Seville Flowers Mosses: Utah and the West
Nomenclatural clarifications and updates

William A. Weber

For bryologists studying mosses in the interior western United States, Seville (Bill) Flowers' *Mosses: Utah and the West*, published in 1973 by the Brigham Young University Press, is by far the best single source. Being a posthumous publication, it probably was not completed to Bill's satisfaction. The scientific editing was taken up by Howard Crum, who revised it extensively. Dr. Arthur Holmgren, of Utah State University, saw it through the press. The book contains some of the most handsome original illustrations of mosses ever made, all by the author, and he used a unique method of pagination. In addition to standard page numbers, the families were given consecutive numbers (for example 10 for Pottiaceae) and each paragraph is numbered in the family treatment, e.g. 10:1, 10:2. Within the families the genera are numbered from one onward. The introduction is one of the clearest I have found for introducing students of bryology.

It is obvious that Flowers never completely unraveled the complexity of forms in a few large genera (*Bryum, Brachythecium*) that are still in need of clarification, but he worked at it mightily, making permanent slides of a great many specimens. He also planned to distribute an exsiccati of a hundred sets but did not live to do it. He was a great teacher, but somehow he found time to be close to his students, take them in the field, carry a heavy teaching load, and he spent what must have been enormous amount of time making his magnificent India Ink drawings, a few of which I once had the privilege of placing on display at the Hunt Botanical institute in Pittsburgh.

Bill Flowers was very helpful to me as I began to work on the bryophytes of Colorado. The University of Colorado Herbarium and the University Archive were very fortunate to receive his collections, collecting notebooks, and original art work, and to distribute his exsiccati to other herbaria. It was doubly fortunate for western American bryology that his collection remained in the West where it will be close at hand for future bryologists.

More than two decades have gone by since the book was published, and although it has been a great boon to me in my work with the Colorado flora, I realize that the field has developed to an enormous extent. The multi-volume *Bryophyte Flora of North America* is now in full swing, and many workers have been drawn

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from all over the world to contribute to the assembly of the most up-to-date information. Through no fault of its own, the nomenclature of Flowers' *Mosses: Utah and the West* has become out of date, and the names he used are not always recognized or remembered. Many families and genera have been broken up (in his day almost all of the pleurocarpous mosses in the flora belonged to the Hypnaceae!). In order for amateurs to make better use of the book, I feel it will be useful to have a list of his names and what they mean in today's taxonomy.

I have gone through text and made two lists of species, one in order of appearance (page number) and one in alphabetic order (with authorities). Many of my entries consist of forwarding addresses, i.e., changes of name to reflect current generic concepts; others are statements of my best judgment as I have been able to compare Utah with Colorado taxa. I am fairly sure of most of my statements, but they nevertheless are only points of view. I have not had time to study some critical specimens in depth. My observations may be considered to be educated guesses. They are not given to the reader as Gospel, and are offered for what they are worth. Anyone owning the book can enter these notations on the proper pages. I am certain that these lists will help every serious user of Bill's wonderful book.

I am very much indebted to some other bryologists whose help has been freely given me. Among them are: Bruce Allen (*Fontinalis*), Hans Blom (*Schistidium*), David Cooper (fen mosses), Howard Crum (minute pleurocarps), Patricia Eckel (*Tortella*), Jan-Peter Frahm (*Campylopus, Paraleucobryum*), Henk Greven (*Grimmia*), Dana Griffin III (*Anacolia*), Roxanne Hastings (*Coscinodon*), Lars Hedenäs (*Amblystegiaceae*), Fred Hermann (Colorado), Diana Horton (*Encalypta*), Bob Ireland (*Dicranum*), David Jamieson (*Hygrohypnum*), Timo Koponen (Mniaceae), Brent Mischler (*Syntrichia*), Barbara Murray (*Andreaea*), Ryszard Ochyra (*Palustriella*), Jon Shaw (*Pohlia*), Wilf Schofield (Hypnum), John Spence (*Bryum*), Toby Spribille (Montana taxa), Dale Vitt (*Orthotrichum*), Richard Zander (*Pottiaceae*), and Bill Steere (Arctic mosses).

