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RESEARCH ARTICLE

BRYOPHYTE SURVEY OF THE COLLEGE WOODS AND CAMPUS OF THE COLLEGE OF WILLIAM AND MARY

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ABSTRACT

While botanists search for larger flora – trees, shrubs and herbaceous plants — small plants like bryophytes are easily overlooked. In many areas of Virginia that are well documented with vascular plants there are sparse collections of bryophyte flora. This is especially true in the Coastal Plain where habitats are often less suitable for mosses, liverworts and hornworts that prefer cooler moist, shaded areas. This study is part of an effort by the author to add bryophytes to plant collections of the Coastal Plain. Throughout 2016-2022, 176 bryophyte collections were made representing 57 moss species and 23 liverworts. Among these, 39 mosses and 17 liverworts had not been reported by earlier collectors from this study area. Ten mosses and four liverworts were new records for James City County. Eight mosses and two liverworts show a disjunct distribution in which they are present in the mountain/western Piedmont counties but are absent, or largely absent, from the remainder of the Piedmont. All of these except one moss show a significantly stronger representation in the mountains/western Piedmont than in the coastal plain, a pattern that has been documented for numerous species of vascular plants.

Keywords: disjunct, liverwort, moss, non-native.

INTRODUCTION

Traditionally, the term “bryophytes” has referred to three groups of non-vascular plants now recognized as three divisions within the plant kingdom: Bryophyta (mosses); Marchantiophyta (liverworts); and Anthocerotophyta (hornworts). These are ancient plants, mostly visually unchanged since the early Paleozoic Era (400 million years ago) when aquatic plants transitioned to the land environment. With no vascular tissue to conduct water and nutrients, bryophytes absorb water directly through their thin cell walls. They are distinguished from other land plants by a

unique combination of two characters: they lack vascular or conducting tissue and they reproduce by single-celled spores.

Bryophytes are found worldwide from the Arctic to temperate and tropical forests and deserts. In woodlands, mats of green cover tree bark, bare soil, and boulders, and in developed areas they grow in asphalt paths, on shingles, and on cinder blocks. These tiny plants are often the first colonists of bare soil, tree bark, and rocks. Spores are blown onto soil or into tiny rock crevices, where rain or splashed water stimulate their germination. The emerging plant uses dust particles for mineral nutrients and creates a microhabitat for small organisms and other vegetation. In dry regions they help stabilize soil.

These plants require two forms of reproduction, alternating between haploid sexual and diploid nonsexual phases. The haploid sexual phase is at first minute and alga-like, from which the leafy form will emerge. Eggs and sperm are produced at the top of the haploid leafy forms, and after rain or heavy dew, sperm swim to fertilize eggs. After fertilization at the top of haploid female plants, a diploid stalk with a capsule forms that when mature will by meiosis release haploid spores that will allow rapid, long-distance dispersal into a variety of suitable habitats.

Since bryophyte identification requires a unique suite of references and microscopic examination of their structures, these plants have been under-represented in collections and studies of Virginia flora. Botanists in the 18th and 19th century primarily focused on vascular plants, but some also made limited collections of bryophytes. In the 20th century studies of bryophytes in the eastern area of Virginia were reported by several authors (Breil 1996, 2003; Milby & Metzgar, 2021).

Collections in the southeast are in the physiographic region of Virginia known as the Coastal Plain, extending from the Fall Zone (roughly the location of Interstate-95) eastward to the Atlantic Ocean. It is a terraced landscape formed from ancient shorelines and sediments eroded from the Piedmont region (Fig. 1).

The College of William and Mary is within James City County between two rivers, James and York, and is part of the Chesapeake Bay estuarine system (Fig. 1). Changes in political boundaries now place College properties in the City of Williamsburg but it currently is considered part of James City County for purposes of species distribution information (Digital atlas of the Virginia flora 2016). Habitats on college property include upland forests, swampy lake edges, wooded slopes and ridges, and lawns in developed areas. A significant portion of the College Woods supports stands of mature hardwoods and has many calcareous ravines, areas where fossiliferous soils are exposed, primarily at or below the 50 ft. contour (Gerald Johnson, pers. comm.).

