, vi.1973, *Greene 166* (S); Bird Island, 15.xii.1960, *Greene 232* (S); *indidem*, 15.xii.1960, *Greene 271* (S); *indidem*, 18.xii.1960, *Greene 324b* (BM); *indidem*, 18.xii.1960, *Greene 326b* (B, S); *indidem*, 18.xii.1960, *Greene 334* (B); Barff Peninsula, 14.i.1961, *Greene 809* (BM); *indidem*, 14.i.1961, *Greene 867* (B); Paul Beach Bays of Isles, 23.i.1961, *Greene 1252* (S, NY); Cumberland East Bay, 10.ii.1961, *Greene 1786a* (NY); Cumberland West Bay, 11.ii.1961, *Greene 1929* (B); Between Esmark Glacier and Holmestrand Peninsula, 11.iii.1961, *Greene 2688a* (as *B. majusculum*) (S); *indidem*, 11.iii.1961, *Greene 2688b* (B); Diaz Cove, 12.iii.1961, *Greene 2772* (S); 1919, *Hamilton 543* (as *B. serribracteatum*) (GL); Cumberland East Bay, 18.ii.1964, *Longton 446* (B); *indidem*, 25.iii.1964,

Longton 793 (S, NY); Hystadhuttet, 20.ii.1928, *Olstad 24* (BM); Australis Cumberland Bay, 19.iv.1909, *Skottsberg 68* (UPS, S); Cumberland Bay, 23.iv.1902, *Skottsberg 409* (FT, S); Royal Bay, 29.iv.1902, *Skottsberg 410* (BA); Cumberland Bay, no date, *Skottsberg 411* (S); *indidem*, 23.iv.1902, *Skottsberg s.n.* (S); Cumberland East Bay, 11.ii.1957, *Smith M23* (S); *indidem*, 27.i.1968, *Walton CG256* (BM); Stromness Bay, 5.iv.1972, *Webb 177* (B).

TIERRA DEL FUEGO: Hermite Island, *56* (BM); Torvenir, 13.x.1923, *Benove, s.n.* (as *B. sericeovirens*) (BR); Bosque de la Matanza, 31.i.1942, *Castillanis s.n.* (BA); Punta Arenas, 22.xi.1895, *Dusén 2* (B, GB, S, UPS, US); Fuegia austr., 29.ii.1896, *Dusén 189* (NY with *B. majusculum*) (S); Ushuaia, 5.v.1896, *Dusén 360* (as *B. majusculum*) (FI, GB, S, UPS); Hermite Island, 1839-1843, *Hooker s.n.* (NY, HBR); *indidem*, 1839-1843, *Hooker 165* (BM); Puesto Millaldao, 17.i.1929, *Roivainen s.n.* (S, CANM); Lago Linch, 19.xii.1928, *Roivainen s.n.* (as *B. sericeovirens*) (S); *indidem*, 20.xii.1928, *Roivainen s.n.* (S); Fuegia media, 19.i.1929, *Dusén s.n.* (as *B. flagellare*) (CANM); Lago Deseado, 5.i.1929, *Roivainen [681]* (S, CANM); Magallanes, 20.xii.1928, *Roivainen 1872* (FH); Ushnaia, 6.iii.1902, *Skottsberg 171* (as *B. macrogynum*) (S, UPS); Ushuaia, 11.iii.1902, *Skottsberg 173* (S).

Brachythecium subplicatum

ARGENTINA: San Carlos, 19.vii.1897, *Dusén 752* (as *B. patagonicum*) S); Rio Negro, Lago F. Frias, 17.i.1940, *Perez-Roieau s.n.* (BA); Ushuaia, 16.xi.1940, *Santesson M48* (FH, G, S, UPS).