LIST 1. WITH THE TAXA ARRANGED BY PAGE REFERENCE

88. *Sphagnum recurvum* = *S. teres*
89. *S. capillaceum*: Probably *S. russowii*
93. *Fissidens limbatus* = *F. bryoides*
103. *Ceratodon conicus*. Probably a form of *C. purpureus* with excurrent costa. Flowers admits "many intergradations."
112. *Dicranella schreberiana* = *Anisothecium schreberianum.*
124. *Weissia tortilis* = *W. eutyches*
126. *Weissia perligulata* = *Trichostomum sweetii.*
128. *Gymnostomum recurvirostrum* = *Hymenostylium recurvirostrum*

139. *Tortella nitida.* Erroneous identification of *T. alpicola.*
146. *Didymodon trifarius* (of American authors) = *D. vinealis* var. *luridus.*
151. *Barbula cruegeri* = *B. indica*
156. *Barbula fallax* = *Didymodon fallax*, possibly correct but also likely to be *D. ferrugineus*
155. *Barbula acuta* = *Didymodon rigidulus*
159. *Barbula bescherellei* = *Didymodon rigidulus*
160. *Barbula vinealis* = *Didymodon vinealis*
161. *Barbula cylindrica* = *Didymodon vinealis*
164. *Phascum cuspidatum* = *Tortula acaulon*
166. *Pottia heimii* = *Hennediella heimii*
168. *Pottia nevadensis* = *Tortula nevadensis*
169. *Pottia arizonica* = *Microbryum starckeanum*
169. *Pottia latifolia* = *Stegonia latifolia*
176. *Aloina pilifera* = *A. bifrons*
178. *Crossidium griseum* = *C. squamiferum*
182. *Crossidium desertorum* = *C. crassinerve*
185. *Desmatodon latifolius* = *Tortula euryphylla*
186. *Desmatodon plinthobius* = *Tortula plinthobia*
188. *Desmatodon obtusifolius* = *Tortula obtusifolia*
191. *Desmatodon laureri* = *Tortula laureri*
193. *Desmatodon cernuus* = *Tortula cernua*
194. *Desmatodon convolutus* = *Tortula atrovirens*
201. *Tortula inermis* = *Syntrichia inermis*
202. *Tortula brevipes* = *cf. Tortula muralis*
204. *Tortula intermedia* = *Syntrichia intermedia*
206. *Tortula princeps* = *Syntrichia princeps*
206. *Tortula bistratosa* = *Syntrichia caninervis*
207. *Tortula norvegica* = *Syntrichia norvegica*
211. *Tortula papillosissima* = *Syntrichia papillosissima*
212. *Tortula ruralis* = *Syntrichia ruralis*
214. *Tortula ruraliformis* (American plants) = *Syntrichia ruralis*
216. *Scopelophila latifolia* = *Crumia latifolia*
233. *Grimmia agassizii* = *Schistidium agassizii*
234. *Grimmia atricha* = *Schistidium atrichum*
236. *Grimmia dupretii* = *Schistidium dupretii*
238. Grimmia alpicola = *Schistidium alpicola*
239. *Grimmia cinclidodontea.* Erroneous reports for *Grimmia (= Schistidium) occidentale*
241. *Grimmia apocarpa* = *Schistidium spp.* (true *S. apocarpum* not known from Utah).
242. *Grimmia apocarpa* var. *conferta* = *Schistidium confertum*
244. *Grimmia apocarpa* var. *ambigua* = *Schistidium ambiguum*