Owned by the College of William and Mary, the approximately 800-acre College Woods includes Lake Matoaka, a 40-acre man-made lake created in the early 18th century as a millpond when the original creek system was dammed (<https://www.wm.edu/as/kecklab/lakematoaka/>). Interest in conservation and documentation of plant and animal species on College property has resulted in numerous previous and ongoing studies by faculty, staff and students. Vascular plant surveys by students Allene Barans (1968, 1974), Virginia Crouch (1989) and Caitlin Cyrus (2016) are accessible at the William & Mary Swem Library, with specimens on deposit in the William and Mary Biology Department Herbarium (WILLI).

The College of William and Mary has not hosted many people interested in collecting bryophytes. A few collections were made in the 1940's-1970's by Bayard H. Long 1940 (2); J. C. Strickland, 1942 and 1944 (3); Bernard Mikula, 1951 (1); Elva Lawton 1964; (1) P. Sandman 1973 (2); and Phyllis Appler, 1974 (1). However, from 1946-1954 Paul Patterson made significant collections on college property – 27 moss species and 6 liverworts. The present study is part of a long-

term goal by the author to add to bryophyte inventory of Virginia by surveying portions of this under-collected region.

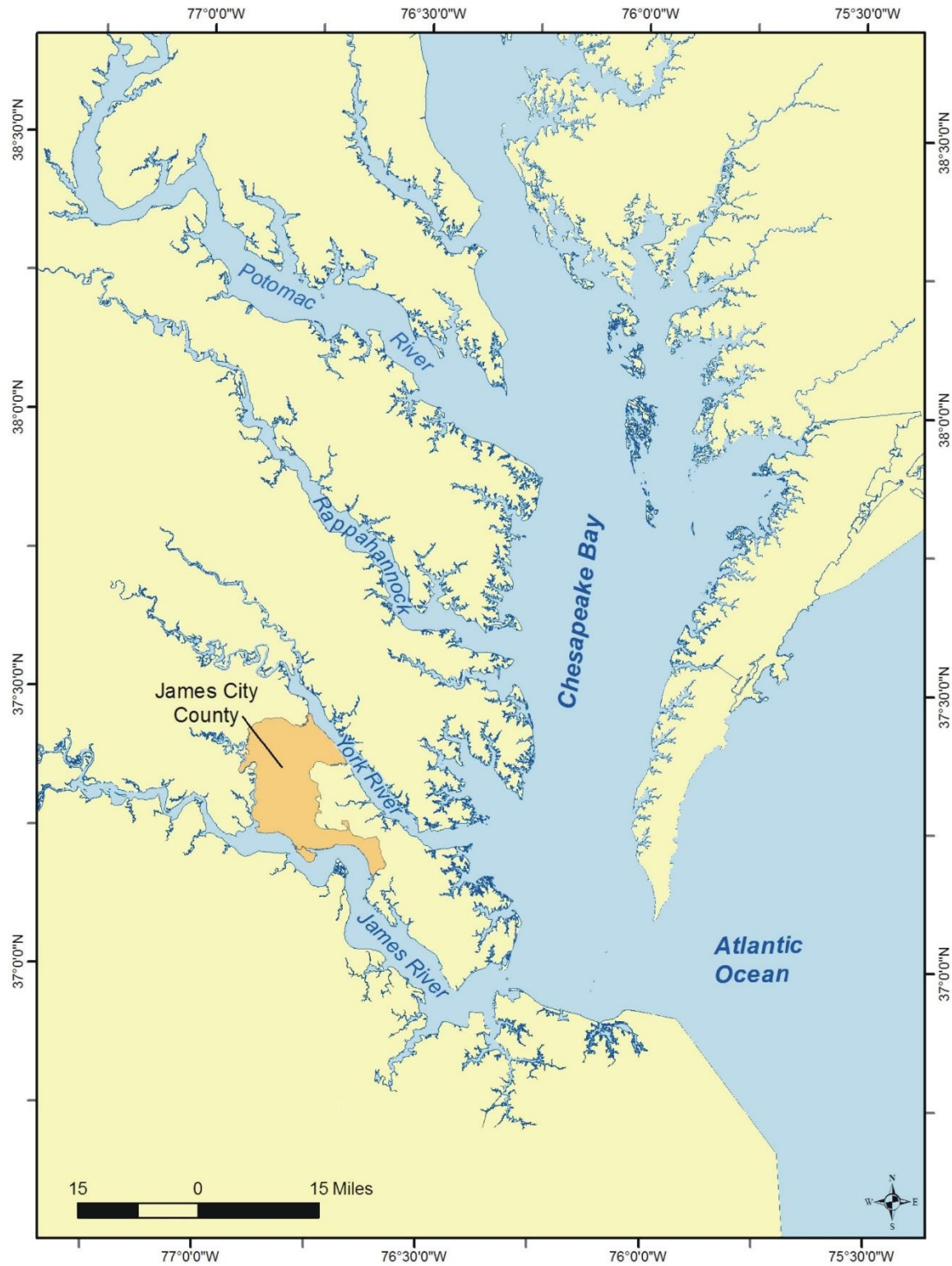


Figure 1. Location of James City Co. within the Chesapeake Bay estuarine system.

MATERIALS AND METHODS

From 2016-2022, the author collected and identified bryophytes (mosses and liverworts, no hornworts were found) in areas of the College Woods that include walking trails off Compton Drive, Mill Neck Road, Strawberry Plains Road, Dupont Bridge, and ravines, bottomlands, and forested uplands of these and similar areas. Collections from the College campus included the areas surrounding the Sunken Gardens, Crim Dell, Wildflower Refuge and adjacent dormitory sites. These plants are found on tree bark, stream banks, bare soil, lawns, brick walls and rotting wood. References used in identifications include Allen (2005, 2014), Breil (1996, 2003), Crum & Anderson (1981), Hicks (1992), Flora of North America (2007, 2014), Jenkins (2020) and the Digital atlas of the Virginia flora (2016).

This study reports current as well as historical bryophyte collections from the study area. Bryophyte collections by P. Appler (CINC), E. Lawton (WTU), B. Long (PH), B. Mikula (NY), P. Patterson (NY) (TENN), P. Sandman (MO), and J.C. Strickland (URV) are vouchered in various university herbaria. In these collections the habitat is often described simply as “College Woods”; without GPS data it is impossible to know if the area collected is actually in the present College Woods or within the more recently developed areas of the College campus proper as delineated today. Specimens recorded as “College Creek” are presumed to be the area south of Lake Matoaka Dam.