CHILE: Panguipulli, x.1923, *Claude-Joseph 2448* (as *B. rutabulum*) (NY); Panguipulli, vi.1923, *Claude-Joseph 2284* (as *B. rutabulum*) (NY); Rio Centinelas, 2.xii.1896, (S); Salto Laja, i.1925, *Claude-Joseph 5914* (FH, US); Corral Partum, 5.vi.1896, *Dusén 105* (S, US); Punta Arenas, xii.1911, *Herzog 5206* (as *B. turgens*) (BM, JE); Panguipulli, 20.vii.1923, *Hollermayer 73* (as *B. rutabulum*) (NY); Cantina, vi.1970, *Landrum B36161* (US); Llanquihue, 15.xii.1970, *Landrum B37294* (US); Llanquihue, xi.1969, *Landrum 36* (MO); *indidem*, 15.xii.1970, *Landrum 489* (US); Bio Bio, 27.iii.1971, *Mahn 6000* (US); Valdivia, 21.xii.1974, *Mantero 9560* (US); Magallanes, 14.xii.1928, *Roivainen s.n.* (FH); Magallanes, 15.xii.1928, *Roivainen 4* (FH); Magallanes, 2.ii.1929, *Roivainen 307* (as *B. turgens*) (CANM, FH); Magallanes, 3.i.1929, *Roivainen 736* (FH); *indidem*, 3.i.1929, *Roivainen 743* (FH, S); Nuble, 17.iv.1929, *Roivainen 1050* (FH, L, S); Magallanes, 27.xi.1928, *Roivainen 1437* (as *B. turgens*) (CANM, FH, S); Magallanes, 21.ii.1929, *Roivainen 1483* (FH); Magallanes, 17.xii.1928, *Roivainen 1715* (FH); Magallanes, 27.xii.1928, *Roivainen 3597* (FH); Calbuco, 7.viii.1937, *Schwabe 32* (JE); Calbuco, 29.viii.1937, *Schwabe 195* (JE); Magellanes, ii.1906, *Thaxter s.n.* (MO); Magallenes, 20.x.1968, *Zalensky (Mahn 8408)* (US);

CROZET ISLANDS: xii.1907, *Ring 2b* (as *B. sublicatum* var. *minus*) (BM); 1907-1908, *Ring & Raknes s.n.* (BM, GL, S); 1907-1908, *Ring & Raknes 32c* (as *B. subplicatum* var. *dilaceratum*) (BM, NY); 1907-1908, *Ring & Raknes 33m* (UPS); 1907-1908, *Ring & Raknes 43m* (UPS); 1907-1908, *Ring & Raknes 61c* (B, FH).

FALKLAND ISLANDS: *Abbott s.n.* (BM); *Abbott s.n.* (as *B. subpilosum*) (NY); West Falkland, Halfway Cove, 21.xi.1907, *Halle 869* (as

B. subplicatum var. *minus*) (S, UPS); Weddell and Quaker Island, 1925, *Hamilton 1213* (as *B. subplicatum* var. *minus*) (GL); *Hooker s.n.* (as *Hypnum rutabulum* var. *5*) (BR, FH, H, H-SOL, NY, OXF, RO); Port Louis, 2.viii.1902, *Skottsberg 242* (FI, S); Arrow Harbor, 17.i.1908, *Skottsberg 868* (S, UPS); West Falkland Islands, 1909-1911, *Vallentin 274* (as *B. albicans*) (BM).

KERGUELEN ISLAND: 1913-1914, *Bossiere 3b* (BM); *Hooker s.n.* (as *Hypnum rutabulum*) (BM); *Hooker s.n.* (as *Hypnum rutabulum* var. *4*) (BM).

MARION ISLAND: 21.x.1965, *Huntley 836a* (BM, NY); 9.xi.1965, *Huntley 882a* (as *B. austrosalebrosum*) (NY).

NEW ZEALAND: 1874, *Berggren s.n.* (as *B. supilosum*) (NY); Kelly's Hill, 1874, *Berggren s.n.* (FH); Kelly Hill, iii.1874, *Berggren 3* (BM, FH, NY); *indidem*, iii.1874, *Berggren 2212* (S).

PATAGONIA: Valle fluminis Aysen, 5.i.1897, *Dusén s.n.* (as *B. argyrocaulon*) (S); Valle Fluminis Aysen, 1897, *Dusén s.n.* (as *B. cusparioides*) (S); Punta Arenas, 26.v.1896, *Dusén 9* (as *B. subpilosum*) (NY); Rio Aysen, 5.i.1897, *Dusén 389* (as *B. cuspidarioides*) (FH, FI, GB, M, NY, S, UPS, US); Valle fluminis Aysen, 5.i.1897, *Dusén 426* (as *B. argyrocaulon*) (S); Lago Viedema, 19.ii.1905, *Dusén 5865* (as *B. turgens*) (B, GB, HBG, H-BR, NY, S); Lago Viedma, 19.ii.1902, *Dusén 5866* (as *B. cuspidarioides*) (FH, GB, NY, S); Rio Fossiles, 5.iv.1905, *Dusén 5945* (as *B. cuspidarioides*) (S); Casa Ottea, 22.ii.1905, *Dusén 6001* (GB, S); Moor Lake Cerro, 1936-1937, *Fester 6* (as *B. turgens*) (JE, S); Lago San Rafael, 1939, *Grosse 2* (as *B. turgens*) (JE); Sta Cruz, 21.xii.1908, *Halle 1* (S); Chabout, 5.xii.1908, *Halle 2* (S); Chubut, 5.xii.1908, *Halle*

823 (S); Sta Cruz, 21.xii.1908, *Halle 825* (BM, S, UPS); Chubut, 7.xii.1908, *Skottsberg 824* (UPS).