244. *Grimmia rauii* = *Jaffueliobryum rauii*
245. *Grimmia calyptrata* = *Coscinodon calyptratus*
252. *Grimmia donniana*. Probably does not occur in the American interior.
258. *Grimmia affinis* = *G. longirostris*
262. *Grimmia hartmanii var. anomala* = *G. anomala*
273. *Orthotrichum texanum* = *O. rupestre*
276. *Orthotrichum macounii* = *O. laevigatum.*
278. *Orthotrichum affine*. Attribution to Utah flora is incorrect., fide Vitt.
282. *Orthotrichum jamesianum* = *O. pellucidum*
288. *Orthotrichum strangulatum*. Erroneous reports of *O. cupulatum*, fide Vitt.
000. *Orthotrichum flowersii* Vitt. This was published in 1973, possibly after the book.
296. *Orthotrichum garrettii* = *O. diaphanum*
337. *Mielichhoferia macrocarpa* = *Bryum* sp. (fide Cox & Hedderson ined.)
350. *Pohlia rothii* = *P. drummondii*
360. *Bryum angustirete* = *B. algovicum*
364. *Bryum arcticum.* Identity questionable despite Andrews' acceptance.
368. *Bryum turbinatum* = *B.lisae.,* fide Spence (in litt.).
370. *Bryum creberrimum*. An Australian species. American collections are *B. lisae*, fide Spence (in litt.).
372. *Bryum lonchocaulon* = *B. lisae*, fide Spence (in litt.).
374. *Bryum capillare*. Misinterpretation. The correct name for our plant may be *Bryum flaccidum or B. subelegans*. Spence is revising the group.
378. *Bryum bicolor.* No Utah collections fide Vanderpoorten & Zartman (2002).
382. *Bryum argenteum* var. *lanatum* = *Bryum lanatum*, now recognized by Spence.
383. *Bryum sandbergii* = *Roellia roellii*
390. *Mnium orthorrhynchum.* American plants belong to *M. thomsonii.*
360. *Mnium cuspidatum* = *Plagiomnium cuspidatum*
392. *Mnium medium* = *Plagiomnium medium*
394. *Mnium affine*. Utah collections are *Plagiomnium ellipticum*
396. *Mnium punctatum* = *Rhizomnium*, either *R. pseudopunctatum* or *R. magnifolium*
400. *Thuidium abietinum* =*Abietinella abietina*
410. *Leskeella tectorum* = *Pseudoleskeella tectorum*
412. *Leskeella arizonae* = *Lescuraea arizonae*
417. *Eurhynchium substrigosum* = *Rhynchostegium pulchellum*
418. *Eurhynchium pulchellum* = *Rhynchostegium pulchellum*
426. *Brachythecium delicatulum* = *cf. B. oedipodium*
428. *Brachythecium suberythrorrhizon* = *B. erythrorrhizon*
432. *Brachythecium digastrum* = cf. misidentification of *B. erythrorrhizon*
434. *Brachythecium campestre* = cf. misidentification of *B. erythrorrhizon*
436. *Brachythecium oxycladon* = cf. misidentification of *B. erythrorrhizon*

438. *Brachythecium albicans* = cf. misidentification of *B. erythrorrhizon*
440. *Brachythecium starkei* = *B. oedipodium*
446. *Brachythecium asperrimum* = cf. misidentification of *B. erythrorrhizon*
448. *Brachythecium lamprochryseum* = cf. misidentification of *B. erythrorrhizon*
452. *Scleropodium tourretii*. Probably misidentification of *S. obtusifolium*
460. *Amblystegium juratzkanum* = *A. serpens*
464. *Amblystegium kochii* = *A. humile* (P. Beauv.) Crundw.
464. *Amblystegium compactum* = *Conardia compacta*
472. *Amblystegium fluviatile var. noterophilum* = *Amblystegium noterophilum*
474. *Campylium hispidulum*. American collections are *Campylophyllum sommerfeltii*
476. *Campylium chrysophyllum* = *Campyliadelphus chrysophyllus*
478. *Campylium stellatum* var. *protensum* = *C. protensum*
481. *Calliergon stramineum* = *Straminergon stramineum*
482. *Calliergon turgescens* = *Pseudocalliergon turgescens*
495. *Drepanocladus uncinatus* = *Sanionia uncinata*
500. *Drepanocladus fluitans* = *Warnstorfia fluitans*
502. *Drepanocladus exannulatus* = *Warnstorfia exannulata*
505. *Cratoneuron commutatum*. Not in America. Utah plants are *Palustriella falcata*
506. *Cratoneuron decipiens* = *Palustriella falcata*
515. *Hypnum hamulosum*. All such small specimens have turned out to be *H. revolutum*.
516. *Hypnum lindbergii* = *Calliergonella lindbergii*
518. *Hypnum pratense* = *Breidleria pratensis*
520. *Hypnum haldanianum*. No specimen was found in the Flowers herbarium. In Colorado, plants resembling this are slender forms of *Hypnum cupressiforme*, which, curiously, is not listed in the flora.
522. *Plagiothecium pulchellum* = *Isopterygiopsis pulchella*
423. *Plagiothecium muellerianum*. probably a misidentification of *Isopterygiopsis pulchella*.
524. *Platygyrium repens*. Probably a misidentification of *Homomallium mexicanum*, which is common in Colorado, but the specimen has not been studied.
528. *Orthothecium diminutivum* = *Isopterygiopsis pulchella*
529. *Neckera menziesii* = *Metaneckera menziesii*
536. *Fontinalis duriaei* = *Fontinalis hypnoides*
541. *Atrichum selwynii* = *Atrichum undulatum* var. *altecristatum*
543. *Pogonatum alpinum* = *Polytrichastrum alpinum*
544. *Polytrichadelphus lyallii* = *Meiotrichum lyallii*
548. *Polytrichum gracile* = *Polytrichastrum longisetum*