RESULTS AND DISCUSSION

Throughout 2016-2022, the author made 176 bryophyte collections that included species found also by earlier collectors. Among these, 39 mosses and 17 liverworts had not been previously reported from this study area. Ten mosses and four liverworts were new records for James City County. With few exceptions, most bryophytes that were collected are common in Virginia, distributed throughout the state. Twenty-six mosses and three liverworts in this list were collected earlier in the College Woods and campus and also in this survey. Earlier collectors found six moss species and three liverworts that were not seen in the current survey. Some areas of the William and Mary College Woods and campus are difficult to access and may harbor additional bryophyte taxa.

Seven species that have been collected infrequently in the state of Virginia are *Cyrto-hypnum minutulum*, *Fissidens obtusifolius*, *Gemmabryum dichotomum*, *Leptobryum pyriforme*, *Pohlia annotina*, *Ptychomitrium drummondii*, and *Riccia beyrichiana* (Fig. 2). Scattered across the state with fewer than 20 collections is *Tortula muralis*, non-native to Virginia. This plant grows abundantly in brick mortar throughout the developed areas of the College.

In the present study, eight mosses and two liverworts show a disjunct distribution in which they are present in the mountain and western Piedmont counties but are absent or largely absent from the remainder of the Piedmont, and have a secondary distribution in the Coastal Plain. This pattern has been documented for numerous species of vascular plants which are largely restricted to deep calcareous ravines in the Coastal Plain. (Harvill, 1965; Ware & Ware, 1992).

These ten bryophytes, with their habitat/microhabitat where collected for this study, include the mosses *Cyrto-hypnum minutulum* (“woods”, Patterson, no microhabitat given), *Homomallium adnatum* (hardwood bark, woods and campus), *Tetraphis pellucida* (hardwood bark in swampy area by lake); *Rhodobryum ontariense* (Fig. 3) (in soil at base of hardwood tree on wooded

ravine slope); *Pohlia wahlenbergii* (creek bank on campus), *Hypnum cupressiforme* (brick walkway on campus), *Leptobryum pyriforme* (brick wall and moist soil on campus), and *Schistidium viride* (Fig. 4) (concrete on campus); and the liverworts *Reboulia hemisphaerica* (no habitat recorded, Patterson) and *Frullania riparia* (brick wall on campus).