SOUTH GEORGIA: Stromness Bay, 25.xii.1971, *Bell 1072* (B, BM); Cumberland East Bay, 7.i.1957, *Bonner 250* (BM); *indidem*, 31.i.1968, *Clarke CG285* (B); *indidem*, 1.ii.1968, *Clarke & Greene CG 314* (BM); Sphagnum Valley, 1.ii.1961, *Greene 1539* (NY); Cumberland West Bay, 11.ii.1961, *Greene 1890* (BM, S); Stromness Bay, 20.iii.1961, *Greene 3132* (B); *indidem*, 23.iii.1961, *Greene 3235* (NY, S); Cumberland West Bay, 30.iii.1961, *Greene 3445* (NY); Nadesvijold Glacier, 22.i.1964, *Longton 264* (BM); Jasm Harbor, 23.vi.1902, *Skottsberg s.n.* (S); *indidem*, 23.vi.1902, *Skottsberg 404* (S); 1933, *Troin 77* (as *B. skottsbergii*) (BM).

- **TIERRA DEL FUEGO:** Hito XIX, 6.ii.1842, *Castellaius s.n.* (BA); Rio Grande, 23.i.1896, *Dusén s.n.* (as *B. turgens*) (S); Prope Porvenis, 22.xii.1895, *Dusén 105* (as *B. subpilosum*) (S); Porvenis, 22.xii.1895, *Dusén 126* (as *B. cuspidarioides*) (GB, H-BR, S, UPS); Rio Grande, 23.i.1896, *Dusén 153* (as *B. turgens*) (FI, H, H-BR, S, UPS); Rio Grande, 23.i.1896, *Dusén 167* (as *B. turgens*) (UPS); Rio Azopardo, 1.iii.1896, *Dusén 201* (with *B. rutabulum*) (as *B. majusculum*) (S); Hermite Island, *oper s.n.* (as *Hypnum albicans*) (BM); *indidem*, *Hooker s.n.* (as *Hypnum rutabulum* var. *2*) (BM, H, H-SOL); *indidem*, *Lyell 3* (BM); Fuegia Media, 14.xii.1928, *Roivainen s.n.* (as *B. turgens*) (L); Fuegia Media, 20.xii.1928, *Roivainen s.n.* (CANM); Monte Buckland, 23.ii.1929, *Roivainen s.n.* (S); Ushuaia, 11.iii.1902, *Skottsberg 119* (as *B. subplicatum* var. *dilaceratum*) (PC, S).

Brachythecium zanonii

DOMINICAN REPUBLIC: La Estrelleta, 16.iii.1981, *Buck 4564* (NY).

HAITI: Sud'est, 19.ii.1981, *Adams & Zanoni* (NY); South of Kenscoff, 18.v.1941, *Bartlett 17698* (as *B. pseudo-laetum*) (MICH); South of Kenscoff, 18.v.1941, *Bartlett 17726* (as *B. pseudo-laetum*) (MICH); Sud'est, 21.xi.1982, *Buck 9440* (NY); Furcy, 26.v.-15.vi.1920, *Leonard 4351d* (NY).

VITA

Kenneth Dale McFarland was born in Xenia, Ohio, on July 7, 1950. He attended elementary schools in that city and was a graduate from Xenia High School in June 1968. The following September, he entered Central State University in Wilburforce, Ohio, and in June 1972, he received a Bachelor of Science degree in Biology. In the fall of 1972, he accepted a teaching assistantship from the Botany Department at Ohio University at Athens, Ohio, and began study toward a master's degree. This degree was awarded in March 1975.

After a two-year research position at the Department of Botany, The University of Tennessee at Knoxville (UTK) working with Dr. A. J. Sharp on the moss flora of Mexico project, he entered the graduate program in the Department of Botany at UTK in September 1977. As a full-time graduate student with a graduate teaching assistantship until August 1981, Mr. McFarland pursued his studies. From September 1981 until September 1986, he was a full-time instructor, and from then until August 1988, a full-time lecturer in the Department of Botany at UTK with responsibilities divided between teaching in the General Botany course and managing the greenhouse facilities in the Botany Department. He received the Doctor of Philosophy in August 1988 and continues with his position in the Department of Botany at UTK.