LIST 2. WITH THE TAXA ARRANGED IN ALPHABETICAL ORDER

Aloina pilifera = *A. bifrons* (De Not.) Delgadillo
Amblystegium compactum = *Conardia compacta* (C. M.) H. Robinson
Amblystegium juratzkanum = *A. serpens* (Hedw.) BSG
Amblystegium kochii = *A. humile* (P. Beauv.) Crundw.
Atrichum selwynii = *A. undulatum* (Hedw.) Beauv. var. *altecristatum* Ren. & Card.
Barbula acuta = *Didymodon rigidulus* Hedw.
Barbula bescherellei = *Didymodon rigidulus* Hedw.
Barbula cylindrica = *Didymodon vinealis* (Brid.) Zander
Barbula cruegeri = *B. indica* (Hook.) Spreng., fide Zander
Barbula fallax = *Didymodon fallax* (Hedw.) Zander. Possibly correct but also likely to be *D. ferrugineus* (Besch.) Hill
Barbula vinealis = *Didymodon vinealis* (Brid.) Zander
Brachythecium albicans = cf. misidentification of *B. erythrorrhizon* BSG
Brachythecium asperrimum = cf. misidentification of *B. erythrorrhizon* BSG
Brachythecium campestre = cf. misidentification of *B. erythrorrhizon* BSG
Brachythecium delicatulum = cf. *B. oedipodium* (Mitt.) Jaeg.
Brachythecium digastrum = cf. misidentification of *B. erythrorrhizon* BSG
Brachythecium lamprochryseum = cf. misidentification of *B. erythrorrhizon* BSG
Brachythecium oxycladon = cf. misidentification of *B. erythrorrhizon* BSG
Brachythecium starkei = *B. oedipodium* (Mitt.) Jaeg.
Brachythecium suberythrorrhizon = *B. erythrorrhizon* BSG
Bryum sandbergii = *Roellia roellii* (Broth. ex Roell) Andrews ex Crum
Bryum angustirete = *B. algovicum* Sendtn. ex C. M.
Bryum arcticum. Identity questionable despite Andrews' acceptance.
Bryum argenteum var. lanatum = *B. lanatum* P. Beauv.
Bryum bicolor. No Utah collections seen by Vanderpoorten & Zartman (2002).
Bryum capillare. Misinterpretation. According to Spence, the correct name for our plant may be *B. flaccidum* De Not. or *B. subelegans* Kindb.
Bryum creberrimum. An Australian species. American collections are *B. lisae* De Not., fide Spence (in litt.).
Bryum lonchocaulon .= *B. lisae* De Not., fide Spence (in litt.).
Bryum turbinatum = *B. lisae* De Not.
Calliergon stramineum = *Straminergon stramineum* (Brid.) Hedenäs
Calliergon turgescens = *Pseudocalliergon turgescens* (T. Jens.) Loeske
Campylium chrysophyllum = *Campyliadelphus chrysophyllus* (Brid.) Kanda
Campylium hispidulum. American collections are *Campylophyllum sommerfeltii* (Myrin) Hedenäs
Campylium stellatum var. *protensum* = *C. protensum* (Brid.) Hedenäs, ined.

Ceratodon conicus. Probably a form of *C. purpureus* (Hedw.) Brid. with excurrent costa. Flowers admits "many intergradations."

Cratoneuron commutatum. American plants are *Palustriella falcata* (Brid.) Hedenäs

Cratoneuron decipiens = *Palustriella falcata* (Brid.) Hedenäs

Crossidium desertorum = *C. crassinerve* (De Not.) Jur.

Crossidium griseum = *C. squamiferum* (Viv.) Jur.

Desmatodon cernuus = *Tortula cernua* (Hüb.) Lindb.

Desmatodon convolutus = *Tortula atrovirens* (Sm.) Lindb.

Desmatodon latifolius = *Tortula euryphylla* Zander

Desmatodon laureri = *Tortula laureri* (C. F. Schultz) Lindb.

Desmatodon obtusifolius = *Tortula obtusifolia* (Schwaegr.) Mathey

Desmatodon plinthobius = *Tortula plinthobia* Sull. & Lesq.) Austin

Dicranella schreberiana = *Anisothecium schreberianum* (Hedw.) Dix.