Figure 2. *Riccia beyrichiana*. Photo by Helen Hamilton.



Figure 3. *Rhodobryum ontariense*. Photo by Bob Klips.

All of these disjunct species, except *Pohlia wahlenbergii* (disturbed clay or sandy soil), are known sometimes to occur on calcareous substrate (Flora of North America online, 2022.) For example, *Rhodobryum ontariense*, a moss, is widespread in the mountains, collected in only two counties of the western Piedmont, but found in six counties of the Coastal Plain, where it grows in fossiliferous soils on ravine slopes (Digital Atlas of Virginia Flora, 2016). Both the author and Paul Patterson have made a collection of this interesting moss in the College Woods. *Reboulia hemisphaerica*, a liverwort, occurs in many counties in the mountains and Piedmont but is found in only four counties of the Coastal Plain in calcareous soils with shell deposits (Digital atlas of Virginia flora, 2016). Future work will be required to determine whether the disjunction patterns of these ten bryophytes are for the same historical or ecological reasons as the vascular plant disjunctions.

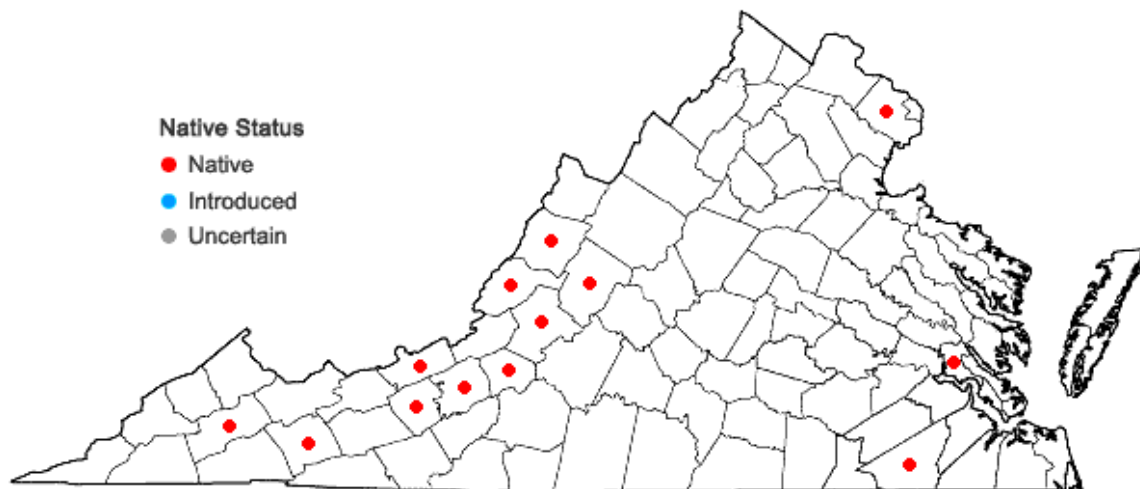


Figure 4. *Schistidium viride*, a Mountain/Coastal Plain disjunct (www.vaplantatlas.org).

Ten mosses and four liverworts that are new to the college database are mostly common throughout Virginia. The author made the only collection of a common, weedy moss, *Weissia controversa*, (Fig. 5) that grows profusely on rotting wood, soil, rock, brick mortar and in disturbed areas. This moss is so common it was no doubt overlooked earlier.

Of the 39 Mosses and 17 liverworts not previously located in the William and Mary College Woods and Campus, three mosses in the family Grimmiaceae - *Grimmia* sp., *Orthotrichum* sp., and *Schistidium viride*, were collected from concrete and brick mortar. These mosses are common on metamorphic and igneous rocks of the mountain and Piedmont regions of Virginia but are located here on calcareous manmade substrates. The identification of *Grimmia* and *Orthotrichum* to species is best left to experts familiar with the genus. *Schistidium viride* is a new name for *Grimmia latifolia*, reported as endemic to and widely distributed in eastern North America, common in areas with calcareous rock and artificial habitats, e.g., on buildings and wall-tops (Blom & Darigo, 2009).

The moss *Tetraphis pellucida* grows on the banks of wet ravines of other locations in James City County but only a few stems with gemmae cups were collected from the base of a hardwood tree in a swampy area by Lake Matoaka.

Added to the college bryophyte database is an interesting liverwort, *Bazzania trilobata* (Fig. 6), growing in cool, shady habitats. It is common in mountains but grows in the Piedmont and Coastal Plain only on moist bluffs and bogs. The leaves have three points and curve downward,

resembling a millipede. Another liverwort, *Riccia beyrichiana*, grows in several areas of James City County but only a few rosettes were found on campus in the brick mortar of a shaded walkway.



Figure 5. *Weissia controversa*. Photo by Helen Hamilton.



Figure 6. *Bazzania trilobata*. Photo by Helen Hamilton.

Collected earlier in the College Woods and campus but not in the present study are three liverworts. One is *Reboulia hemisphaerica*, discussed above. *Plagiochila porelloides* grows in the mountain and Piedmont regions of Virginia, but is known from only two counties in the Coastal Plain. *Riccia fluitans* is a plant of the Coastal Plain in ditches and ponds, with two collections in the Piedmont and only one in the mountain region. These plants likely still exist in appropriate habitats on college property.

Most of the mosses collected earlier in the College Woods and campus but not in the present study are found throughout Virginia and are very likely still on college property. For example, *Cyrto-hypnum minutulum* is tiny and easily overlooked on rotten logs and tree bases.

LIST OF SPECIES

Nomenclature for mosses follows *Flora of North America*, vols. 27 and 28 (2007, 2014) and Digital atlas of the Virginia flora (2016). Nomenclature for liverworts follows Hicks (1992) and Digital atlas of the Virginia flora (2016).

For each entry, an asterisk before the name of the species means this was a county record for James City County (with the City of Williamsburg included). After the name of the species and the authority, a description of habitat(s) is given. The letter-number codes after the habitat descriptions (such as H-3375 CW) normally include the first letter of the name of the collector (in this case, H=Helen Hamilton; others listed below), the collection number, and the two-letter abbreviations for three areas where collections were made, when that can be determined: CW= College Woods, CC= College Creek, and CA= the developed portion of the William and Mary campus.

The names of collectors, the year(s) they made their collections, and the code at the beginning of collection numbers are A=Phyllis Appler, 1974; H=Helen Hamilton, 2016-2022; La=Elva Lawton, 1973; Lo=Bayard Long, 1940; M=Bernard Mikula, 1951; P=Paul Patterson, 1946-1947; Sa=P. Sandman, 1973; St=J.C. Strickland, 1942, 1944. The code P-s.n. is a collection by Paul Patterson to which he did not assign a collection number. Paul Patterson used the code P-SE with a numeral for many of his specimens, possibly for his organization into regions of the state.

Mosses

Amblystegium serpens (Hedwig) Schimper. Common and weedy; tree bark and moist soil. H-947a CA, H-3014 CW, H-3564 CA, P-SE422 CW

Anomodon attenuatus (Hedwig) Huebener. Abundant; bark and soil of tree bases. H-3018 CW, H-3160 CW, H-3375 CW, H-4067a CW, H-4128 CW

A. minor (Hedwig) Lindb. Uncommon; tree bark and rotting wood. H-3288 CW

A. rostratus (Hedwig) Schimper. Occasional; bark at base of trees and rotting wood. H-279 CA, H-597 CA, H-2985 CW, H-3697 CW, P-SE434 CW

A. tristis (Ces.) Sull. & Lesq. Occasional; tree trunks and rotting wood. H-3783 CW, H-3823 CW

Arrhenopterum heterostichum Hedwig. [*Aulacomnium heterostichum* (Hedwig) Bruch & Schimper]. Occasional; forest soil and wooded ravine banks. H-3022 CW, H-4066 CW, H-4335 CW, H-4337 CW, Lo-2631 CC

Atrichum altecristatum (Renauld & Cardot) B. B. Smyth & L. C. D. Smyth. Common and weedy. H-4333 CW

A. angustatum (Renauld & Cardot) B. B. Smyth & L. C. D. Smyth. Common and weedy; abundant in soil of roots of fallen trees. H-2054 CW