Didymodon trifarius (of American authors) = *Didymodon vinealis* (Brid.) Zander var. *luridus* (Hornsch. in Spreng.) Zander

Drepanocladus exannulatus = *Warnstorfia exannulata* (BSG) Loecke

Drepanocladus fluitans = *Warnstorfia fluitans* (Hedw.) Loeske

Drepanocladus uncinatus = *Sanionia uncinata* (Hedw.) Loeske

Eurhynchium pulchellum = *Rhynchostegium pulchellum* (Hedw.) H. Rob.

Eurhynchium substrigosum = *Rhynchostegium pulchellum* (Hedw.) H. Rob.

Fissidens limbatus = *F. bryoides* Hedw.

Fontinalis duriaei = *F. hypnoides* C. J. Hartm.

Grimmia affinis = *G. longirostris* Hooker

Grimmia agassizii = *Schistidium agassizii* Sull. & Lesq.

Grimmia alpicola = *Schistidium alpicola* (Hedw.) Limpr.

Grimmia ambigua = *Schistidium ambiguum* (C. M. & Kindb.) Blom

Grimmia apocarpa = *Schistidium spp.* (true *S. apocarpum* not known from Utah).

Grimmia apocarpa var. *conferta* = *Schistidium confertum* (Funck) BSG

Grimmia atricha = *Schistidium atrichum* (C. M. & Kindb.) Blom

Grimmia calyptrata = *Coscinodon calyptratus* (Hook. ex Drumm.) C. Jens. in Kindb.

Grimmia cinclidodontea. Erroneous reports for *Grimmia (=Schistidium) occidentale* Lawton

Grimmia donniana. Probably does not occur in the American interior.

Grimmia dupretii = *Schistidium dupretii* (Thér.) Blom

Grimmia hartmanii var. *anomala* = *G. anomala* Hampe

Grimmia rauii = *Jaffueliobryum rauii* (Aust.) Thér.

Gymnostomum recurvirostrum = *Hymenostylium recurvirostrum* (Hedw.) Dix.

Hypnum haldanianum = *Callicladium haldanianum* (Grev.) Crum. No specimen was found in the Flowers herbarium. Plants resembling this in Colorado

are slender forms of *Hypnum cupressiforme* Hedw., which, curiously, is not listed in the flora.

Hypnum hamulosum. All such small specimens have turned out to be *Hypnum revolutum* (Mitt.) Lindb.

Hypnum lindbergii = *Calliergonella lindbergii* (Mitt.) Hedenäs

Hypnum pratense = *Breidleria pratensis* (Koch ex Spruce) Loeske

Leskeella arizonae = *Lescuraea arizonae* (R. S. Williams) Wils. & Norris

Leskeella tectorum = *Pseudoleskeella tectorum* (Funck ex Brid.) Kindb. ex Broth.

Mielichhoferia macrocarpa = *Bryum* sp. (fide Cox & Hedderson ined.)

Mnium affine. Utah collections are *Plagiomnium ellipticum* (Brid.) Kop.

Mnium medium = *Plagiomnium medium* (BSG) Kop.

Mnium orthorrhynchum. American collections belong to *M. thomsonii* Schimp.

Mnium punctatum. Possibly Utah has only *Rhizomnium pseudopunctatum* (BSG) Kop., but Flowers was not clear about whether he has seen a second species, *R. magnifolium* (Horikawa) Kop.

Neckera menziesii = *Metaneckera menziesii* (Hook.) Steere

Orthothecium diminutivum = *Isopterygiopsis pulchella* (Hedw.) Iwats.

Orthotrichum affine. Attribution to Utah is incorrect, according to Vitt.

Orthotrichum flowersii Vitt. This was published in 1973, possibly after publication of the flora.

Orthotrichum garrettii = *O. diaphanum* Brid.

Orthotrichum jamesianum = *O. pellucidum* Lindb.

Orthotrichum macounii = *O. laevigatum* Zett.

Orthotrichum strangulatum. Erroneous reports of *O. cupulatum* Brid., fide Vitt.

Orthotrichum texanum = *O. rupestre* Schleich. ex Schwaegr.

Phascum cuspidatum = *Tortula acaulon* (L. ex With.) Zander

Plagiothecium muellerianum. Probably a misidentification of *Isopterygiopsis pulchella.*

Plagiothecium pulchellum = *Isopterygiopsis pulchella* (Hedw.) Iwats.