Bartramia pomiformis Hedwig. Uncommon; moist wooded ravine banks. H-4336 CW, L-2632 CC, P-SE436 CA, St-1123 CW

Brachythecium acuminatum (Hedwig) Austin. Occasional; tree bark. H-3116 CW, H-4031 CW, P-s.n CW (4)

B. laetum (Brid.) Schimper. Occasional and weedy; tree bark. H-3278 CW, H-3565 CA

Bryoandersonia illecebra (Hedwig) H. Rob. Abundant; soil around tree bases. H-3021 CW

**Bryum argenteum* Hedwig. Abundant; brick mortar and sidewalk cracks. H-945 CA, H-963b CA, H-4388 CA

Campyliadelphus chrysophyllus (Brid.) Kanda. Occasional; hardwood bark, sandy and gravelly soil. P-SE420 CW

Campylophyllum hispidulum (Brid.) Hedenas. Uncommon; concrete fragment in woods. H-3156b CW

Ceratodon purpureus (Hedwig) Brid. Occasional; mortar of brick walkways, soil around trees. A-1081 CA, H-1050 CA

Clasmatodon parvulus (Hampe) Sull. Common; tree bark and brick wall. H-3020 CW, H-3663 CA, P-1139 CC

Climacium americanum Bridel. Uncommon; moist ravine bank and swamp forest soil. H-4065 CW, H-4256 CW

Cryphaea glomerata Schimper ex Sull. Occasional; tree bark and branches. P-1138 CC

Cyrto-hypnum minutulum (Hedwig) W. R. Buck & H. A. Crum. Uncommon; woods. P-SE356 CW

**Dicranella heteromalla* (A. Evans) Steph. Common; soil around tree bases. H-694 CW, Sa-s.n CW.

**Dicranum flagellare* Hedwig. Common; soil around tree bases, rotting logs. H-354 CW, H-693 CW, H-695 CW

D. scoparium Hedwig. Common; soil banks along trails. H-4391 CW, P-SE74 CW, St-1124 CW

Diphyscium foliosum (Hedwig) D. Mohr. Uncommon; soil banks along trails. H-277 CA, H-594b CA, H-596 CA, H-3117a CW, P-SE70 CW

Diplophyllum apiculatum (A. Evans) Steph. Uncommon; soil by Lake Matoaka. P-SE73 CW

Ditrichum pallidum (A. Evans) Steph. Common; in early spring on bare forest soil. H-3169 CW, H-3172 CW, H-3784 CW, P-SE77 CW

Entodon seductrix (Hedwig) Mull. Hal. Abundant; disturbed areas, walkways, lawns, tree bark, rotting wood, brick. H-3019 CW, H-3575 CA, H-3650 CA, H-3654 CA, H-3656 CA

**Fissidens bushii* (Cardot & Ther.) Cardot & Ther. Common; wooded ravine banks. H-1048 CA, H-4129 CW, H-4254 CW, H-4257 CW, H-4332 CW

F. dubius P. Beauv. Uncommon; tree bark in ravine off Compton Drive. H-4067b CW

F. taxifolius Hedwig. Common; wet areas. H-3159 CW, P-SE66 CW

**F. obtusifolius* Wilson. Uncommon; soil bordering foundations of Wren Building. H-946 CA, H-3567 CA, H-3658 CA

Forsstroemia trichomitria (Hedwig) Lindb. Common; hardwood bark. H-1052 CW, H-3277 CW, H-4132 CW, P-SE421

Gemmabryum dichotomum (Hedwig) J. R. Spence & H. P. Ramsay (*Bryum dichotomum* Hedwig). Uncommon; brick wall at campus entrance. H-3561b CA, P-1838 CA

Grimmia sp. Uncommon; brick foundation of Wren Building. H-949 CA, H-951 CA

Haplocladium microphyllum (Hedwig) Broth. (*Bryohaplocladium microphyllum* R. Watan. & Z. Iwats.). Shaded lawn of campus. M-8223 CA

Homomallium adnatum (Hedwig) Broth. Uncommon; hardwood bark. H-3373a CW, H-4063 CA

Hygroamblystegium varium (Hedwig) Mönkemeyer (*Amblystegium varium* (Hedwig) Lindb.); (*Hygroamblystegium tenax* (Hedw.) Jenn.). Abundant and weedy; bark, muddy creek edges, gravel soil. H-2986 CW, H-2987 CW, H-4329 CW, P-SE431 CW, P-SE433 CW, P-SE67 CW

Hypnum curvifolium Hedwig. Uncommon; rotting log. H-3162 CW

H. cupressiforme Hedwig. Uncommon; brick walkway by Sunken Gardens. H-3649 CA, P-SE428 CW

H. imponens Hedwig. Common; rotting logs and wooded slopes. H-3272 CW, H-3273 CW, H-4032 CW

H. lindbergii Mitt. Uncommon; bricks near Sunken Garden. H-3657 CA, H-3661 CA, P-1137 CC, P-SE418 CW

Isopterygium tenerum (Sw.) Mitt. Common and weedy; rotting logs. H-3280 CW, H-3376 CW, H-4069 CW, P-SE80 CA

Leptobryum pyriforme (Hedwig) Wilson. Uncommon; brick wall and moist soil. H-964 CA, H-3572 CA, La-5250 CA

Leptodictyum riparium (Hedwig) Warnst. Uncommon; exposed root in swamp. H-4075 CW, P-SE68 CW

Leskea gracilescens Hedwig. Uncommon; tree bark H-962 CA, H-1044 CA

Leucobryum albidum (Brid. ex P. Beauv.) Lindb. Abundant; rotting logs and wooded ravine banks. H-3157 CW, H-4163 CW, H-4172 CW, H-4338 CW, Sa-s.n. CW

Leucodon julaceus (Hedwig) Sull. Common; brick walls. H-965 CA, H-3154 CW, H-3566 CA, H-3578 CA

Orthotrichum sp. Uncommon; brick walls. H-281 CA, H-282 CA

Oxyrrhynchium hians (Hedwig) Loeske. Common; exposed roots and shaded trail banks. H-1053 CW, H-3012b CW, H-4330 CW

Physcomitrium pyriforme (Hedwig) Hampe. Uncommon; in early spring, tree bases, bare soil. H-286 CA, H-3274c CW, H-3276 CW, H-3279 CW

Plagiomnium ciliare (Mull. Hal.) T. J. Kop. Uncommon; soil at tree base. H-4167 CW

P. cuspidatum (Hedwig) T. J. Kop. Common; moist soil. H-3017 CW, H-3287 CW, H-4071 CW, H-4072 CW

Plagiothecium cavifolium (Brid.) Z. Iwats. Common; moist habitats, decorticated logs. H-3115 CW, H-3161 CW, H-3163 CA, H-3173 CW, P-SE75 CW, P-SE430 CW

Platygyrium repens (Brid.) Schimper. Common; rotting logs. H-1057 CW, H-2386 CA, H-3015 CW, H-3151 CW, H-3168 CW, P-SE75 CW, P-SE430 CW

**Pohlia annotina* (Hedwig) Lindb. Uncommon; bare soil around Wren Building foundation. H-950 CA

P. wahlenbergii (F. Weber & D. Mohr) A. L. Andrews. Uncommon; bank of creek on campus. P-437 CA

Polytrichastrum ohioense (Renauld & Cardot) G. L. Sm. (*Polytrichum ohioense* Renauld & Cardot) Common; dry soil, wooded banks. H-410b CW, H-3786 CW, P-SE435 CW

Physcomitrium pyriforme (Hedwig) Hampe. Occasional; early spring, bare soil, and tree bases. H-286 CA

Ptychomitrium drummondii (Brid.) Schimper. Uncommon; tree bark. P-SE81 CA, P-SE86 CA, P-SE424 CW, P-1840 CA

**P. incurvum* (Schwagr.) Spruce. Uncommon; brick walls near Sunken Garden. H-3576 CA, H-3662 CA

**Rhizomnium punctatum* (Hedwig) T. J. Kop. Uncommon; damp soil of bottomland. H-692 CW

Rhodobryum ontariense (Hedwig) T. J. Kop. Uncommon; soil at base of hardwood on wooded ravine bank. H-4070 CW, P-SE423 CW

Rhynchostegium serrulatum (Hedwig) A. Jaeger. Common; moist soil at tree bases. H-1056 CW, H-3153b CW, H-3283 CW