Platygyrium repens. Probably a misidentification of *Homomallium mexicanum* Card., which is common in southern Colorado, but the specimen has not been studied.

Pogonatum alpinum = *Polytrichastrum alpinum* (Hedw.) G. L. Smith

Pohlia rothii = *P. drummondii* (C. M.) Andrews

Polytrichadelphus lyallii = *Meiotrichum lyallii* (Mitt.) G. L. Merrill

Polytrichum gracile = *Polytrichastrum longisetum* (Sw. ex Brid.) G. L. Smith

Pottia arizonica = *Microbryum starckeanum* (Hedw.) Zander

Pottia heimii = *Hennediella heimii* (Hedw.) Zander

Pottia latifolia = *Stegonia latifolia* (Schwaegr. ex Schultes) Venturi ex Broth.

Pottia nevadensis = *Tortula nevadensis* (Card. & Thér.) Zander

Scleropodium tourretii. Probably misidentification of *Scleropodium obtusifolium*

Sphagnum capillaceum. Probably *S. russowii* Warnst.

Sphagnum recurvum = *S. teres* (Schimp.) Ångstr. ex C, Hartm.
Thuidium abietinum = *Abietinella abietina* (Hedw.) Fleisch.
Tortella nitida. A misidentification of *T. alpicola.*
Tortula bistratosa = *Syntrichia caninervis* Mitt.
Tortula brevipes = *cf. Tortula muralis* Hedw.
Tortula inermis = *Syntrichia inermis* (Brid.) Bruch
Tortula intermedia = *Syntrichia intermedia* Brid.
Tortula norvegica = *Syntrichia norvegica* Web. & Mohr
Tortula papillosissima = *Syntrichia papillosissima* (Coppey) Loeske
Tortula ruraliformis. American plants probably all belong to *Syntrichia ruralis* (Hedw.) Web. & Mohr
Tortula ruralis = *Syntrichia ruralis* (Hedw.) Web. & Mohr
Weissia perligulata = *Trichostomum sweetii* (Bartr.) Stark
Weissia tortilis = *Weissia eutyches* Zander

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Aulacomium androgynum excluded from Missouri and the Interior Highlands of North America

Carl Darigo[1] & Bruce Allen[2]

Aulacomnium androgynum (Hedw.) Schwaegr. was recently reported (Buck & Harris 2002) new to Missouri and the Interior Highlands. The specimen on which this record was based (*Buck 40028A* NY) had been separated from a collection of the parasitic alga *Epigloea pleiospora* Döbbeler. The *Aulacomnium* collection was of interest to several projects cataloguing the Missouri moss flora, as well as the state's rare and endangered species. As a result of this interest, we borrowed the collection in order to verify its identity.

The collection is very small, consisting of five or six small plants. Nevertheless, on the basis of plant size, habit, its distinctive yellow-green color, inflated alar cells, and upper leaf cell characteristics (see Crum & Anderson 1981), we have no hesitation in calling this collection *Aulacomnium palustre* (Hedw.) Schwaegr. Although *A. palustre* is a common moss in Missouri, the collection does represent a Madison County record (see Gier 1955, Redfearn 2002).

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The Bryophyte Flora of Cunningham Park and Alley Pond Park, Queens County, New York. A New Flora From Old Specimens.

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Cunningham Park and Alley Pond Park are located in Queens County, in the western portion of Long Island, New York. These two connected parks combine for a total of approximately 578 hectares of mixed vegetation types. Both parks consist of natural forest areas as well as "mixed use" areas such as athletic fields. The purpose of this study is to document the previous Bryophyte flora of the two parks so that current and future studies will have a historical record for comparative purposes. The Vascular flora, forest types, and canopy composition have all been well documented in literature (Greller, 1977, Greller and Garcia, 1986 Lefkowitz and Greller, 1973, Stalter 1981).

This flora is derived from hundreds of specimens collected by Jon A. Sperling between the years 1975 and 1986 during frequent forays into both parks throughout all seasons. The specimens have recently been checked and annotated by both authors and deposited in the Herbarium of Queens College of the City University of New York. The Sphagnaceae had been annotated in 1986 by Richard E. Andrus, of the State University of New York at Binghamton, and those identifications are used here.

In total, 31 families of bryophytes, consisting of 77 species were recorded from the parks. Nomenclature for Class Musci follows that of (Ketchledge, 1980) and Hepaticae follows (Schuster, 1953). Identification in the field and lab was done using the keys provided by Andrus (1980), Crum (1983), Grout (1916), Conard and Redfearn (1979), and Schuster (1953).

Class MUSCI

Amblystegiaceae

Amblystegium serpens (Hedw.) B.S.G.
A. juratzkanum Schimp.
Calliergon stramineum (Brid.) Kindb.
Campylium hispidulum (Brid.) Mitt.
Drepanocladus exannulatus (B.S.G.) Warnst.

Aulacomniaceae

Aulacomnium palustre (Hedw.) Schwaegr.

Brachytheciaceae

B. oxycladon (Brid.) Jaeg. & Seuerb. var. *oxycladon*

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Brachythecium calcareum Kindb.
B. rutabulum (Hedw.) B.S.G.
B. salesbrosum (Web. & Mohr.) B.S.G.
Eurynchium hians (Hedw.) Sande Lac
Rhynchostegium serrulatum (Hedw.) Jaeg. & Sauerb.

Bryaceae
Bryum argenteum Hedw.
B. caespiticium Hedw.
B. capillare Hedw. var. *flaccidum* (Brid.) B.S.G.
Pohlia nutans (Hedw.) Lindb.

Dicranaceae
Bruchia flexulosa (Sw. *ex* Schwaegr.) C.Muell.
Dicranella heteromalla (Hedw.) Schimp.
Dicranum flagellare Hedw. var. *minutissimum* Grout.
Dicranum fulvum Hook.

Ditrichaceae
Ceratodon purpureus (Hedw.) Brid.
Ditrichum pallidum (Hedw.) Hampe.
Pleuridium subulatum (Hedw.) Rabenh.

Entodontaceae
Entodon cladorhizans (Hedw.) C. Muell.
E. seductrix (Hedw.) C. Muell.

Fissidentaceae
Fissidens taxifolius Hedw.

Funariaceae
Funaria hygrometrica Hedw. var. *Hygrometrica*
Physcomitrium pyriforme (Hedw.) Hampe.

Grimmiaceae
Grimmia apocarpa Hedw. var. *apocarpa*

Hypnaceae
Callicladium haldanianum (Grev.) Crum.
Hypnum curvifolium Hedw.
H. fertile Sendtn.
Isopterygium elegans (Brid.) Lindb.
I. tenerum (Sw.) Mitt.
Platygerium repens (Brid.) B.S.G.

Leucobryaceae
Leucobryum glaucum (Hedw.) Angstr. *ex* Fr.

Leskeaceae
Leskea gracilescens Hedw.

Mniaceae
Mnium cuspidatum Hedw.
Mnium hornum Hedw.

Polytrichaceae
Atrichum angustatum (Brid.) B.S.G.
A. crispum (James) Sull.
Pogonatum pensilvanicum (Hedw.) P.-Beauv.
Polytrichum commune Hedw.
P. juniperinum Hedw.
Pottiaceae
Barbula unguiculata Hedw.
Desmatodon obtusifolius (Schwaegr.) Schimp.
Weissia controversa Hedw.
Sphagnaceae
S. fimbriatum Wils.
S. lescurii Sull.
S. palustre L.
S. platyphyllum (Braithw.) Warnst.
S. subsecundum Nees.
Tetraphidaceae
Tetraphis pellucida Hedw.
Thuidiaceae
Haplocladium microphyllum (Hedw.) Broth.
Helodium paludulosum (Sull.)Aust.
Thuidium delicatulum (Hedw.)B.S.G. var. *delicatulum*

Class HEPATICAE

Calypogeiaceae
Calypogeia fissa (L.) Raddi.
Cephaloziaceae
Cephalozia bicuspidata (L.) Dum.
C. lunulifolia (Dum.) Dum.
C. pleniceps (Aust.) Lindb.
Odontoschisma prostratum (Sw.) Trev
Cephaloziellaceae
Cephaloziella rubella (Nees.) Warnst.
Codoniaceae
Fossombronia wondraczekii (Corda.) Dum.
Jungermanniaceae
Gymnocolea inflata (Huds.) Dum.
Jamesoniella autumnalis (D.C.) Steph.
Jungermannia leiantha Grolle.
J. gracillima Sm.
Lophocoleaceae
Lophocolea heterophylla (Schrad.) Dum
Pallaviciniaceae

Pallavicinia lyellii (Hook.) Carruth.

Pelliaceae

Pellia epiphylla(L.) Corda.