**Schistidium viride* H. H. Blom & C. Darigo. Rare; concrete. H-4386 CA, H-4389 CA, H-4431 CA

Sematophyllum adnatum (Michx.) E. Britton. Uncommon; on hardwood bark. P-SE427 CW

Sphagnum palustre (L.) Common; wet ravines. H-4168 CW

**Tetraphis pellucida* Hedwig. Uncommon; base of mature *Fagus grandifolia* near edge of Lake Matoaka off Lake Matoaka trail near Keck Lab. H-3174 CA

Thelia hirtella (Hedwig) Sull. Uncommon; soil at tree base. H-3282 CW

Thuidium delicatulum (Hedwig) Schimper. Abundant; lawns, ravine banks, moist habitats. H-4131 CW, H-4170 CW

Tortella humilis (Hedwig) Jenn. Uncommon; concrete fragment in woods. H-3156c CW

Tortula muralis Hedwig. Abundant; mortar on brick walls. H-958 CA, H-2387 CA

Weissia controversa Hedwig. Common; shaded bank by river, mortar of brick walkways. H-2917 CW

Liverworts

Bazzania trilobata (L.) Gray. Uncommon; shaded ravine bank along arm of Lake Matoaka. H-3024 CW, H-4169 CW

**Calypogeia muelleriana* (Schiffn.) Mull. Frib. Common; sandy banks along Matoaka Lake trails. H-1051 CW, H-3171 CW

Cololejeunea biddlecomiae (Austin ex Pearson) A. Evans. Uncommon; tree bark. H-2984 CW

Conocephalum salebrosum Szweyk., Buczk. & Odrzyk. Uncommon; only in continuously wet, swampy areas. H-3016 CW, P-SE361 CW

Frullania brittoniae A. Evans. Uncommon; hardwood bark, uplands. H-3373b CW

F. eboracensis Gottsche ssp. *eboracensis*. Common; hardwood bark. H-4073 CW, H-4074 CW

**F. inflata* Gottsche. Common; tree bark. H-959 CA, H-1047 CA, H-1049b CA, H-3013 CW, H-4064 CA

**F. riparia* A. Evans. Uncommon; brick wall around Wren Building. H-957a CA

Fuscocephaloziopsis catenulata (Huebener) Vana & Soderstr. Common; wooded ravine bank. H-4339 CW

F. lunulifolia (Dumort.) Vana & Soderstr. Common; rotting stump in ravine bottom. H-4255 CW, P-SE65 C

**Cheilolejeunea clypeata* (Schwein.) W. Ye & R. L. Zhu. Common; hardwood bark. H-3026 CW, H-3153a CW, H-3286 CW, H-3768 CW, H-4164 CW

Lophocolea heterophylla (Schrad.) Dum. Uncommon; rotting logs and tree bases. H-3114 CW, H-3150 CW

L. minor Nees. Uncommon; rotting logs. H-3152 CW, H-3174 CW

Nowellia curvifolia (Dicks.) Mitt. Uncommon; decorticated logs. H-3271 CW, H-4334 CW

Odontoschisma denudatum (Nees) Dumort. Uncommon; rotting logs. H-3281 CW

O. sphagni (Dicks.) Dumort. Common; rotting wood and humus. H-3023 CW, H-3027 CW, H-4162 CW, H-4171 CW

Pallavicinia lyellii (Hook.) Gray. Uncommon; moist soil in ravines and bottomland. H-3025 CW, H-4166 CW, H-4331 CW

Plagiochila porelloides (Torrey ex Nees) Lindenb. [*Plagiochila asplenioides* (L.) Dumort.] Uncommon; woods along College Creek. P-1135 CC

Reboulia hemisphaerica (L.) Raddi. Uncommon. No habitat recorded. P-1134 CW

Riccia beyrichiana Hampe ex Lehm. Uncommon; mortar in brick sidewalk. H-285 CA, H-2384 CA

R. fluitans L. (*Ricciella fluitans* (L.) A. Br.) Uncommon; shallow water. P-SE78 CW, St-1784 CW

Scapania nemorea (L.) Grolle. (*Scapania nemorosa* (L.) Dumort. Common; tree bark, soil banks. H-3119 CW, H-3155 CW, H-3170 CW, H-3374 CW, P-SE71 CW

Telaranea longifolia (M. Howe) J. J. Engel & G. L. Merr. Common; tree bark. H-3117b CW

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