Ptilidiaceae

Ptilidium pulcherrium (G. Web.) Hampe.

Kurzia sylvatica (Evans) Grolle.

Ricciaceae

Riccia fluitans L.

Ricciocarpus natans (L.)Corda.

Scapaniaceae

Scapania nemerosa (L.) Dum.

Class ANTHOCEROTAE

Anthocerotaceae

Anthoceros punctatus L.

Phaeocerus laevis (L.) Prosk.

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Exploring the Effects of Mollusk Herbivory on an Epiphytic Lichen Community

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Abstract. We excluded mollusks from shrub stems to explore possible effects of herbivory on understory lichen communities in Pacific Northwest forests. Epiphytes on shrubs were compared between exclusion stems and control stems over a 2-year period. Results suggested that crustose lichens in these communities may be significantly affected by mollusk herbivory.

Introduction

We frequently encounter evidence of mollusk herbivory on lichens in the wet temperate forests of the Pacific Northwest of North America (PNW). Thus, we asked whether slugs and snails influence lichen communities in these, and other forests, where mollusks are common.

Mollusk herbivory has been shown to affect calcicolous lichen communities in other habitats, including the Negev desert of Israel and limestone grasslands in Sweden (Jones and Shachak 1994; Fröberg et al. 1993). The abundance of slugs and snails in PNW forests, along with the markings left by their radulas after grazing, would suggest they may also influence communities of epiphytic lichens. Given that various species of slugs and snails have shown preferences for some lichen species over others (Lawrey 1980; Baur et. al 1994), they may be affecting the composition of some PNW lichen communities as well as lichen abundance.

We chose to look for potential effects of mollusk herbivory by examining lichen communities on understory hardwoods. Our sample size was small and the duration of the experiment short, but we gained knowledge that could be useful to others. Hardwoods were chosen as substrate because they are easily accessible and commonly harbor an abundance of lichens. Following a traditional approach to the study of herbivory, we attempted to exclude mollusks from selected shrub stems and observe any changes in the abundance of epiphytes on the selected stems relative to control stems. As slugs and snails make their homes in the duff, our first objective was to find a way to prevent them from crawling up the stems to graze. Then, while testing methods, we observed changes in the epiphytic communities over a 2-year period.

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Study Site

Our study plot was located in the MacDonald-Dunn State Forest, near the town of Corvallis, Oregon, at 44° 36'N 123° 20'W. The area receives approximately 127 cm of precipitation annually and mollusks are common forest inhabitants. We chose an area within the forest where hardwood shrubs were common in the understory, and evidence of grazing was apparent on the epiphytic lichens. As with other forests in the region, *Pseudotsuga menziesii* was the dominant overstory tree. *Acer circinatum* was the dominant understory shrub in the area, and our chosen substrate for this study.

Methods

Development

Prior to the start of the experiment, we used recently captured slugs of various sizes to test potential methods of mollusk exclusion. Two main methods were tested: copper tape, which is sold as a barrier for controlling garden slugs (e.g. SureFire Products by Consep, Inc., Bend, OR), and a physical barrier. The copper tape reportedly works as a sort of "electric fence", with a slug or snail receiving a slight shock on contact (Gordon 1996). Our physical barrier was empty space between the ground and the study stem, the stem being held in space with monofilament fishing line tied to nearby stems; although the mollusks could access the isolated stem via the fishing line, we presumed this would be much more difficult than crawling along the larger more stable surface of an adjacent stem. Neither of our trial methods would prevent slugs from accessing stems from above, as some species are capable of lowering themselves from mucous cords (Gordon 1996), but we presumed this would be an infrequent occurrence as we had never seen a slug in midair.

In our trials, the fishing line was a much more effective barrier than the copper tape. To facilitate these trials, we placed slugs on suspended stems and watched as they tried to exit, an approach that was much more reasonable than waiting indefinitely for them to attempt to move onto a stem. We found that, in these conditions, slugs would readily crawl over copper tape wrapped around the stem, but appeared to have extreme difficulty extending themselves out across the monofilament line. One very small slug managed to crawl across a section of monofilament, but all others would only extend part of their bodies out along the line, searching the surroundings for other surfaces while keeping an anchor on the stem from which they had left, and finally retreating back to the stem.

Application

Within our chosen study area we searched for shrubs that had at least 2 stems with similar lichen abundances, where any of the chosen stems could be cut and hung in their original position from stems above. This proved to be challenging criteria, though we did manage to find 14 pairs. Stems were then randomly